Creating a closed-loop supply chain model and evaluating it through a business case for sustainability.
Management Summary

With the ease of access to almost any product from almost anywhere in the world due to the rise of e-commerce, shipping and transportation are undergoing serious transformation. With regards to sustainability, this involves not only emissions in terms of vehicle transportation but also waste in terms of transport packaging. In fact, it has become a priority to transport a product from one point to another in the most efficient, rapid, safe and costless manner. A variety of materials can be used for shipping products in the B2C area, but the most prominent one remains cardboard. In order to gain insight and valuable data on this rather ordinary material, the thesis sets focus on an area which uses cardboard boxes at the heart of its packaging concept: subscription box retail. A parallel with the B2B sector is made within theory, specifically with regards to the reverse logistics in order to gain insights for the B2C sector, where it remains a gap. The thesis, although written in an academic context, tries to give out a more practical view applicable and suitable in the business world.

With the basis of four case studies and an expert interview, researchers develop a closed-loop supply chain model with a focus on reusable transport packaging. The created model includes the reuse of the packaging box via the parcel delivery service shipping and return and cleaning process. Researchers evaluate the sustainability of the model and expect a majority of positive issues. A calculated example lasting a year, with a monthly shipping of 100 boxes, illustrates the findings and presents a 67% waste reduction when assuming a return rate of 70% and a 5-time cycle-use of the box. When looking at the economic performance, the overall cost increase due to the additional transportation and cleaning costs but the packaging cost can be reduced. Within another expensive-packaging calculation scenario, the packaging savings outweigh the additional transportation and cleaning cost after the 4th reuse of the box. In the following reuses, the closed-loop supply chain model proves to be less costly than the traditional ones. Nevertheless, researchers point out that the different reusable packaging options should be assessed and costs verified in real-life cases.
Abstract

Purpose
The purpose of this thesis is to set up a closed-loop supply chain model for B2C online subscription box retailers and to develop a business case evaluating the model’s sustainability.

Method
This explorative thesis has an abductive research approach. Multiple-case studies are conducted and data from four cases and an expert are collected by conducting interviews. The research contains both qualitative and quantitative data.

Findings
A closed-loop SC model is created with regards to transport packaging. The model suggests that once the package is received by the consumer it can be returned in an empty state. After being cleaned it should be reused by the 3PL.

The model’s sustainability is evaluated by developing a business case. Sustainable performance measures with regards to economic, social and environmental practice are assembled. The model enhances general social performance and environmental performance. Economic performance is mostly positively influenced. Options for cost savings in order to improve the economic performance of the model are suggested by the researchers.

Practical implications
The work provides businesses within the online B2C subscription box retail with a model for a possible closed-loop supply chain with regards to transport packaging. The business case for sustainability can be applied as a guideline to evaluate the model or similar ones. Researchers give suggestions on adapting packaging to enhance economic performance.

Societal implications
This thesis points out possible environmental and social benefits that may be achieved by a closed-loop supply chain model. Besides waste and emission reduction, social performance such as employee motivation is positively influenced.

Theoretical implications
The thesis provides a model developed from theory and empirical data. The model does not only have practical implementations but also complements theory where a gap has earlier been identified.

Through the business case for sustainability researchers contribute to theory since literature is scarce.
Keywords

Thanks
The research and writing process of the master thesis took place in spring semester 2018 as the final degree project within the master program Business Process and Supply Chain Management at Linnaeus University in Växjö, Sweden. It was a very stimulating and challenging course for both researchers. Nevertheless, assistance from different actors allowed the researchers to always remain motivated and focused.

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Lola Girot
Claudia Kopf
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List of Abbreviations

3PL Third-party logistics
3R Reduce, Reuse, Recycle
B2B Business-to-business
B2C Business-to-consumer
BCS Business case for sustainability
CE Circular economy
CLSC Closed-loop supply chain
CSR Corporate social responsibility
EU European Union
RL Reverse logistics
RPM Returnable packaging materials
RQ Research question
RTI Returnable transport items
RTP Returnable transport packaging
SC Supply chain
1 Introduction

This chapter provides a background on general terms such as sustainability, packaging waste, closed-loop supply chain and more specifically on reverse logistics and one of its components: reuse. From then on, the problem discussion is based on e-commerce such as subscription boxes and the gap there currently is regarding the reverse flows of packaging waste. This is the foundation for the research questions and purpose. Finally, delimitations, structure and approach are provided to guide the course of the thesis.

1.1 Background

High amounts of municipal waste are generated within the European Union (EU) every year. According to Eurostat (2017a) in 2015, 477 kg of waste was generated per person in the EU. Although there are countries that have only a small percentage of waste going into landfills in comparison to recycling, there is still 28% of municipal waste going into landfill. “Overall, 29% is recycled and another 28% landfilled, 26% incinerated and 17% composted” (Eurostat, 2017a). Thereof, in 2015, 166.1 kg of packaging waste per person was produced in Europe (Eurostat, 2017b). The biggest contribution comes from paper and cardboard packaging with 41% (Eurostat, 2017b).

In order to minimize these figures, the European Waste Directive was put in place to inform about waste prevention through reuse, recycling, recovery, and waste disposal (Gallardo et al., 2018). Specifically targeted at packaging, the EU has set within its legal framework one of the first waste streams specific directive: The Packaging and Packaging Waste Directive. It promotes the prevention of packaging waste production as a first priority along with the additional fundamental principles of reuse, recycling and other forms of recovery of packaging waste (Retail Forum for sustainability, 2011). All European packaging needs to comply with the essential requirements which specify that packaging should allow any type of re-use (Retail Forum for sustainability, 2011).

Packaging is a part of the overall life-cycle of the packed product and plays a key role in the consumer goods supply chain. Optimum packaging, among other benefits, reduces waste and makes logistics more efficient. Retailers alongside suppliers, packaging producers and recycling companies have put in place and studied innovative solutions to decouple packaging consumption and packaging waste for final disposal (Retail Forum for sustainability, 2011).
Packaging waste is essentially created for transportation needs for delivery. When working in a business-to-business (B2B) area, packaging is done in bulk, for large volumes. While in the business-to-consumer (B2C) sector, packaging is used for smaller articles but in more numerous quantities. In all, the volume of packaging, and therefore waste, is greater in the B2C sector (Selviaridis et al., 2016; Glock, 2017; Yusuf et al., 2017; Katephap and Limnararat, 2017). Furthermore, B2B supply chains involve returnable transport items (RTI), such as pallets, boxes, crates or containers, which have a minimal environmental impact (Glock, 2017). Other terms used within the literature are returnable transport packaging (RTP) or reusable packaging, that all refer to non-disposable, multi-trip packaging (Selviaridis et al., 2016; Glock, 2017; Yusuf et al., 2017; Katephap and Limnararat, 2017). Unfortunately, this option appears to not yet be common in the B2C sector, which only limits the possibility to reduce packaging waste.

Sustainability, in a business environment, consists of making decisions to meet existing needs while maintaining the usefulness of products for the future. This approach not only considers the economic benefits but also keeps social and environmental impacts under consideration (Sarkar et al., 2017). The approach of sustainability incorporated to the supply chain has been conceptualized by Elkington’s triple bottom line (1998) where environmental, social and economic performance intersect each other. Carter and Liane (2011) give cost saving examples, within the triple bottom line approach, to reduce packaging: effective design for reuse and recycling. To incorporate sustainability in a business is to implement long-term solutions which includes fostering close relationships with partners. Overall, sustainability is considered to be a key factor that can help firms improve both operations and strategic growth while at the same time gaining a sustained competitive advantage, and delivering sustainable values to the broader society (Hart and Milstein, 2003).

Looking back almost 30 years, Frosch and Gallopoulos (1989) already described the problem that traditional manufacturing processes deplete raw materials and generate waste. The authors call for the transformation of the traditional manufacturing model into an “industrial ecosystem” that optimizes the energy and raw material consumption, minimizes waste “and the effluents of one process […] serve as the raw material for another process” (Frosch and Gallopoulos, 1989, p. 144). The authors describe different cycles and the concepts of recycling and reuse.
Businesses have felt the urge and need from customers to adapt themselves due to the decline of raw material resources, the overflow of waste sites and the never-ending rise of pollution levels (Masi et al., 2017). Masi et al. (2017) state that, from a business perspective, companies that wish to obtain environmentally friendly inputs and establish environmental management practices such as product return, reuse, and recycling, have to work together with their upstream and downstream players. Therefore, traditional linear supply chains need to be transformed to circular ones (Masi et al., 2017). Synonymously to “circular”, the term “closed-loop” is commonly used (Homrich et al., 2018). When the reverse and the forward supply chain are integrated it is considered as a closed-loop supply chain (CLSC) (Govindan et al., 2015). Closed-loop supply chains include the return flows of products on top of the traditional downstream flows (Glock, 2017). Thierry et al. (1995) confirms that an integrated supply chain includes waste management, product recovery and direct reuse of products. The aim is to extend the entire life-cycle of the product.

When looking at the reverse part of the closed-loop supply chain, reverse logistics play an important role. Reverse logistics (RL) include the collection of used products from the end users and the further recycling, reuse, remanufacturing, repairing or disposition of them (Govindan et al., 2015). A business definition of RL can be given as the “reintroduction of a by-product or waste material as an input into a manufacturing process, usually without any physical or chemical change” (Business Dictionary, 2018). Nevertheless, it is a complex business process and the returned products are, to an extent, a competition to new products. To be effective, a RL system must have a product recovery and collection of returnables equally effective (Das and Chowdhury, 2012). As RL is set on the quantity of returning products and this forecasting process remains difficult, it may not be economically suitable for the original manufacturer to handle the recovery process but rather a third-party logistics (3PL) provider. 3PL providers manage, control and deliver logistic activities on behalf of a company. They have become an asset to the supply chain loop (Thierry et al., 1995).

1.2 Problem Discussion

1.2.1 Reusable Transport Packaging within B2C Online Retail

In the last 15 years, B2C and in particular e-commerce has grown rapidly (Mangiaracina et al., 2015). Researchers and practitioners have been paying close attention to the rise of e-commerce and in particular to the environmental repercussions of the supply chain.
The most influential factors, in this area, are the envelop of the product to protect it and facilitate manipulation (packaging) and, the physical distribution of items (transportation). The negative side effects that packaging is currently associated with, are mainly due to the nature of it (e.g. cardboard) as well as its size (small individual packages in contrast to bulk packages for stores). A common packaging material for transportation and delivery is corrugated cardboard (see figure 1) due to of its durability, light weight and strength (Duong, 2017).

![Figure 1 Corrugated Cardboard (Duong, 2017, p. 15)](image1)

Van Loon et al. (2015) found cardboard plus filling material normally count for higher CO2 emissions than common shopping bags. Óskarsdóttir (2016) agrees with the previous literature that the packaging for e-commerce uses a lot more cardboard than purchases from a physical store. There are different forms of packaging, but the one this research focuses on is: transport packaging, which is mainly associated with transportation efficiency (Chung et al., 2018).

![Figure 2 Transport Packaging in B2C (Saxon Packaging Limited, 2017)](image2)

Sending products via carriers requires additional transport packaging material to protect the products from possible damages. For instance, it can include “plastic films, polystyrene foam, carton box” (Chung et al., 2018, p. 259). Transport packaging material contributes to production waste.
Furthermore, European directives have obliged member states to drastically reduce and in the near future, cut the use of plastic bags. Some countries have agreements with retail companies to completely ban the bags, others to charge a low fee for the bags and others, to offer only biodegradable and compostable plastic bags (European Commission, 2017).

As of today, no regulations or incentives have been set forth to reduce transport packaging in any production and distribution network. Correspondingly, literature focuses on recycling and reuse in general but the “reuse of transport packaging is not being studied thoroughly” yet (Chung et al., 2018, p. 265).

The issue of transport packaging waste (for instance cardboard boxes), the benefits of sustainable packaging (including reusable options), and research gaps regarding these topics are currently discussed by different authors. Carrillo et al. (2014) discuss that online businesses start to provide customers with the opportunity to decide themselves whether they would like to pay more for environmental friendly shipping. This can include transportation with hybrid vehicles, less packaging material and efficient utilization of the transport medium, such as full truck loads.

In addition, Óskarsdóttir (2016) adds that although transport packaging is needed for online retail, the product packaging does not need to be attractive, which provides the retailers with the opportunity to adjust packaging to a more sustainable alternative. Furthermore, Pålsson et al. (2017) ask for more research on green packaging solutions within packaging logistics for e-commerce. The opportunity regarding transport packaging is that it may still be in a reusable condition after transportation of a product (Chung et al., 2018). Chung et al. (2018, p. 260) state that there are “several practical applications of production and distribution network in recycling and reuse of products” that can be found in literature. They apply essentially to the electronics sector and to the recycling or reuse of certain components of the device. Also, several other authors have studied the recycling and reuse of products or components related to plastic. But, their approaches have either been oriented towards the current numerical impact of transport packaging in a specific sector or towards the implementation of a system but under very specific and restricted conditions (Chung et al., 2018).

This thesis aims to shorten the lack of research identified by Chung et al. (2018) on the reuse of transport packaging. It focuses on the creation of a closed-loop supply chain model targeted at subscription box retailers. The purpose of the master thesis is to explore the feasibility of a closed-loop supply chain (SC) model for online subscription boxes,
where the closed-loop is carried out by the reuse of the cardboard box. A sketch of a generic closed-loop SC model is shown in figure 3. It will be further developed within this thesis in order to fulfill the outlined purpose. The supply chain of the online subscription boxes naturally consists of suppliers, a subscription box retailer, and possibly 3PL provider. The model is studied from the perspective of the subscription box retailer (see figure 3). Therefore, the package is taken as a given as well as the consumer who is not part of the study object. The scope is outlined within figure 3. The purpose and the delimitations lead to the following research question:

*RQ1: How can a closed-loop SC model for B2C online subscription boxes be set up?*
1.2.2 Business Case & Evaluation of Sustainability

“Although the environmental effects of e-commerce have drawn attention in recent years, data on this issue is still limited and prior findings are inconclusive or incomplete” state Bertram and Chi (2016, p. 2). Currently, authors discuss the environmental impact of online businesses and the benefits of reverse logistics and non-disposable reusable packaging. For instance, Selviaridis et al. (2016) confirm that reverse exchanges have been studied previously and can help reduce cost and waste but also enable the use of returned products as resources. However, Selviaridis et al. (2016) state their research is one of the first that deals with reverse exchange of transport packaging materials and ask for further empirical research. Further, Pålsson et al. (2017) affirm that the amount of used material influences the environmental impacts of e-commerce and that a replacement of the package or using other packaging materials could improve the sustainability of e-commerce. As pointed out earlier (see chapter 1.2.1), Chung et al. (2018), have studied reusable transport packaging, and give suggestions on how to optimize flows and reduce operational cost. Another study by Sarkar et al. (2017) focuses on the environmental impacts of RTIs for product transportation. Accordingly, Katephap and Limnarat (2017) prove that within a case study on automotive parts in Thailand, RTP created cost savings of 61% and a waste reduction of 68%. Nevertheless, no empirics within B2C online retail can be found. In addition, within current literature the outcomes of RTP or RTI are not pointed out from a business performance perspective (Yusuf et al., 2017).

Setting up a SC model where transport packaging could be reused would not only reduce waste but it might give a competitive advantage. Indeed, according to Willard (2012), contributing to sustainability provides companies with competitive advantage and quantifiable benefits. Moreover, it reduces hiring and retention costs, improves productivity, reduces risks, increases revenues and market share as well as profits (Willard, 2012). Williard (2012, p. 4) calls for numbers that convince companies to “do better by doing good”. In order to achieve a change from the mindset that green is bad, the benefits drawn from it should be quantified using the frameworks and language of senior executives, as they are the ones responsible for decision making and initiating change within a company (Willard, 2012).

Documenting a win-win relationship between corporate social responsibility and financial benefits would make it easier to “sell” corporate social responsibility to internal and external stakeholders (Panwar et al., 2017).
Recently, Pedersen et al. (2017) state that when looking at corporate sustainability, there is only few research on how tools for decision making are applied. Salzmann et al. (2005) explain that the business case for sustainability (BCS) proves or disproves the sustainable business strategies. A business case is “(…) a pitch for investment in a project or initiative that promises to yield a suitably significant return to justify the expenditure” (Crane et al., 2008, p. 84). With regards to reusable, multi-way packaging, Yusuf et al. (2017) find that there is a literature gap on how returnable transport packaging can improve business performance.

The paper’s aim is to evaluate to what extent transport packaging, in particular cardboard boxes, would not only limit harmful impact on the environment, by reducing waste, but also give a competitive advantage, through image improvements and cost savings, to online subscription box retailers. The purpose is to establish a business case to evaluate the closed-loop SC model to act as decision support for businesses. The sketch of a generic closed-loop SC model can be found within figure 3. The methodology of a business case is chosen as it is a common investment decision method used by business practitioners (Crane et al., 2008). More specific, a business case for sustainability will be used, which suits to assess the model with a triple bottom line approach (Schaltegger et al., 2012). It gives legitimacy to the model in front of businesses by demonstrating its profitability. The perspective will stay as in RQ1: the subscription box retailer.

**RQ2: How can a business case for the closed-loop SC model be developed to evaluate the model’s sustainability?**

1.3 Delimitations

The scope of research is restricted to online subscription boxes in the B2C area, situated in France, Germany and Sweden. In other words, a monthly box filled with either meal kits, food articles, beauty products or accessories (depending on the brand) received at the customer’s door. The frame is set within the retailers selling the boxes, which are the focal point of the closed loop SC model. Furthermore, the model takes a specific interest on the closed loop supply chain and more specifically reverse logistics with a focus on the 3Rs (Reduce, Reuse, And Recycle). The research concentrates on one of the 3Rs: Reuse. This choice is supported by the fact that recycling is researched quite extensively and remanufacturing has a focus on product rather than packaging. The main driver of the thesis is to determine the sustainability of the model through social, environmental and economic performance.
1.4 Structure and Approach
The thesis is a feasibility study with an exploratory research approach. In order to explore the research area, the approach has a loose structure that is adaptable to the incremental findings. As the essay is done in two steps: the creation and development of the SC model and then its assessment through a business case, the course of the structure is similar. Indeed, the thesis does not follow a common academic approach, rather a more business procedure as it includes more practical elements.

The second chapter provides the methodology. Afterwards, chapter three focuses on RQ1 and four sub-chapters (theory, frame of reference, empirical findings, and analysis) are distinguished in order to answer it. First, theory is presented. As the thesis has an exploratory approach only the underlying theoretical concepts are described within that chapter. The theory provides insights into online subscription boxes, closed-loop supply chain, reverse logistics, reuse, transport packaging. The theoretical insights will be the basis for the development of a generic closed-loop SC model. Following that, a frame of reference is provided. Then, empirical data is gathered and presented from the selected companies. Finally, a closed-loop SC model for the B2C online subscription boxes is suggested.

Chapter four targets RQ2 and the same structure of four sub-chapters (theory, frame of reference, empirical findings, and analysis) is noted. First, the theory for the business case for sustainability is explained. Following that, the theory on links between economic, environmental and social performance measurements are set forth. Then, a frame of reference is provided accordingly. Finally, the closed-loop SC model is assessed in the business case for sustainability.

Lastly, within the conclusion, a summary of the main findings, practical, theoretical and societal contributions, as well as research limitations and suggestions for further research are set forth. The following figure provides an overview on the set up of the methodology, theory and analysis chapters:
Figure 4 Research Design
2 Research Methodology

Methodological choices are presented and defined according to research philosophy, paradigms, approach and strategy. Furthermore, the research design and collection, as well as data analysis and quality are set forth. Also, ethical awareness is presented. The specific methodological choices for RQ1 and RQ2 are explained in the end of every chapter (see grey boxes).

There is no best way or approach to collecting data and making statements. Yet, it is not as simple as “just” collecting data and making statements. Each study produces a different kind of knowledge according to the research approach chosen. In other words, not one specific research approach fits one specific study. Therefore, each study brings out a different analysis. A research approach specifies which research tools are to be used. The latter are based on more general philosophical question on how social reality is understood and the appropriate ways of studying it. However, distinction needs to be made between method and methodology. The term method is principally related to the tools for data collection or analysis: techniques such as questionnaires and interviews. While methodology has a more philosophical background and refers to the approach or paradigm that gives the basis to the research (Blaxter, 2010). The research onion by Saunders (2016) is used as a guideline for the methodology chapters 2.1- 2.7, working from the outer layers to the core.

Figure 5 Research Onion (adapted from Saunders, 2016, p. 124)
2.1 Research Philosophy and Paradigms

2.1.1 Research Philosophy and Assumptions
A research philosophy determines how knowledge is developed. It includes a “system of beliefs and assumptions” (Saunders, 2016, p. 124). As research develops knowledge, the researcher has different assumptions and beliefs made consciously or subconsciously. There are epistemological, ontological and axiological assumptions. In order to make the researchers’ work credible, they need to be aware of the available choices and think about which one fits. According to the assumption, the researchers should choose a matching research philosophy, on which they base their work (Saunders, 2016).

Ontological assumptions influence the way of seeing and studying the research objects. It includes assumptions on the “nature of reality”. In a business context, these assumptions could be on how researchers see “organizations, management, individual’s working lives and organizational events” (Saunders, 2016, p. 127).

Epistemology are assumptions about knowledge. It considers what makes knowledge accepted, valid and legitimated and how it is communicated. Therefore, the epistemological assumptions steer the choice of methods of a research project (Saunders, 2016).

Axiology assumptions are about the values of the researcher and the participants of the research and how they are considered within the research. How own values influence the research is of importance for the credibility of the research (Saunders, 2016).

2.1.2 Research Paradigm
Other dimensions that need to be understood when distinguishing between research philosophies are the research paradigms (Saunders, 2016). Research paradigms “are ways of breaking down the complexity of the real world that tell their adherents what to do. Paradigms are essentially intellectual cultures, and as such they are fundamentally embedded in the socialization of their adherents: a way of life rather than simply a set of technical and procedural differences.” (Oakley, 1999, p. 155, cited in Blaxter, 2010, p. 60). As explained earlier, the researcher has assumptions when he conducts research.

The dimension of regulation or radical change points out the political and, or ideological orientation within the social world studied (Saunders, 2016).

A radical change judges the original process and makes suggestions to improve and achieve a better process. Contrarily, a regulation change describes the on-going process and suggests minor improvement (Bryman, 2016). In addition, there is an objectivism or subjectivism dimension.
Objectivism views the organization from an external point of view where processes and structures define the business. While subjectivism makes the assumptions that an organization is socially constructed where individuals are set to experience (Saunders, 2016). Four paradigms are created by combining both dimensions within a matrix (Bryman et al., 2005). Each paradigm, of the four research paradigms, includes a set of assumptions of the dimensions explained above. Each paradigm also shares assumptions with its “neighbor” within the matrix (Burrell, 1985) as can be seen in the following figure:

Figure 6 Research Paradigms (adapted from Burrell, 1985, p. 22)

Radical humanist believes that individuals should be liberated from the “social aspect” of the organization and research guides the need for change (Bryman et al., 2005). Radical structuralist analyzes the organization as a “product of structural power relationships” which results in conflict (Bryman et al., 2005, p. 35). Interpretative focuses on social aspects and that knowledge comes from the experience of those who work (Bryman et al., 2005)

Functionalist is the dominant framework when studying organizations as it is oriented towards problem-solving which lead to rational explanation (Bryman et al., 2005).

Each assumption gives a set of research philosophies. There are five different common research philosophies: Positivism, Critical realism, Interpretivism, Post-modernism and Pragmatism (Saunders, 2016).

Positivism is applied to research strategies of natural sciences to the study on social reality. Positivism can include a deductive approach and an inductive strategy (see chapter 2.2).

There is a sharp separation between theory and research, with research theories being tested (Bryman et al., 2005).
Critical Realism is an approach that relies on observable phenomena or events. But observation is only a small part. The next step reasons critical realists of what reality has caused the event (Saunders, 2016). What describes it as “critical” is the identification of mechanisms which in turn offers a possibility to change that can transform the actual phenomena (Bryman et al., 2005).

Within Interpretivism the researcher studies meanings and takes into consideration that social actors are different from physical phenomena and therefore cannot be studied in the same way. The researcher has to take into consideration a subjective approach. Interpretivism focuses on interpretations of the social world which is seen as rich, diverse and complex (Saunders, 2016).

Postmodernism is of two things: a perspective on the nature of modern society and culture and, a way of representing the nature of social sciences and their claim of knowledge. The researcher is critical of any view of research which pushes him to problematize and question one’s own capacity to know anything (Bryman et al., 2005). Further, postmodernism focuses on power relations as they cannot be avoided (Saunders, 2016).

Pragmatism focuses on practical outcomes. Knowledge enables to carry out practice successfully. In addition, concepts, ideas or theories are only taken into consideration when they work as instruments for action and practical consequences (Saunders, 2016).

The philosophy sets forth that it is possible to work with several types of knowledge and methods within one study.

It can be concluded that this research and the underlying RQs fall under the epistemology assumption and more precisely under a pragmatic research philosophy. In fact, the process is to understand the current environment and phenomena. A dimension of research paradigm can be added: subjectivism. Due to the nature of the thesis, the analysis and conclusions drawn will be influenced by the researchers. The purpose is focused on practical outcomes which will be achieved by taking support from existing theory to adapt it to this research and practical knowledge. The contribution of the thesis is purely pragmatic as it corresponds to expectation of pragmatism as stated by Saunders (2016, p. 143): “the research starts with a problem and aims to share practical solutions that inform future practice”.

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2.2 Research Approach to Theory Development

Theory is referred to as the background literature, as the latter “defines the focus of the research and thereby acts as the equivalent of theory” (Bryman et al., 2005, p.22). There are two ways to link theory and research. The first one is that theory guides and influences the collect and analysis of the data. While the alternative views theory as the conclusion to the collection and analysis of data (Bryman et al., 2005).

There are three common approaches to theory building, namely, deductive, inductive and abductive (Saunders, 2016). Deductive reasoning is deriving a conclusion on something known to be true (Zikmund et al., 2010). Therefore, the deduction moves from “general to the particular” (Collis, 2014, p. 7). Within deduction, hypotheses are created and tested (Saunders, 2016). It is the most common relationship view between theory and research.

Inductive is about creating general conclusions on the basis of particular facts derived from data analysis (Zikmund et al., 2010; Saunders, 2016). It is the reverse of deductive since the general is induced from the particular instances (Collis, 2014). Abductive reasoning explores data to create new theory but also change existing ones. It is a way of overcoming the limitation associated with inductive and deductive and thereby moves between the two most common approaches. Abduction comes from researchers not being able to explain empirical phenomena with existing literature. More importantly, it highlights the limited capacity of rational thinking and acknowledges the importance of cognitive reasoning in theory building (Bryman et al., 2005).

An abductive approach is applied to this research as researchers will move back and forth between theory and practice. Due to the lack of knowledge and limited access of data, there is no possibility to yet frame precisely a hypothesis. The abductive approach allows the adaption of the research design according to the information that will be revealed further in the thesis. Furthermore, abductive data collection is defined by Saunders (2016, p. 145) as “to explore a phenomenon, identify themes and patterns, locate these in a conceptual framework and test this through subsequent data collection and so forth”. This establishes the closed-loop SC model, answering RQ1. The approach is also relevant for RQ2 where researchers simultaneously use theory and cognitive reasoning to assess the model from RQ1.
2.3 Research Design
The way in which the research question is answered is influenced by the research philosophy and approach to theory development. The research design is the general guide to answer the research question (Saunders, 2016). It can follow several options: qualitative, quantitative or mixed elements which are explained within chapter 2.3.1. Further a time-horizon needs to be considered when it comes to the research design, which is explained within chapter 2.3.2.

2.3.1 Qualitative, Quantitative and Mixed Design
Qualitative refers to data that is non-numeric such as words or images while quantitative refers to numerical data (Saunders, 2016). The research design should be linked to the research paradigm and refer to the choices within the research methods (Collis, 2014). According to Bryman (2016), quantitative research represents a research design that includes a deductive approach, applies norms from natural sciences and positivism, as well as social reality, seen as an objective reality. Whereas a qualitative research design focuses on words within the data collection and analysis. It is closer to an inductive approach and rejects the norms of natural sciences. It is therefore closer to Interpretivism and views the social reality as constantly being modified by individuals. Mixed method approach utilizes both qualitative and quantitative data collection and analysis in order to answer one or more questions (Mertens, 2013). Combining both methods allows a more rounded and complete approach (Bryman et al., 2005). In fact, it allows a greater depth of understanding of the research while at the same time outweighing the weaknesses of each approach itself. Nevertheless, mixing the underlying research paradigms must be critically thought through. Choosing a mixed method should not be used as a default solution because researchers do not know the best manner to conduct research. There are specific situations in which a mixed method fits the research. According to Kumar (2014), a mixed approach is suitable when the research needs one method to inform another method, when there is a want to develop a theory about a phenomenon and then test it or, to generalize findings from a qualitative research. Mixed method approach utilizes both qualitative and quantitative data collection and analysis in order to answer one or more questions (Mertens, 2013). There are several types of mixed methods research design as shown in the table below.
2.3.2 Time Horizon

Further, different time horizons are considered: cross sectional design, longitudinal design (Saunders, 2016). Cross sectional design includes research methods such as “structured observation, content analysis, official statistics, and diaries” (Bryman et al., 2005, p. 61). When more than one case is studied, the research is conducted at a single point in time so that data is collected simultaneously, in a quantifiable manner and patterns of association are examined (Bryman et al., 2005).

Longitudinal design on the other hand is suitable when mapping changes, for instance, within an organization. Therefore, the research takes place over a longer time span. There are panel studies and cohort studies which have the common elements of collecting data in at least two waves on similar variables, people or organizations (Bryman et al., 2005).

The research is conducted through a mixed methods approach. More specifically, it is described as having a sequential exploratory design, for RQ1. The major challenge faced is to focus on the appropriate qualitative findings in order to design the model. The initial findings are then the basis for RQ2 where qualitative and quantitative data is collected. Within this study, a cross-sectional time horizon is in focus.

<table>
<thead>
<tr>
<th>Sequential explanatory design</th>
<th>Sequential exploratory design</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Explain, interpret or contextualize quantitative findings</td>
<td>- Explore a phenomenon and expand on qualitative findings</td>
</tr>
<tr>
<td>- Examine in more detail unexpected results from a quantitative study</td>
<td>- Test elements of an emergent theory resulting from qualitative research</td>
</tr>
<tr>
<td></td>
<td>- Develop and test a new instrument</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Concurrent triangulation</th>
<th>Concurrent nested</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Develop a more complex understanding of a phenomenon</td>
<td>- Gain broader and in-depth perspectives on a topic</td>
</tr>
<tr>
<td>- Cross-validate or corroborate findings</td>
<td>- Offset weaknesses to the predominant method</td>
</tr>
</tbody>
</table>
2.4 Research Strategy

Different research strategies are proposed within literature such as: survey, case studies, action research, and experiments (Saunders, 2016; Bryman et al., 2005). In the following, an overview of strategies is presented followed by a detailed description of the case study strategy.

2.4.1 Overview

Action research is defined as “resolving real organizational issues” (Saunders, 2016, p. 191). The process of action research is iterative and includes repeating steps of diagnosing and planning, taking and evaluating action on the issue diagnosed. These steps are taken to facilitate change in organizations (Saunders, 2016).

Survey is a strategy that is commonly applied in combination with a deductive approach. It is popular to use questionnaires in order to collect comparable data from sizeable populations. In general, a quantitative approach is used and data is analyzed statistically (Saunders, 2016).

Experiments are known from natural sciences but also applicable in social sciences (Saunders, 2016). However, Bryman et al. (2005) explain that it is rather uncommon in business and management research.

Saunders (2016) further introduces ethnography, grounded theory, archival and documentary research as well as narrative inquiry within research strategies. Nevertheless, this thesis does not focus on these. The main focus is the case study strategy introduced in the following.

2.4.2 Case Study

Case studies are common within business research. A basic case study is the analysis of a single case such as a single organization, a single location (such as site, factory, office building), a person or a single event (Bryman et al., 2005). It is an intensive in-depth study, investigating a problem or a topic in a real-life setting. Therefore, the context of the case study needs to be well understood. In order to receive in-depth insights, qualitative or quantitative is applied but also commonly mixed method approaches (Saunders, 2016). Case studies have been subject to criticism regarding their ability to create generalizable and reliable theory due to the small sample sizes and the interpretive approach. Nevertheless this criticism has been countered in studies and qualitative approaches are becoming more recognized (Saunders, 2016). Case studies have been designed and used manifold and for various purposes such as within a deductive or inductive approach for explanatory and exploratory purposes.
For case studies, different methods or combinations of methods can be suitable such as observation, ethnography, interviews, focus groups and questionnaires (Saunders, 2016). Yin (2014) discusses two dimension that generate 4 main types of case studies.

A single case is often chosen when it is an extreme, unique or critical case. A multiple-case studies does not focus on a single case but often compares different cases within a study. Thereby, researchers assess whether the findings are unique and common to the cases. This makes it easier to translate findings into theory (Bryman et al., 2005). A holistic case is when the researched organization is considered as a whole. On the other hand, an embedded case is used if only several units are selected.

This thesis uses a multiple case study strategy with holistic cases. Multiple online subscription box retailers selected are as cases, as there are no unique or extreme cases identified. With multiple cases, the research aims to be more generalizable than with a single case. Further, each case company will be treated as a holistic case. The case study is the mean for RQ1 to gain data which is the basis for creating a closed-loop SC model. For RQ2, the multiple case study strategy remains relevant but the analysis follows the business case for sustainability methodology to be presented in chapter 4.
2.5 Population and Sampling

It is often impossible to collect data from every case or group member. Collection data from a whole population is called census. However, the population does not need to be a group of people, but can refer to companies or products (Saunders, 2016). Due to restrictions of access, time and money, it is common to take samples from a population: “the full case set of cases or elements from which a sample is taken is called the population”(Saunders, 2016, p. 274). Sampling helps reduce the amount of data from a subgroup. When selecting an organization for a case study, a group of managers or employees are selected, which are defined as a sample. A sample should represent the full set of cases in a meaningful and justifiable way. Thereafter, results are sometimes generalizable to the whole population (Saunders, 2016).

There are different sampling techniques: probability (or representative) sampling and non-probability sampling. Probability sampling is often used within survey or experiment strategies. It is equally probable for each individual to be selected into the sample. Therefore, it is possible to generalize, on a statistical basis, characteristics from the sample to the target group (Saunders, 2016).

Non-probability sampling means that the individual is not selected in a random way. In that case subjectivity influences the sampling. The sample size is not regulated and depends on the research question and objectives. Sampling techniques within non-probability sampling are quota, purposive, volunteer and haphazard (Saunders, 2016). Quota sampling is often part of a survey strategy and used for large populations. Within purposive sampling, the individuals that fit the objective best, based on the researcher’s judgement, are selected. It is used for very small sample size, for instance case study strategies. The individuals are not statistically representative since the selection follows a purposive logic (Saunders, 2016). For the methodology of this thesis, volunteer sampling such as snowball sampling and self-selection sampling, are highlighted more thoroughly.
The techniques have in common that the participants partake voluntarily in the study. Snowball sampling is used when it is difficult to identify participants. Once one or two individuals have been found, this helps to identify further participants, “and so the sample snowballs” (Saunders, 2016, p. 303). However, since the participants are likely to select an individual similar to themselves, there is a risk of bias within this technique. Self-selection sampling is when the individual states the desire to partake in the research. In the first step, the need for participants is addressed through advertising or direct demands. In the second step, data is collected from responding individuals. Often, the individuals are willing to partake because they have strong feelings or opinions on the topic.

Haphazard sampling has the characteristic that there is no principle or pattern on how to choose the individuals. Mostly, respondents are selected because they are available or convenient to reach out to. Often, the selected individuals meet the purposive sampling selection criteria. Nevertheless, if the reasons behind the selection have no relevance or relation to the research question or objective, it happens that the selected participants are of limited use for the study, and results are biased (Saunders, 2016).

For both RQs, the population of reference is subscription box retailers. The target population is subscription box retailers located in France, Germany and Sweden. The researchers consider that the retailers have the most global insight of the whole supply chain as they have contact with upstream and downstream players. The subscription box retailers are deemed to have the appropriate point of view to create the model. The sampling technique used is self-selection sampling as the researchers reach out to the targeted population but data is collected only if the online subscription box retailers wish to partake in the research. Approximately 20 companies of the target population in each country (France, Germany, Sweden) are contacted via mail and phone. The positive respondents constitute the sample. The sample is defined as a company and the sample size is of four company cases. Additionally, to the company cases, an expert interview is conducted.

<table>
<thead>
<tr>
<th>Type</th>
<th>Case company</th>
<th>Interviewee</th>
<th>Job position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case A</td>
<td>Food box (Germany)</td>
<td>Interviewee A</td>
<td>Co-founder</td>
</tr>
<tr>
<td>Case B</td>
<td>Healthy lifestyle box (France)</td>
<td>Interviewee B</td>
<td>Owner/ Founder</td>
</tr>
<tr>
<td>Case C</td>
<td>Snack sample box (Sweden)</td>
<td>Interviewee C</td>
<td>Owner/ Founder</td>
</tr>
<tr>
<td>Case D</td>
<td>Sample box (Sweden) &amp; Transport provider (Sweden)</td>
<td>Interviewee D1</td>
<td>Owner/ Founder</td>
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<tr>
<td></td>
<td></td>
<td>Interviewee D2</td>
<td>Distributor</td>
</tr>
<tr>
<td>Expert</td>
<td>Meal kit box (Germany)</td>
<td>Interviewee E</td>
<td>Procurement Manger</td>
</tr>
</tbody>
</table>
2.6 Data Collection
The methods adopted for data collection determines the classification of the study (Kumar, 2014). In other words, according to the design chosen: qualitative, quantitative or mixed, the data collection technique differs.

There are two approaches to collecting data. Either from primary sources or secondary sources. Secondary sources are data that previously collected or already existing as part of routine record keeping (Kumar, 2014). There are documents of different nature: government publications, earlier research, personal record or mass media. They are suitable for all three designs, the only difference is the data is extracted (descriptive and narrative information for qualitative research while quantitative research extracts data of numerical or categorical form). Primary sources, on the other hand, provide researchers with first-hand information. There are several methods to collecting data from primary sources: observation, interviewing and, or questionnaire.

Observation is defined by Kumar (2014, p. 173) as a “selective way of watching and listening to an interaction or phenomenon as it takes place”, possible for both qualitative and quantitative designs. Researchers can either participate in the activities of the observed group (with or without their knowledge) or remain passive. However, limitations to this method only “allow” observation to be made under two conditions: natural and controlled. In fact, observation prevails potential problems such as the Hawthorne effect, where individuals change their behavior when they know they are being observed, which produces distortion. Also, observation cannot be considered an objective method as the observer may be biased and furthermore, interpretations differ from each observer. Lastly, incomplete observation is a possibility. Indeed, the average human being cannot observe the global environment and individual reactions, and record (should it be through detailed notes or video record).

Table 2 Recording of Observations (adapted from Kumar, 2014)

<table>
<thead>
<tr>
<th></th>
<th>Narrative observation (qualitative design)</th>
<th>Numerical observation (quantitative design)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recording</td>
<td>Detailed notes in narrative form</td>
<td>One-, two- or three-directional scale</td>
</tr>
<tr>
<td>Advantages</td>
<td>Deep insight into observation</td>
<td>Concentration on observation and not taking notes</td>
</tr>
<tr>
<td>Disadvantages</td>
<td>Bias of interpretation and conclusion</td>
<td>No specific and in-depth information</td>
</tr>
<tr>
<td></td>
<td>Incomplete recording</td>
<td>about the interactions</td>
</tr>
</tbody>
</table>

Interviews are the most common method to collect information as it is adaptable according to situations. They have different level of flexibility and specificity ranging from unstructured to structured interviews.
Interviews do not specifically refer to a design although unstructured and semi-structured interviews are predominantly used in qualitative design. To explore the interested areas it is critical to appropriately formulate the questions (Saunders, 2016). There are three main types of questions: open questions, probing questions and, specific and closed questions. Open questions encourages interviewees to extensively develop their answers. They are usually used to define or describe a situation, obtain facts and reveal attitudes. Probing questions have a similar structure to open questions but have a particular focus. They are used when further explanation or clarification is needed. Specific and closed questions are usually used as introductory questions to confirm a fact or opinion. They are also used similarly to probing questions when needed to obtain specific information. Questionnaires, as defined by Kumar (2014, p. 178) are, “a written list of questions, the answers to which are recorded by respondents”. They are generally applied within a quantitative strategy, more specifically in a deductive approach. This method expects for the questions to be clear and easy to understand, and the sequence should be easy to follow. Furthermore, questionnaire only allow one chance to collect the data and there is no possibility to explore in-depth or return to collect additional information.

Due to the aim of the research and selected sample, interviews are the most appropriate method to collect data. As the research is an exploratory study, the interviews are conducted in a semi-structured manner. In fact, according to Saunders (2016, p. 394), these interviews are, “to understand the reasons for the decisions or, to understand the reasons for […] attitudes and opinions”. Data collected from these interviews are the basis for creating the model for RQ1 and assessing it for RQ2.
2.7 Data Analysis
For the purpose of this research, in a first step, qualitative data is collected and analyzed in a multiple case study. From then on, a business case for sustainability is established and a quantitative design initiated in order to assess the business case.

2.7.1 Multiple Case Study
There are two aspects to consider when analyzing qualitative data: the approach to the analysis and the interactive nature of the data (Saunders, 2016). Saunders (2016) has identified several analysis techniques: thematic analysis, template analysis, grounded theory method, narrative analysis, discourse analysis and content analysis.

Thematic analysis is the most generic technique as it is suitable for deductive and inductive approaches, it is not tied to any particular philosophical position and can be used irrespective of an objectivist or subjectivist position (Saunders, 2016).

Template analysis is similar to thematic analysis to the difference that data is coded before searching for themes. Thus, a structure is set before analyzing the data. This may bias the researchers by forcing them to make the data fit to the structure and not developing a structure around the data (King and Brooks, 2012).

Grounded theory method is not as flexible as the two previous techniques. It has defined procedures to collect and analyze data. For Saunders (2016, p. 595), “its use in practice is criticized when researchers only implement some of these elements, not all”. Therefore, for the validity of data, researchers that follow this method should understand the implications and verify that their research strategy corresponds.

Narrative analysis is not considered as a pure analytical technique but rather as a collection of analytical approaches to analyze different aspects of narrative (Saunders, 2016). This technique is used for analyzing data within a narrative form and not extracted from it.

Discourse analysis is a technique centered around the analysis of text or talk: “it examines the relations between discourse and other objects in the world” (Saunders, 2016, p. 607). It is related to the analysis of the use of language in a situation not the analysis of the data collected from a situation.

Saunders (2016, p. 608) defines content analysis as “an analytical technique that codes and categorizes qualitative data in order to analyze them quantitatively”. In other words, the aim is to count frequencies and examine the relationship between variables.
Answering both RQs requires an exploratory research design with an abductive approach to data collection. Researchers go back and forth between the theoretical framework and the practical framework (data collected). The data collection phase and data analysis phase is done somehow simultaneously. In fact, due to the interactive nature of the data, it will be necessary to recognize themes, patterns and relationships in order to adjust the framework. Per the broad framework of this thesis, a thematic analysis seems to be the most appropriate analysis technique. The followed procedure is outlined by Saunders (2016, p. 580) as “becoming familiar with data, coding data, searching for themes and recognizing relationships, refining themes and testing propositions”.

2.8 Research Quality

There are three main quality criteria within business research: reliability, replicability and validity (Bryman et al., 2005). In the following, the criteria are explained and the quality assurance within this thesis outlined.

2.8.1 Reliability and Replicability

If a research is reliable it should be repeatable and measures used consistently (Bryman et al., 2005). Therefore, the research is considered as reliable when other researchers are able to replicate the research and come to the same research results (Saunders, 2016). According to Saunders, there can be a distinction made between internal and external reliability. This refers to the internal consistency of research procedures. For instance, when more than one researcher is conducting interviews or the analysis, it can be evaluated to what extent they agree about the data and analysis (Saunders, 2016). External reliability, on the other hand, refers to the fact that the researcher or other researchers could replicate research project at another time with consistent findings. Saunders (2016) presents threats to reliability that a research needs to be aware of:

- **Participant error**
  E.g. participant is careless or in a hurry and therefore is affected when answering a questionnaire

- **Participant bias**
  E.g. when an interview is hold in an open space and the interviewee fears to be overheard the interviewee might give false positive answers

- **Researcher error**
  E.g. the researcher is unprepared or tired and misunderstands subtle meanings of the interviewees

- **Researcher bias**
  E.g. the researcher makes interpretation and has subjective views on the interviewee’s response
Saunders (2016) states that it is most important that the research process is very clear without logic gaps or false assumptions. In addition, the work needs to be transparent so that others can make own judgments or replications of the research piece (Saunders, 2016).

Replicability is closely related to reliability. It shall ensure that the research is replicable, by giving details on research procedures. Within business research, it is rather uncommon to actually replicate a study (Bryman et al., 2005).

### 2.8.2 Validity

Validity is concerned with the integrity of the conclusions within a research project. The main aspects of validity are (Bryman et al., 2005):

- Measurement validity
- Internal validity
- External validity
- Ecological validity

Internal validity is established when the research “accurately demonstrates a causal relationship between two variables” (Saunders, 2016, p. 203). The concept of internal validity is important for quantitative and explanatory research designs. It is not applicable when it comes to exploratory or descriptive research designs. External on the other hand is concerned with the generalizability of research findings. It may be necessary to replicate the research within another context in order to generalize findings (Saunders, 2016).

### 2.8.3 Trustworthiness within Qualitative Research

Within qualitative research, it is more difficult to demonstrate the quality and credibility of the research. Here, internal reliability may be achieved by having more than one researcher working on interviews, observations or data analysis. Further, internal validity, can be established when there is a lot of data showing the theoretical relationships that are proposed. External validity is questionable due to small sample size. Nevertheless, research results or learning outcomes may still be generalizable within other settings (Saunders, 2016). Moreover, Lincoln and Guba (1985, cited in Saunders, 2016, p. 205) introduced terms for trustworthiness criteria within qualitative research. They introduced dependability (reliability), credibility (internal validity), transferability (external validity) and confirmability (objectivity) (Saunders, 2016; Bryman et al., 2005). In order to ensure credibility Bryman et al. (2005) refer to two techniques: common respondent validation (also called member or participant validation) and triangulation.
First, triangulation, which means that the researcher should use more than one source of data, which are independent. Second, participant validation, which is the step of letting the participants read the research data and comment on mistakes or confirm the accuracy. This is most important within qualitative research (Saunders, 2016).

For RQ1 and RQ2, researchers work on interviews, data analysis and interpretation through several data sources. In addition, respondent validation is assessed by sending data back to the interviewees for possible misinterpretations. Certain research outcomes may be generalizable. Internal reliability is achieved as each researcher follows an interview guideline. External reliability is harder to achieve as the chosen market is evolving non-stop. The authors of the thesis aim to describe the research process clearly and transparently and thereby achieve trustworthiness.

2.9 Research Ethics
For research purpose, ethics is the “standard of behavior that guide your conduct in relation to the rights of those who become the subject of your work, or are affected by it” (Saunders, 2016, p. 239). Collection of data involves human participation whether or not the research is conducted person-to-person. More importantly, when involving businesses, the way to gain data and what it is done with it during and after analysis may flounder and prove impractical or problematic if there is no ethical approach (Saunders, 2016).

According to Berry (2004), there are two conflicting philosophical positions on a researcher’s conduct: a deontological view and a teleological view. A deontological view implies that transgressing the rules is not acceptable. While a teleological view argues that an act should be justified, or not, according to the consequences and not according to the rules that were followed, or not. A code of ethics is set to facilitate the understanding and broadness of principles that it surrounds. It is intended to “avoid poor practice, malpractice and harm as well as to promote ethical practice and private or public good” (Saunders, 2016, p. 245). However, the code of ethics should be adapted to each type of data research according to the philosophy, design, approach and method.

There are different types of access to data (traditional access, Internet-mediated access, intranet-mediated access and hybrid access) and each access has its own issues that can affect the ability to collect suitable and high-quality data (Saunders, 2016).
The code of ethics implies that participants should have agreed to participate in the research that they have been informed about (informed consent). Further, the researcher should not interfere with the participants privacy or do harm to them (Flick, 2014). However, ethics do not concern only data access and collection but occurs at all stages of the research. It is necessary for researchers to discuss and decide along with those who grant them the data, the ways in which the data should be collected, analyzed and reported (Saunders, 2016).

Nonetheless, it is the researchers who decide upon the plan and guidelines of their research but external actors have a say on the level of confidentiality of the data.

Consequently, the researchers of this thesis inform the participants about the research and interview those who have agreed to partake. Further the privacy of the interviewees is protected through anonymization. The level confidentiality of the data is aligned with the case companies’ needs. The level of research ethics remains the same whether answering RQ1 or RQ2.

2.10 Working Process
The thesis project is jointly developed by Lola Girot and Claudia Kopf, and the idea approved within seminar PM0. The time plan is set and agreed upon by both researchers and can be found within the appendix E. Both authors attend five seminars (PM0-PM4) where the thesis manuscript is discussed and opposed by fellow students under guidance of the examiner. When no individual opposition is mandatory, oppositions are written and presented together. The final seminar is for presenting the thesis. The work within the process of planning, reading theoretical resources, data collection and writing is divided and shared out equally between authors. Nevertheless, all parts are re-read and edited by both authors. As of data collection, both authors contact a set of Swedish companies. Moreover, Lola Girot contacts French companies and Claudia Kopf German companies to make the most of the authors’ language skills and have a larger access panel. Interviews are conducted with both authors present, the main interviewer being the one which established the first contact with the respective company cases. The interviews are set up as follows:

- Interviewee A – Claudia Kopf
- Interviewee B – Lola Girot
- Interviewee C – Lola Girot
- Interviewees D1 & D2 – Claudia Kopf
- Interviewee E – Claudia Kopf
The data is analyzed and discussed jointly. While Lola Girot has a focus on the written parts within the analysis, Claudia Kopf focuses on creating figures, tables and calculations. The conclusion is written by both authors. Furthermore, one and the other are responsible for referencing, appendix and overall layout. Although the authors have worked to some extent independently one from another, the thesis is written jointly and both take shared responsibility for all parts.

### 2.11 Research Methodology Summary

The chosen methodologies are highlighted within the research onion:

![Figure 9 Summary Methodology Research Onion (adapted from Saunders, 2016, p. 124)](image-url)
3 **RQ1: Closed-loop Supply Chain Model**

This chapter answers RQ1 “How can a closed-loop SC model for B2C online subscription boxes be set up?” with the presentation of theory, frame of reference and empirical findings and then data analysis.

### 3.1 Theory

The theoretical background gives definitions and an overview of online subscription boxes, transport packaging as well as closed-loop supply chain, reverse logistics and reuse. In the next step, literature on reuse and transport packaging are merged. Further, a generic closed-loop SC model is developed.

![Diagram](image)

**Figure 10** Theory RQ1

#### 3.1.1 Online Subscription Boxes

With the ease of using the internet to search, find, order and have delivered almost anything to your doorstep, online retail sales have an exponential growth and it is not expected to stop anytime soon. In 2015, online retail sales represented 7.4% of the total worldwide retail sales. Today, they represent 11.6% and in 2021 they are expected to represent 15.5% (Statista, n. d.-a). The most successful brands, in terms of online shopping, have the ability of creating a “unique” shopping space for each customer. It is a space where customers feel familiar and relaxed, the opposite of how a majority of shoppers feel like when they have to go shopping (Munson et al., 2017). Furthermore, Robinson et al. (2007) report, more than ten years ago, that customers rarely have a regular time or place for shopping but rather “sometimes from home, sometimes from work, other times in the middle of the night”. With the significant advances in technology and specifically with the ease of use of m-shopping interfaces, this statement can only be reinforced. Overall, online shopping, different from single item shopping contexts, has rarely been studied (Desrochers et al., 2015). This makes literature on online shopping rather scarce and leaving researchers and therefore readers with practical knowledge.
The first subscription box is a beauty subscription box launched in the USA, in 2010. The aim of the founders is to allow users to discover a selection of beauty samples. This benefits two parties: the consumers and the brands. The consumers discover and test a range of different sample products and brands that they would have not discovered on their own. For the brands, this is a way of promoting their products and reaching out to potential future customers. This phenomenon has become so popular that it has spread further than just beauty products. Nowadays, subscription boxes include pet products, outdoor gear, sport apparel, fashion products, flower arrangements snack and meal kits.

According to Kestenbaum, (2017), a “subscription business is a company that sends you a package, usually once a month, of items they’ve picked out for you”. For the food industry, there are two types of subscription: subscription boxes where the consumer gets to taste a variety of different products (snacks, dried fruits, nuts, chocolates, condiments, pastries…) according to the “theme” of the box (healthy, gluten-free, exotic, traditional, luxury, organic…) or, meal kits where recipes and ingredients are supplied so that the consumer can make its own meals. Kestenbaum (2017) believes that the reason for the exponential growth of subscription boxes is that the customer demand has changed. The businesses have not only adapted themselves to new technologies but to how the consumer reacts to products. In fact, the “success in subscription does not depend on what’s being sold, it’s a new way of selling products” (Kestenbaum, 2017). Marketing is not based on bringing the right product to the right consumer but to make the consumers “look at existing products in a new way” (Kestenbaum, 2017). The consumerism society is filled of thousand different products in each category (clothes, footwear, food, electronics, books, leisure, sports…) and it has become very competitive as each business wants consumers to choose their products. The “experience” of the subscription box or the meal kit is to get the consumer excited and “to get a consumer excited, you have to offer something they’re not expecting and subscriptions are an ideal instrument for surprise” (Kestenbaum, 2017). According to the strategy of each company, the consumer can choose to an extent the products they will be receiving. Some companies can fully personalize the boxes: consumers choose from a range of products the company offers. Other companies personalize the boxes according to the “type” of consumer: for beauty boxes, it can be according to age, skin type or lifestyle. Other boxes do not offer personalization but every box has different samples.
3.1.2 Transport Packaging

This chapter shortly defines packaging and transport packaging. In addition, the packaging process is briefly described.

3.1.2.1 Definition Packaging

According to Sohrabour et al. (2015) packaging is the interface between the consumer’s and the e-retailer’s supply chain. Further, packaging covers different functions within the supply chain and is responsible for the safe and secure but also efficient and effective product handling, transportation and storage (Sohrabpour et al., 2016; Oghazi, 2014; Yusuf et al., 2017). Rundh (2009) emphasizes that the design of packaging is influenced by new technologies, material developments, logistics, environmental and customer requirements. Pålsson et al. (2017) refer to the term packaging system. They explain that packaging differs between products sold in regular stores or online, because there are different requirements. More classical literature emphasizes on the marketing function of packaging, additional to containing and protecting the product. They point out the communicating function of the package as an interface between the product and the customer that can create a positive image (Sara, 1990; Underwood, 2003).

3.1.2.2 Transport Packaging Lifecycle

A package is layered out through primary, secondary and transport packaging (Pålsson et al., 2017). The latter mostly facilitates transport and product handling whereas primary packaging is responsible for containing and presenting the product (Rushton et al., 2014). Accordingly, Chung et al. (2018) describe primary packaging as the inner envelop while the second one protects the primary packaging.

Transport packaging affects logistics efficiency and the requirements for equipment and vehicles used for handling and transportation (Chung et al., 2018). The opportunity regarding transport packaging, according to Chung et al. (2018), is that it may still be in a reusable condition after the transportation of a product. Transport packaging is usually assimilated to corrugated cardboard boxes. Simply explained, cardboard is made from kraft paper (refined wood and paper pulp). The rigidity of the sheets of cardboard depends on the thickness of combination of the kraft paper.
Once made, the box goes through quality control that measures moisture and resistance of the cardboard (Made how, 2009). Cardboard boxes are generally for a single use: once delivery has been made. After that, they are generally recycled to make future cardboard boxes. It can be added that recycled cardboard only takes 75% of the energy needed to make new cardboard. Unfortunately, cardboard boxes are not infinitely recyclable: only up to 8 times (Made how, 2009). The following picture is an example of a shipping box from corrugated cardboard.

![Corrugated Cardboard Box](PSD Mockups, 2016)

Due to the effects from urbanization, overall population growth, short product life and the generalized use of packaging, the amount of packaging waste grows continuously worldwide (Varžinskas et al., 2016) which has set an emphasis on improved waste management (Gallardo et al., 2018). To increase the “energy recovery, re-use and recycling of packaging” a packaging directive has been introduced by the EU (Rundh, 2009, p. 990). The European Waste Directive gives a hierarchy to waste management. Within the hierarchy, waste prevention comes first, then re-use followed by recycling, recovery and waste disposal (Gallardo et al., 2018). As a consequence, some countries have adapted reusable packaging options. For instance, suppliers of soft drinks, beer and water in Portugal must provide a reusable packaging option on top of the disposable option, so that consumers can choose. Additionally, extended producer responsibility systems, e.g. the Green Dot scheme have appeared. These systems are supported financially by the producing companies within an industry in order to facilitate recycling (Ferreira et al., 2017). Furthermore, when buying from an online retailer, customers need to take initiative and recycle the packaging by themselves. Nevertheless, when the customer is on a regular shopping trip it is also the customer’s own decision to use a plastic bag or a more sustainable alternative. Palombini et al. (2017) discuss sustainable packaging requirements for packaging:

- does not compromise the health and safety of people and communities and
- meets performance and cost requirements for the specific market and within all supply chain functions, such as transportation, manufacturing or recycling, renewable energy and clean production technologies are used.
3.1.3 Closed-loop Supply Chain, Reverse Logistics & Reuse

This chapter gives basic definitions and overviews on closed loop supply chain and reverse logistics, reuse and the concept of 3Rs as well as third party logistics provider and reverse channels. Within literature, the reuse of products as well as, less frequently, the reuse of packaging are discussed. The following figure outlines the structure of this chapter.

![Figure 13 Theory Closed-loop SC](image)

3.1.3.1 Definition – Closed-loop Supply Chain

The term of closed-loop supply chain (CLSC) originated from public awareness on the waste management of consumed products. Starting from 2000, consumers have been demanding that firms take environmental responsibility. In order to fulfill consumer requirement and continue to thrive as businesses, companies had to “design, control, and operate a system to maximize value creation over the entire life cycle of a product with dynamic recovery of value from different types and volumes of returns over time”, in other words, develop a closed-loop supply chain (Guide and Van Wassenhove, 2009, p. 1).

3.1.3.2 Reverse Logistics

As CLSCs consist of a forward and reverse supply chain, literature states the latter as reverse logistics (RL). According to Rogers (1999, p. 603), RL is defined 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”. It is an area of strategic advantage for companies as it enhances a companies’ efficiency and effectiveness (Langley C. and Holcomb, 1992).
However, RL is not the opposite of forward logistics, it is much different. Reverse logistics flows have to be much more reactive as there is less visibility since it is difficult to forecast (Govindan et al., 2015). But, how are reverse logistic flows more difficult to forecast than forward flows? First of all, RL refers to the following activities: repair, return, refurbish, recycle or remanufacture. However these activities do not fit to all products. Each activity does not require the same implication nor the same costs from all actors of the supply chain. Secondly, reverse logistics is initiated according to the customer’s needs (wrong color, size or quantity of product, damaged product) or willingness to return it (incentives from company, waste awareness) and these conditions are not accurate or specific enough to be translated into numbers. Supply chains therefore put more efforts in their reactive capacity rather than the accuracy of their forecasting methods (Govindan et al., 2015). Nowadays with an increase of online shopping (37.4 % of total shoppers are e-commerce shoppers according to Statista (n. d.-b)), the way returns are dealt by companies is an important factor of quality for customers. If the return policy is not advantageous and the return flows are long, complicated and costly, then customers will not be ordering again from the company. In addition, Chen et al. (2009) add that companies with high quality RL are the ones that hold the most long-term relationships with customers.

And, businesses thrive on the loyalty of their customers. Now, even though the first priority for companies is economic performance and thus their need to implement a RL process as profitable as possible, it has been found that RL also benefits environmental performances (Huang and Yang, 2014). In light of this, businesses have been found to ask themselves “What is it that we need to do, not just to survive, but to thrive, and not just one year, three years, or five years from now, but in ten years, twenty years, and beyond?” (Carter and Liane, 2011, p. 49).

### 3.1.3.3 Reuse and Concept of 3Rs
From there on, the concept of sustainability is introduced as a guideline to answer this issue. Carter and Rogers (2008, p. 368) define sustainability as “the strategic, transparent integration and achievement of an organization’s social, environmental, and economic goals in the systemic coordination of key inter-organizational business processes for improving the long-term economic performance of the individual company and its supply chains”. In RL, sustainability is sought through three alternatives: reduce, reuse and recycle, namely the 3Rs.
Reduce is the best option as it is about waste reduction at the source. Reuse is using a product more than once, either for the same purpose or a different purpose. Recycle is managing a product once it has become waste due to the fact that it cannot be reused (EPA, 2017). Reuse takes place when a product has a good enough quality and condition to be used again (Jamshidi, 2011). Common examples are reusable bottles and containers. According to Colligan (2015), implementing a 3Rs strategy is beneficial for the environment, increases profits and saves money. Figure 14 shows where in the closed supply chain does reuse and recycle intervene in the reverse logistics process. This thesis will concentrate only on one of the 3Rs: reuse.

![Figure 14 Simplified Closed-loop Supply Chain (adapted from Kotler and Armstrong, 2010)](image)

Reuse does not encounter the same product recovery issues as the other types of return processes. Within the steps of product recovery there is: collection/acquisition, inspection/separation and disassembly/scheduling (Sasikumar and Kannan, 2008). Collection/acquisition is necessary for all return processes, as is inspection/separation. During the latter, reuse is the simplest as there is little to no need to touch the product (simple operations such as cleaning or minor repairs). The aim of reusing the product is its quick availability and lower cost rather than producing a new one. As of the third step: disassembly/scheduling, a reusable product does not reach it (Sasikumar and Kannan, 2008).

3.1.3.4 Third-Party Logistics Provider
Third-Party Logistics provider or 3PL is defined as "a special middleman of logistics channel who provides other enterprises with whole or part logistics business service, from generic transportation to design, execute and operation whole system of distribution and logistics in certain period by contract form" (Ying and Dayong, 2005).
However, 3PLs should not only be integrated in the "strategic supply chain management efforts" of the supply chain but rather included. This allows for the focal company, and therefore the supply chain, to analyze patterns of business intelligence. The role associated to 3PLs has gone beyond just storing and transporting goods. The providers have included "recent value-added functions such as after-sales support, customer service and reverse logistics". As an example, Jayaram and Tan (2010) talk about the PC industry where 3PLs perform simple repair jobs in the warehouse centers and send them back to the customers instead of being repaired at the manufacturer's site. Specifically, in the e-commerce environment, 3PL "reengineer the logistics business process flow and thus improve the customer responding ability and service quality". Outsourcing to a logistics provider decreases the retailer's logistics cost, product stock and therefore has the "ability to accommodate the market's variation". Furthermore, Wang and Dayong (2005) explain that 3PLs include the following processes in their scope: customer relation management, customer service management, customer order fulfillment, structural logistics network design, stock management, transportation management, returns management. Returns management is a topic that companies are taking more and more into consideration due to regulations but also waste management profitability which can be withdrawn from it. Similar to the reasons why companies use 3PLs for forward flows, they also adopt them for reverse flows: better quality service, reduced costs (Vasiliauskas and Jakubauskas, 2007).

3.1.3.5 Reverse Channels
Reverse channels can be managed by the manufacturer, the retailer or a third party (Liu et al., 2017). In practice there are different options on how reverse flow look like. There are companies that provide prepaid mailboxes, such as Hewlett Packard, that enables the customer to return a used product by themselves. Moreover, there can be subcontracted distributors that collect used products while selling products with a trade-in policy (Liu et al., 2017). Return networks should be designed in order to receive the best trade-off between time and cost efficiency. Further, outsourcing the return process to 3PL provider may help to increase efficiency, achieve economy of scale, and provide access to returns management knowledge (Bernon et al., 2016). Moreover, there are several types of uncertainty within reverse logistics including uncertainty of timing, the quality of returns, the quantity of returns, the disassembly of returned items and the uncertainty of processing times (Nagalingam et al., 2013).
The quantity of returns is often measured with the return rate (Bernon et al., 2016). Further, companies measure environmental performance of their reverse supply chain with reuse or recycling rates (Geyer and Jackson, 2004).

3.1.4 Reusable Transport Packaging

*Here the concept of reuse, and transport packaging meet. The following chapters introduce existing reusable transport packaging options mainly common in B2B. Further it introduces possible reuse flows that are currently found within literature.*

![Figure 15 Theory Reusable Transport Packaging](image)

3.1.4.1 Packaging Components

Reverse logistics can contribute to environmental improvements, as well as higher competitiveness and market shares of companies. Nevertheless, disposable packaging is still present and more common than returnable packaging, although the latter promises waste reduction and cost savings (Katephap and Limnararat, 2017). The purpose of reusable packaging is that it is built to last and delivers verifiable economies. They are made from durable materials such as wood, metal, plastic and corrugated cardboard. The initial cost of reusable packaging is more expensive as it has to be made to resist several trips and easily manipulable. Furthermore, manufacturers have engineered new features to the packaging to deliver additional value to users as to enhance product quality, storage and transportation efficiency, food safety depending on the nature of the transported products.

RTPs are one part of the return flows within reverse logistics and helps recover the value of the packaging, e.g. by reuse, or plan for suitable disposable or recycling (Yusuf et al., 2017; Selviaridis et al., 2016). Another term used within literature is reusable transport item (RTI). Within B2B, RTIs are used to reduce waste caused by one-time packaging material (Glock, 2017). On the other hand, within B2C, reusable transport packaging is not common, which leads to the use of one-time transport or single-use packaging material. RTIs enable an industry to create closed-loop supply chains with efficient resource usage (Glock, 2017). Sarkar et al. (2017) found that a main part of production waste is transport packaging and therefore in many industries RTIs are used since they help to reduce waste.
In addition, Yusuf (2017) explains that RTP minimizes not only waste but also environmental risks in general. Moreover, workplace efficiency and safety can be increased. On the other hand, returnable packaging may contribute to higher cost due to additional collection, tracing and tracking, cleaning, repairing, inventory handling and storing as well as new management tasks (Yusuf et al., 2017; Sarkar et al., 2017).

Yusuf et al. (2017) state challenges associated with RTP such as: stolen transport package, no empty package return from the customers, or no report if damages occur. These will lead to the undersupply of transport packaging and emergency purchases of new RTP. Moreover, if the RTPs are not tracked, they can be misplaced or misallocated which contributes to them being lost or returned late.

This requires higher logistics assets and sufficient employees to manage the RTPs. Although, according to Yusuf et al. (2017), tracking and tracing creates higher visibility of the transport items throughout the supply chain which helps to resolve issues.

3.1.4.2 Reuse Flows and Processes
Reusuable packaging is used in a number of different areas such as automotive manufacturers, pharmaceutical suppliers, food and beverage manufacturers, grocery retailers, restaurant suppliers, airline caterers and food service companies (Leblanc, 2017). Each sector has a different supply chain network according to the number and types of channels it interacts with as well as the nature of the product and the means of packaging and transportation set in place (Golicic et al., 2001). Connecting all partners dictates for a certain level of integration which demands for information sharing between actors to be rapid and to a certain extent, transparent. However, information coordination, in e-commerce, is complicated not only because of the multiple parties involved (as in traditional supply chains) but due to distance, market competitiveness and trust (Chen et al., 2009). There are three typical forms in a reverse logistic model: manufacturing collecting, online retailer collecting and third-party logistics providers (3PL) collecting suppliers (Qian et al., 2012). The first two models have slowly disappeared due to the complex and high cost issues that the supply chains would encounter. Outsourcing appeared to be the solution to reduce logistics costs, improve efficiency and allow companies to focus on their core business while providing their customers a better logistic service at a lower cost (Qian et al., 2012).
3.1.5 Development of a Generic Closed-loop SC Model

In the following, a theoretical chapter of the generic closed-loop SC model is developed. It serves as a basis for interviews and the completion of RQ1.

3.1.5.1 Supply Chain Actors and their Activities

![Subscription box retailer](image1)

Figure 16 Generic Model Subscription Box Retailer

The focal point of the model, due to the scope of the thesis, is the subscription box retailer. His activities consist mainly of coordinating the content of the boxes. The retailer receives the products and the box from separate suppliers. The box can either be personalized by the retailer or initially personalized by the supplier. Moreover, the subscription box retailer manages the shipping of the box himself or cooperates with a 3PL which can take care of only the shipping or of the assembly and shipping. Generally, subscription box retailers play on monthly subscription that last between three to twelve months (Kestenbaum, 2017). This is seen as an advantage in terms of coordination for the return flows of the boxes.

![Packaging supplier](image2)

Figure 17 Generic Model Packaging Supplier

The packaging supplier plays a minor role within the model as, due to the scope, the transport packaging will be taken as a given and not manipulated. He is responsible for providing the boxes to the subscription box retailer or the 3PL. Sending reusable transport packaging back to the packaging producer would at this point only add additional steps to the model.

![3PL Provider](image3)

Figure 18 Generic Model 3PL Provider

The 3PL may be used by the subscription box retailer to help manage, control and deliver the logistics on his behalf (Thierry et al., 1995). Whether a 3PL is used in practice, needs to be verified through the case studies. When looking at the return process for the reusable transport boxes, a 3PL may be useful in terms of outsourcing (Bernon et al., 2016).
Whether or not the model contains a 3PL for the return process depends on the outcome of the case studies. Implementing a 3PL in the SC model with a subscription box retailer, who has never worked with, might lead to big investments or redundancies due to own logistics.

The customers define the success of a subscription box retailer. Without customers, there are no orders and therefore no profitability. Furthermore, as it may be pointed out in the case studies, the success of the return flows may solely be due to their goodwill. However, due to limit time and resources, the scope of the thesis does not include a study on them.

### 3.1.5.2 The Box

In general, it is assumed that cardboard is made for one time use. Due to its strength, it can be assumed that it is still in a reusable condition, as suggested for general transport packaging by Chung et al. (2018). Smaller cleaning activities may be added within the return process. The boxes used within the model should not vary in size per case company, but only slightly in weight, which needs to be verified within the case studies.

### 3.1.5.3 The Closed-loop

The following closed-loop SC model, through return and reuse of transport package, is conceivable. The first loop option is set between the 3PL and consumer.

Within this option, the 3PL is responsible for receiving the products and boxes, setting them together and shipping them out. After the consumer receives the box, the 3PL collects it to reuse it for future shipping. Different collection models are possible:

- The box is collected at delivery: the consumer needs to be home, receives the package, immediately empties and gives it back. If the customer has to directly give back the package when receiving it, he would take no time to discover the...
box and the products inside it. Indeed, some subscription box retailers intend to sell more than products: an experience.

- The box is picked up as a new one is being delivered. The client should be home, which is not necessarily the case, or the delivery man has access to the inside of the mailbox (where the client would have left a previous box).
- An additional pick up is scheduled for the empty box.

Another loop may involve the subscription box retailer. In this case, the 3PL is only responsible for the shipping of the box. The 3PL distributes then collects the empty ones and delivers them back to the subscription box retailer.

![Figure 21 Loop Retailer-3PL–Consumer](image)

A third loop is dealt only between the consumer and the subscription box retailer. Two solutions are possible:

- The consumer is given the responsibility of sending the empty package back
- The subscription box retailer uses his own logistics resources for the pick-up of the box.

![Figure 22 Loop Retailer–Consumer](image)

Other options could include the box manufacturer but are rather unlikely due to the additional costs it generates. All options lead to the following possibilities of return flows (dotted lines) within the closed-loop SC model.
Figure 23 Generic Closed-loop SC Model
3.2 Frame of reference

3.2.1 Research Model
The following figure shows the research model applied within this thesis. The theoretical concepts are the basis for a generic closed-loop SC model, as well as the interview guide. Afterwards, the empirical findings will finalize a proposal for a closed-loop SC model within the analysis chapter. The question marks within the closed-loop SC model represent the different return route possibilities.

![Research Model Diagram](image)

1. Online subscription box retailer (case company)
2. Third party logistics provider (if utilized by case company)
3. Transport packaging
4. Closed-loop supply chain (reuse flows)
5. Expected difficulties

3.2.2 Operationalization
The following overview in figure 25 shows the main concept and sub-concepts explained within the theory, which have been included in the operationalization.

Table 4 shows the operationalization of the central theoretical concepts. It is used as basis for the interview guide developed (see for appendix A). The central concepts are described in detail within the theory chapter.
Subscription box companies operate on the B2C online market. They provide a shopping experience to the customer through marketing sample products (Kestenbaum, 2017).

Transport packaging facilitates transport and product handling (Rushton et al., 2014). Within online retail a corrugated cardboard box is generally used (Pålsson et al., 2017).

Transport packaging may still be in a reusable condition after the transportation of a product (Chung et al., 2018).

Closed-loop supply chain is said to improve sustainability. It is a system that maximizes value creation from product recovery according to the type and volume of returns (Guide and Van Wassenhove, 2009).

Reverse Logistics is a part of the closed-loop supply chain. It refers to the flow that goes from the point of consumption back to the point of manufacturing (Rogers, 1999).

Reuse is an option of Reverse Logistics which consists of using a product again for the same or different purpose, while it has a good enough quality and condition (Jamshidi, 2011).

The common reverse logistics models are: manufacturing collecting, online retailer collecting and third-party logistics providers (3PL) collecting suppliers (Qian et al., 2012).

A 3PL provider manages, controls and delivers logistic activities, such as assembling and shipping, on behalf of a company (Thierry et al., 1995).

The expected percentage of products which will be returned to the company. The quantity of returns is one of the uncertainties within reverse logistics (Nagalingam et al., 2013).

<table>
<thead>
<tr>
<th>Concept</th>
<th>Operationalization</th>
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<tbody>
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</tr>
<tr>
<td>Packaging reusability</td>
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</tr>
<tr>
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</tr>
<tr>
<td>Return rates</td>
<td>The expected percentage of products which will be returned to the company. The quantity of returns is one of the uncertainties within reverse logistics (Nagalingam et al., 2013).</td>
</tr>
</tbody>
</table>
3.3 Empirical Findings
The gathered data from the four company cases and expert interview is presented in order to set the background and serve as basis for the analysis to answer RQ1. As the companies deal with different currencies, researchers use the Euro as reference in order to compare costs. The exchanged rate used is 1 SEK = 0.095 € from May 4, 2018 (European Central Bank, 2018).

3.3.1 Case A

3.3.1.1 Background
Case study A is a German food box retailer which offers meal kits composed of 4 to 5 tapas dish declined for two, four or six people. The company is founded and run by a couple and its "support" team. The subscription service targets 35+ year old people living in rural areas where access to Spanish cuisine is not easy. The retailer first started as solely selling Spanish products individually but gradually wanted to offer more by setting up the "tapas meal kit" system. The gastronomic specialties are products from Spain, supplied by regional Spanish producers such as “Pulpo” (octopus) from Galicia or olive oil from Aragon. Products such as fresh meat and milk are supplied by local German producers (Interviewee A, 2018).

3.3.1.2 The Supply Chain
The company does not run on a traditional subscription service scheme: regular clients order only once a month every 3 to 4 months. The company sends out 10 to 15 boxes every week, adding up to 40 to 50 boxes every month. Additionally, more boxes are sent out during winter time than during summer.

The shipping process starts with the client order placement possible up until Tuesday. The retailer then prepares the boxes on Thursday morning: reception of fresh food and ingredients from the suppliers as well as the reception of the transport packaging: boxes and filling material. Assembly is done by the owners themselves. Delivery of the boxes is carried out either by UPS Express, in rural areas which represents 75% of their market, and DHL, in the bigger cities with 25% of total delivery. The boxes are picked up on Thursday afternoon in order to be received before 12pm in rural areas and during the afternoon for urban areas. Clients have the obligation to be home in order to receive the package due to the nature of the products (fresh to frozen) (Interviewee A, 2018).
3.3.1.3  Transport Packaging
The boxes are made from cardboard and polystyrene filled with cool pads and other cooling fillings. Average transport & packaging costs approximately 10 € broken down in the following costs:
  - 3,50 € for the cheapest box; 4,30 € for the most expensive one
  - 5 € of shipping, paid at the customers expense
Shipping costs differ according to the weight and type of box (more or less cooling material). According to the owner's knowledge, the boxes are in a reusable state after one shipping. They estimate their end of lifecycle to be after 3 to 5 times (Interviewee A, 2018).

3.3.1.4  Adaptability to Possible Closed-loop Scenarios
The company has few requests on the possibility of box returns. However, when the occasion did present itself, the company provided the client with a UPS label to allow him to send it back. In this situation, the cost was covered by the company. Nevertheless, Interviewee A (2018) states that the return transportation could be offered cheaper, as less security and no tracking was necessary.
Interviewee A (2018) believes that in their industry, such a system is possible due to the reusable state of packaging, which may only need some minor cleaning. However, with such a small business model as theirs, they do not see the economic possibilities of implementing the system (Interviewee A, 2018).

3.3.2  Case B
3.3.2.1  Background
Case study B is a French box retailer with the ambition of delivering a healthy lifestyle. Each month, the box offers a range of different products, 95% of them produced in France, according to the monthly theme: recipes, tips, sport or wellness accessories, snacks, beauty products... Their themes range from "bye-bye cellulite" to "sporty wake-up" to "zero-sugar". They have no specific target, only people who wish for simple and easy solutions in order to have a healthy food routine for a fit and healthy body. The retailer offers boxes for one, three, six or twelve months. The box contains 4 to 5 new products every month and are valued to a total of more than 50 €. However, the company sells the box for "only" 26€ (Interviewee B, 2018).
3.3.2.2 The Supply Chain
The company is currently under a logistic change: from traditional cardboard boxes to totebags. Today, the company uses the services of a logistician: receives the products from the suppliers and the boxes, sets them together and sends them out. The healthy lifestyle box retailer has five main suppliers: all situated in France to reduce transportation emissions, support national brands and fair trade. Approximately 150 boxes are sold and sent out each month. The boxes are sold as: price of the box plus price of transportation. The price of the box is broken down as: the cost of the box (1/3 of the price of the box) and the price of the products sold (remaining 2/3) (Interviewee B, 2018).

![Figure 26 Tote Bag (Allwhitebackground, 2018)](image)

3.3.2.3 Transport Packaging
The boxes have no particular distinctive sign. They were chosen as the best economic and environment friendly compromise. Inside the box, only the products can be found. The company has made the choice to not fill the boxes with any unnecessary fillings due to the price of transportation and to not generate any additional waste. Company B took the initiative to use a 3PL as the latter has preferential transport rates and saves the company assembly time. However, the 3PL does not deliver the products. The company uses the services of the French national postal service (La Poste). The clients receive the boxes as any typical package and if they are unavailable during delivery, they have to either pick it up at the closest post office or at a designated pick-up. Once received, consumers throw the cardboard boxes away in the recyclable trash (Interviewee B, 2018).

3.3.2.4 Adaptability to Possible Closed-loop Scenarios
Due to the environmental impact of recycling cardboard, Company B has decided to use a completely different concept: totebags. The company has not yet evaluated the cost of this new supply chain. But, there would be no difference in terms of physical flows. The difference can come from the cost of the totebags, the presentation of the products and reusability of the totebags. The major environmental impact comes from giving the consumer the possibility of reusing the totebags, in comparison to reusing the cardboard boxes (Interviewee B, 2018).
3.3.3 Case C

3.3.3.1 Background
Case company C is a Swedish subscription service which provides amongst others international, organic, vegan, gluten-free snacks on a monthly basis. They offer two types of boxes: one to be send home, or send to the office. The former is intended for private households and represents 99% of the market. The latter is intended for companies and delivered to the workplace. It encourages employees to snack on healthy food. With this option, company C sets forth the core guiding principles and objectives of Health 2020 as well as the European Food and Nutrition Action Plan 2015-2020. Both of the boxes can be bought under two formats: medium, which costs 23,66 € (249 SEK) and large, which costs 42,66 € (449 SEK) (Interviewee C, 2018).

![Figure 27 Example of a Snackbox (closed-open-content)](image)

3.3.3.2 The Supply Chain
The first year, the company assembled the products themselves. After that, they decided to develop themselves through the services of a 3PL. The 3PL receives the packaging, composed of the box and the filling (tissue paper), and the products from various suppliers. The 3PL then passes on the prepared boxes to PostNord (Swedish postal service) for shipping. They send out approximately 200 to 300 boxes a month. In general, customers take on the three-month subscription offer. Some customers subscribe a second time when the company advertises the launch of a new box. The cost of the box and the filling represents 5% of its price. Shipping is about 2,85€ (30 SEK) per box so 15% of the price (Interviewee C, 2018).

3.3.3.3 Transport Packaging
As seen on the pictures, the box is plain and has a simple opening system. The box is neither too small nor too big for the quantity of products. The box is filled with the products and some tissue paper used for decoration purpose. With the service of PostNord, the retailer and the customer have the possibility of tracking the box.
However, the tracking method associated to the shipping is not the most detailed one (Interviewee C, 2018).

3.3.3.4 Adaptability to Possible Closed-loop Scenarios
Interviewee C (2018) sees an interest in the possible development of reusable boxes. However, the system initiates double shipping costs which have an impact on the retailer, if he takes on the costs, and therefore on his profits or, on the customer who will have to pay a more expensive box. In order to assume this cost, interviewee suggests that incentives should be set up so as the customer feels as if he gets a return on investment (paying more than usual for a reusable box). Furthermore, it would encourage customers to sign up for another monthly subscription. Interviewee C (2018) estimates that 70% of its customers would choose a reusable box.

3.3.4 Case D

3.3.4.1 Background
Case company D is a subscription service that offers a sample box with a variety of 5 to 9 different products, depending on size and weight, with a value between 14,50 € and 29 € (150-300 SEK). The box includes everything, from grocery such as noodles, olive oil and drinks, but also toothpaste, candles, toys, shower cream, or cleaning supplies products. The boxed products are selected due to new package design or the wish of a brand to reach a specific target group.

It is possible for consumers to update their product preferences and interests so as to personalize the content of the box. Company D has a target customer group of women aged between 30 and 50. Indeed, they make up of 85% of their total customers (Interviewee D1, 2018). The subscription fee is 9,41 € (99 SEK) per box, including delivery. The subscription can be canceled within 14 days. If the box cannot be delivered to the customer, it is dropped off at a pick-up location (Interviewee D1, 2018).

3.3.4.2 Supply Chain
Company D sends out a total of 7 different boxes a year: 4 boxes between January and June and, 3 from September to December. The subscription service does not operate during summer because consumers are not home for a continuous and long period of time. This adds up to deliveries being every two months. Approximately 3500 to 4000 boxes are sent out in every shipment. The company has a rather solid base of regular customers as 40% of their subscribers are customers they have had since the beginning.
Another 20% of them are on-and-off customers: they start the subscription, receive the box, end the subscription and then start again after some period of time (Interviewee D1, 2018). As of the rest 40%, no detailed information was given.

Interviewee D1 (2018) states he has direct contact with the brands supplying the products for the boxes. He coordinates the flows of products from the suppliers to the warehouse, where they arrive in pallets. The cardboard boxes are provided unfolded, from another company. The products are unpacked and accounted for and then selected and packed again into the boxes with additional filling material (for safety and decoration). The distribution company, where interviewee D2 is the key account manager, only takes care of the assembly of the boxes. The deliveries are sent out from the warehouse using primarily DHS as means of transportation (Interviewee D1, 2018; Interviewee D2, 2018).

3.3.4.3 Transport Packaging
The cost of transportation and transport packaging represents 50% of the price of the box. Even though the cost is relatively high, Interviewee D2 (2018) estimates that the cardboard box cannot stand a second delivery as the sides of the box are glued together. They had previously used boxes made from stronger materials or which closed differently, such a click locks. These would present themselves in a more reusable state (Interviewee D2, 2018).

3.3.4.4 Adaptability to Possible Closed-loop Scenarios
According to Interviewee D1 (2018), the main barrier to implementing a closed loop supply chain system is the cost. Indeed, due to the price of the box, his margins are rather small. Even though he states that customers do show positive feelings towards reusable boxes, they do not want to feel directly impacted: higher price of the box or paying an extra fee. Similarly, Interviewee D2 (2018) says that no matter the model, there is a need for a new type of package: a more reusable state and more importantly which falls within their costs. Furthermore, from the distribution company point of view, these additional flows would not require company restructuration as the handling would be quite similar (Interviewee D2, 2018).

3.3.5 Expert Interview
Interviewee E (2018) shares his experiences on reusable transport packaging in a short expert interview. He explains that the company tested reusable transport packaging before. It was feasible to reuse cardboard boxes that were cleaned. He mentions that inventory needs to be managed.
Currently, the reusable packaging is not offered because the business case did not reveal enough positive impact. Nevertheless Interviewee E points out that other reusable solutions are currently making their way on the market (Interviewee E, 2018).

3.3.6 Reusable Packaging Online Retail (Secondary Data)
As mentioned by Interviewees C and E the first solutions for reusable transport packaging are offered by smaller companies. They are companies such as RePack and HackPack that offer recycled plastic packaging (Interviewee E, 2018; Interviewee C, 2018). RePack (2018) offers packages in 3 adjustable sizes and claims the packages last at least 20 cycles. Once the package is emptied it can be folded flat. RePack (2018) advertises that it achieves up to 80% CO2 emission savings and creates no trash. Moreover, customer return is free of charge and reward systems are offered which increases customer loyalty. RePack (2018) states that 60% of the vouchers within the reward system are actually used. The empty packages are coordinated by RePack where they are cleaned, checked and re-distributed to the retailers. The labels for shipping seal the packages (RePack, 2018).

Hack Pack’s solution is a reusable and recyclable package from PET plastic with air filled pockets and insulated internal packaging. It claims this offers better protection than corrugated cardboard. The whole package can be folded and returned back with the size of a large envelope in a collapsed state (Hack:Trash:NYC, 2017). The packaging would be offered in small, medium and large sizes (Szczepanski, 2017).

3.4 Data Analysis
According to the interviews and data collected from the companies, researchers have been able to conceptualize a closed-loop SC model. In the following will be described the thinking process which lead to the making of the SC model. Only the model will be presented. Related costs will be presented in the business case for sustainability in Chapter 4.

3.4.1.1 Supply Chain Actors and their Activities
The studied SC have revealed to be quite similar: the subscription box retailer has a central role. He coordinates the product and information flows from its suppliers to its warehouses or logisticians or 3PL warehouse. Indeed, each SC comprises of three actors: the supplier, the retailer and a 3PL. The main difference is the use of the 3PL. A 3PL offers the following services: storing, assembling and/or shipping.
However, the retailer can decide on the extent of services it allocates to the 3PL. Different reasons can be given: the number of orders, the cost of assembly, the cost of delivery with or without a 3PL. Case company A has decided on using a 3PL only for delivery services and therefore assembles the boxes himself (Interviewee A, 2018). Case company B, C and D have entirely relegated the assembly and shipping tasks to a 3PL (Interviewee B, 2018; Interviewee C, 2018; Interviewee D1, 2018). According to each country, the 3PL either uses its own shipping services (private) or the national postal delivery service. Related to the reverse flows, it can be stated that, as the 3PL is the meeting, assembling and shipping point for the boxes and the products, it is also the return point. Indeed, the 3PL already has the set processes to compile the boxes. With the return flow, the 3PL needs to have the capacity of making the boxes reusable (via cleaning measures). Yet, in case company A, as the receiving and assembling of the boxes is done in the company and not by the 3PL, the return flow should finish there as well. As a matter of fact, the return flow should not be seen as a constraint, therefore not add any complications.

3.4.1.2 The Box
The box is the essence of the closed-loop SC model. The nature and conception of the box determines the feasibility of reusing it. Indeed, case company A clearly states that the box and its cooling components are reusable after one use. The only difference between a new box from the packaging producer and a used box from the return flow is the cleanliness (Interviewee A, 2018). Case company B has already started to address this reusable matter. The solution it has come up with is for the customer to be able to reuse the packaging, not the company. In fact, the box is replaced by a totebag (Interviewee B, 2018). Case company C uses boxes which are easy to open and close, therefore with an easy conceivable return process. Furthermore, as the products are each individually wrapped, the inside of box is not filthy nor damaged. The major inconvenient would be the exterior damages due to the several back and forth deliveries (Interviewee C, 2018). The choice of the box is the main concern in this type of business economically (it should not be too costly as such for the retailer but also in terms of transportation costs due to size and weight), socially (it should appeal to the clients) and environmentally (it should be manufactured in a responsible way and give the possibility to be reused). Nowadays, most boxes are manufactured as such that they are easy to open and can be closed in the same manner: there is no need for scissors or to rip the box. This facilitates the way in which the box should be returned.
Interviewees have suggested different types of boxes: specifically designed cardboard reusable boxes, plastic boxes, click lock boxes, reusable packaging (but do not resemble the boxes in terms of shape and size) (Interviewee A, 2018; Interviewee B, 2018; Interviewee C, 2018; Interviewee D2, 2018). However, due to the scope of the thesis, the choice of the box is not fixed within the model. The companies are free to choose the one that best suits their business model (nature of the business, type of products which are offered, costs...).

3.4.1.3 The Closed-loop

The simplest option, that the researchers have selected, is for the client to send back the package via post. The retailer provides an extra label. The box is sent back to the 3PL in the same way the suppliers send the "new" boxes. The difference is that the used boxes need to go through a cleaning process (Interviewee A, 2018; Interviewee D2, 2018; Interviewee E, 2018). Therefore, the 3PL needs to adopt the right cleaning process: a specific machine or an additional workspace or a trained employee. The closed-loop SC model not only has physical reverse flows (where the box is sent back), but information flows. Indeed, information, directly or indirectly, is exchanged between the consumer and the 3PL provider and, the 3PL provider and the subscription box retailer.
3.5 Findings

The answer to RQ1 “How can a closed-loop SC model for B2C online subscription boxes be set up?” is submitted through the creation of the closed-loop SC model, developed within chapter 3.4.

As discussed within chapter 3.4., the main actors are the subscription box retailer, the 3PL provider, the consumer, and lastly, the parcel delivery service. The closed loop is established by sending the empty package back via the parcel delivery service, to the 3PL provider. Through a cleaning process, the box is re-integrated to a new forward flow, similarly to a new box, and shipped again to the customers.
4  **RQ2: Business Case for Sustainability**

This chapter answers RQ2 “How can a business case for the closed-loop SC model be developed to evaluate the model’s sustainability?”. Afterwards, a conclusion on the findings is presented.

4.1  **Theory**

The business case is an investment capital method used within business and that does not follow a traditional academic methodology. The theory and methodology chapters are adapted to the structure of the business case for a clear comprehension. The following chapters define the business case for sustainability and provide a literature review which includes current business case. From literature, methods are obtained which provides a frame of reference/calculation model. Further, data collection methods, data analysis, research quality as well as ethics are discussed.

![Figure 29 Theory Business Case for Sustainability](image)

4.1.1  **Definition - Sustainability**

Sustainability is a multidimensional concept referring to economic and non-economic criteria to evaluate business performance. A common term is the triple-bottom line approach that includes economic, environmental and social dimensions of sustainability (Liern and Pérez-Gladish, 2018). Corporate sustainability, which is the implementation of sustainability in a business strategy, is defined as voluntary activities by a company to show that social and environmental matters are considered within the business operations (van Marrewijk and Werre, 2003; Pedersen et al., 2017). Reed (2001, p.3) explored how to quantify the value of corporate sustainability and sees an “unexplored potential in applying modern techniques of financial analysis to understanding the value of corporate sustainability strategies, or the financial side of the business case.”
4.1.2 Definition – Business Case

There are different tools that support decision making which meet the organizational requirement of “rationality” (Pedersen et al., 2017). Decision making tools can be benchmarking, scenario planning, balanced scorecard or SWOT analysis. In addition, when a company evaluates new investments, financial analysis tools are commonly used. When looking at corporate sustainability there is only little research on how tools are applied (Pedersen et al., 2017). Pedersen et al. (2017) researched whether business cases are tools that influence corporate sustainability practices. Schaltegger et al. (Schaltegger et al., 2012) define the business case as a situation rather than a pitch. To give a definition, a business case is “(…) a pitch for investment in a project or initiative that promises to yield a suitably significant return to justify the expenditure” (Crane et al., 2008, p. 84). Traditional business evaluation is not able to capture the complex relationships of sustainable developments, where benefits are often indirect or intangible. Kemp (2001) states that in order to convince financial stakeholders, the strategic role of sustainability needs to be pointed out. The business case is then the situation when “economic success is increased while performing in environmental and social issues” (Schaltegger et al., 2012, p. 112).

4.1.3 Definition - Business Case for Sustainability

Salzmann et al. (2005) state that the business case for sustainability (BCS) proves or disproves the sustainable business strategies. According to Kemp (2001) a business case for sustainability is needed in order to convince companies of the opportunities for business performance through sustainable practices. Traditional business evaluation is not able to capture the complex relationships of sustainable developments, where benefits are often indirect or intangible. Schaltegger et al. (2012) focused in their study on the business case for sustainability and define it as the business case that manages the links between voluntary environmental and social activities and economic success.

“A business case for sustainability – as a difference to just a conventional business case or a business case of sustainability – has the purpose to and does realize economic success through (not just with) an intelligent design of voluntary environmental and social activities” (Schaltegger et al., 2012, p. 97)

Schaltegger et al. (2012) name three characteristics of a business case for sustainability. First, a company needs to conduct voluntary activities with the aim of solving problems on a social and environmental level. These activities should not just confirm with regulations or be part of the regular business operations.
Second, the voluntary activities should create an increased economic business performance that can be measured. These can be cost savings, higher sales and profitability, increased competitiveness as well as reputation. The cause and effect relationship between these voluntary activities and improved economic performance can be direct or indirect but have to be based on a convincing business argumentation. Third, a specific management decision or activity initiates the social, environmental and economic effects. A business case for sustainability creates economic success through a specific environmental or social activity, and not just as a side effect of it. Therefore, the business case can not coincidentally happen but is managed and voluntarily, and most importantly not imposed by legal requirements. Within the business case for sustainability, sustainability is improved which in turn creates a positive economic outcome (Schaltegger et al., 2012).

4.1.4 Links between Economic, Environmental, Social and Performance
In order to understand how to manage business cases for sustainability Schaltegger et al. (2012) name the following main drivers:

- Costs and Cost reduction
- Sales and Profit margin
- Risk and Risk reduction
- Reputation and Brand value
- Attractiveness as employer
- Innovative capabilities

These drivers are similar to the drivers of a conventional business case due to their influence on the economic success (priority of a conventional business case). Business case drivers can have a direct or indirect influence on economic performance. The most direct link is seen through costs and specifically cost reduction, which can be addressed through energy savings, reduction of material flows or cleaner production. Opportunity-oriented drivers of business case for sustainability are characterized by the increase of sales and profit margins or the company’s reputation and brand value. Market entry or development drivers have their importance regarding the circumstances and company strategy. Indirect links that the drivers have over the influence of corporate sustainability are attractiveness as an employer which is promoted through recruiting and selection, induction and development programs. Others are the ability to innovate as sustainability pushes to think in diverse dimensions and seek knowledge from diverse sources (Schaltegger et al., 2012).
Current research demonstrates that the association of these six drivers is not random. Hansen (2010, p. 29) demonstrates in a study that “reputation, risks, attractiveness as employer and the capacity to innovate for new products and services were the most important drivers for sustainability engagement”. While, Collins et al. (2010) recognized, in a SME context, that reputation and brand, employees’ demand, risk management and potential cost reductions were important drivers for implementing environmental and social initiatives. Revell and Blackburn (2007) identify cost reduction as the most promising driver that contributes to business success when carrying out environmental actions. Voluntary social and environmental projects and activities are analyzed in terms of their influence on these drivers. Their implementation depends on the extent to which the drivers are influenced.

Kemp (2001, p. 2) has realized the need of a business case for companies “in order to demonstrate how the principles of sustainable development support overall business performance”. The author repeats that there is no roadmap that fits the own circumstances and issues of a company. Therefore, companies have to “apply tools and techniques that will enable them to evaluate their proposals within a business framework and to communicate their proposed actions to others in standard business terms” (Kemp, 2001, p. 2). Kemp (2001, p. 2) points out that it is not always possible to demonstrate a direct link between social, environmental and financial performance as “the benefits may be intangible or indirect”. The author offers a more holistic approach to the business case where alternative course actions with long-term strategies should be coordinated with the values and expectations of society.

Table 5 Links with Improved Performance at Functional Level (adapted from Kemp, 2001, p. 30)

<table>
<thead>
<tr>
<th>Function</th>
<th>Sources of Additional Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company-level</td>
<td>• External relations and company reputation</td>
</tr>
<tr>
<td></td>
<td>• Risk management</td>
</tr>
<tr>
<td></td>
<td>• Organizational systems and processes</td>
</tr>
<tr>
<td></td>
<td>• Asset value and contingent liabilities</td>
</tr>
<tr>
<td>Human Resources</td>
<td>• Resource attraction and retention</td>
</tr>
<tr>
<td></td>
<td>• Employee productivity</td>
</tr>
<tr>
<td>Sales and Marketing</td>
<td>• Product/service differentiation</td>
</tr>
<tr>
<td></td>
<td>• Cost leverage</td>
</tr>
<tr>
<td></td>
<td>• Customer satisfaction and loyalty</td>
</tr>
<tr>
<td>Operations</td>
<td>• Materials and process efficiency</td>
</tr>
<tr>
<td></td>
<td>• Technology and innovation</td>
</tr>
<tr>
<td>Supply Chain Management</td>
<td>• Inbound and outbound logistics</td>
</tr>
</tbody>
</table>
Kemp (2001) looks at how business performance improves on a functional level through improved ethical environmental and social performance. The areas of human resources, sales and marketing, operations and supply chain management have the strongest links. Within table 5 the functional levels and their sources of additional value can be seen. Moreover, Kemp (2001) lists key financial drivers and indicators identified by Van Heel et al. (2001) as specifically relevant with regards to sustainability issues:

- Customer attraction (e.g. ethical product development, resourcing or processing)
- Brand value and reputation (e.g. relationship improvement where the business operates)
- Human and intellectual capital (e.g. by reducing the staff turnover of highly skilled and experts)
- Risk profile e.g. (stakeholder involvement and dialogue improves likelihood of legal disputes)
- Innovation (e.g. researching alternative sources)
- Licence to operate (e.g. by improving communication with authorities)

According to Van Heel et al. (2001) the company’s performance regarding customer attraction may be measured by the brand loyalty of its customers. Looking at brand value and reputation, Van Heel et al. (2001, p. 24) state that it is the “value of the company's corporate and product brands”. The brand value may be measured by the bookvalue, ranking lists, or public opinion polls. Human and intellectual capital is referred to as the knowledge and skills of all employees of a company. It is measured by investment in employee training and development as well as the companies' ability to innovate.

The risk profile is measured through the record of avoiding, withstanding and recovering from external shocks as well as the overall risk rating of investments by agencies. Innovation is according to Van Heel et al. (2001) the “ability to maintain competitive advantage by regularly designing and delivering new and improved products, services and business models”. It can be measured by records of number of new product launches or patents, as well as the innovation quality and the flexibility of the business model. Lastly, the license to operate is the “level of acceptance of the company by its stakeholders” and is given by politicians, local communities, the public and media or civil society in general (Van Heel et al., 2001, p. 32). Likewise, DEFRA (2006) explains that managing and reporting environmental performance not only has an impact on the environment but also has business benefits such as:
• Cost savings and productivity gains: reducing and managing resource use of raw materials, supplies, reduction in waste, waste, and energy use and transport, travel, and packaging. This leads to less landfill waste, the possibility to avoid compliance and lower insurance costs.

• Improved sales: informing customers of the improvement of the business's practices improves its reputation and customer confidence.

•Preferred supplier status: being environmentally aware and applying it to the business makes the company more attractive than its competitors.

• Increased attractiveness to the investment community: the reporting on environmental matters allows stakeholders to assess how the company intends to reduce risks and develop opportunities.

• Product and service innovation: managing environmental impacts encourages for new product development and business opportunities.

• Employee recruitment: environmental reputation and performance is an important factor in an employee's choice of employer. So, clear environmental reporting attracts talented recruits.

• License to operate: reducing environmental impacts reduces exposure to fines, improves relations with regulators.

The links found by Kemp (2001), the financial drivers by Van Heel et al. (2001), and the impacts stated by DEFRA (2006) complete the drivers by Schaltegger et al. (2012). While Schaltegger et al. (2012) talk about drivers for business case for sustainability, Willard focuses on business case benefits which are closely related to the drivers. Both indicate a positive influence on the economic success of a company. Willard (2012, p. 26) points out that businesses are reluctant to launch sustainability strategies due to the "lack (of) an appropriate business case to quantify the benefit opportunities". The strategy needs to help the business, otherwise business leaders will find no relevance to it. The purpose of a business case for sustainability is to "present quantifiable evidence that investing in sustainable development pays off with real bottom-line benefits" (Willard, 2012, p. 26). It is about possibilities and the potential benefits that the business gets from implementing sustainable practices. Detailed explanations of the sustainable business case benefits pointed out by Willard (2012) can be found in the following subchapters completed with examples found by Kemp (2001).
4.1.4.1 Revenue and Market Share

Revenue and market share are inevitably related to the consumer, especially in the B2C sector (Willard, 2012). The revenue and market share is influenced by customer attraction and satisfaction. Moreover, the market share is the competitive position of a company and changes through sales increases or overall industry growth (Anthony et al., 2014). Customer satisfaction is measured by surveys or number of complaints (Anthony et al., 2014). For Willard (2012, p. 40), customers are more likely attracted to companies that are "doing good things and are responsible". Customers gravitate towards companies that explain how sustainability affects their business and with whom they share the same values. Even though consumers are ready to invest in "greener" products, they "will not pay much extra for them" (Willard, 2012, p. 42). But green products open a new market to companies and when green products achieve similar prices to non-green products, customers become very attracted and choose the greener one. An innovation that greener products bring to the market is in "selling services instead of producing goods that deplete natural capital" (Willard, 2012, p. 42). The ability to lease a product means for the company to take it back and recycle its components. It initiates a steady monthly income and reduces the necessity to meet manufacturing capacity with peak demand, which are sources to risk and waste (Willard, 2012).

Additionally, Kemp (2001) provides the following practical examples of increased sales when carrying out sustainable actions: Coca Cola launched its six-week campaign in 1997 about 'Mothers Against Drunk Driving' and sales raised by 490%, while donating parts of it to the respective organization. Another example is Electrolux's 'Green Range' which has a lower environmental impact. The company experienced a 3.5% increase in the gross margin in comparison to the regular range.

In other words, businesses increase their revenue and market share by presenting themselves as an environmental and social responsible corporate citizen, developing their products in a greener way and selling their products in an innovating way, such as leasing.

4.1.4.2 Energy Expenses

Willard (2012, p. 50) states that "the quickest and most cost-effective way to save money is to reduce unnecessary energy use". A very consuming energy expense which has a direct effect on the environment is transportation. Resource-efficient transportation and shipping are possible through:
- Reduced fuel costs from more efficient mean of transportation
- Increased cost-effectiveness due to lighter, smaller, and more efficiently packaged products
- Fewer vehicles or loads due to smarter combinations of shipments by batching loads
- More efficient routing algorithms

When combining sustainability and transportation, Willard (2012, p. 56) observed that "companies are willing to put time and effort into sustainability, even if there is no return on investment (ROI)". Even if the company is willing to implement greener solutions, they are only beneficial and have an impact if employees have the same vision and feel that it is of their individual responsibility to also take part in the process. Indeed, Willard (p.60) states "employees' innovative ideas, firsthand knowledge of work flows, and passion to help the company solve its sustainability puzzle are the underpinnings of eco-efficiency savings".

Willard (2012, p. 62) reminds that "energy costs are still only a small fraction of total costs in most industries". Thus, not many executives give it as much attention. Hawken et al. (Hawken et al., 1999) proposed a method where resource and energy use are improved by four. They say "companies can generate twice the output with half the input of materials and energy; or four times the output with the same amount of materials and energy"(Hawken et al., 1999, p. 11).

4.1.4.3 Waste Expenses
Waste is a direct result of inefficient systems. It is an accepted by-product of doing business and many companies do not want to deal with it as the cost of handling waste is equated to the cost of it (Willard, 2012). However, companies should cover the waste expenses and save on it by adopting a "fresh approach to process design that considers industrial systems as a whole, rather than a collection of isolated parts" (Willard, 2012, p. 70).

One of Denmark's eco-industrial park trade set up an "industrial ecology" where waste from one company is used as food for another. For Willard (2012, p. 73), the closed-loop systems in these industrial ecosystems benefit the companies, the communities, and the environment: they profit from each other's waste. What motivates even further companies to take head on the issue of waste is that "waste reduction makes a surprisingly high contribution to potential bottom-line benefits from sustainability strategies" (Willard, 2012, p. 74).
4.1.4.4 Materials Expenses
Materials englobe raw materials, parts, finished goods, consumables, packaging and water. Willard (2012) presents four ways to save money on them:

- Dematerialization: reduce the amount of material used per product to reduce the material intensity of goods. The company saves money while destroying less natural capital. Indeed, it streamlines operations and increases organizational effectiveness as there are fewer material and components to handle and more efficient processes (Willard, 2012).

- Substitution: use less expensive, more environmentally friendly, raw materials. Unfortunately, substitution cost more than the environmental friendly alternative. Evaluating alternatives is a system that must be thought through so as the consumer does not pay for the consequences (Willard, 2012).

- Recycling onsite waste: reduce, reuse, and recycle scrap materials, turning them into useful raw materials for products instead of throwing them away. The 3Rs of waste reduction lead to material opportunities but break-even analysis should determine the effectiveness of these recovery efforts in comparison to the purchasing of virgin materials. The further upstream the recovery process is initiated, the less expensive the reuse operations are.

- Product take-back: reuse and recycle components and materials from returned products in a closed-loop, cradle-to-cradle system. The company does not sell a product but rather a service. This means that the consumers do not own the product, and the business has the ability of reusing the product for a similar or different use, according to marked demand. This process gives producers responsibility over the environmental impact of their products. More than just giving companies the ability to make a profit or gain a marketing advantage, "it is the producer mindset that it encourages: collaboration among manufacturers, retailers, users and municipal governments” (Willard, 2012, p. 86).

4.1.4.5 Employee Productivity
Intrinsic motivation pushes employees to strive above and beyond their defined role. Daniel Pink, in his book Drive, writes that intrinsic motivation comes from three elements (Pink, 2009):

- Autonomy – the desire to direct our own lives
- Mastery – the urge to get better and better at something that matters
• Purpose – the yearning to do what we do in the service of something larger than ourselves

Willard (2012, p. 96) demonstrates that "sustainability strategies provide a purpose and an opportunity to do something that matters". They inspire feelings of pride and satisfaction of making a contribution to society.

Employees have to engage with the projects or strategies in order to fully commit to them. Belgard – Fisher – Rayner created an engagement model which shows the combination of four factors needed for employees to be committed.

![Engagement Model](image)

Figure 30 Engagement Model Belgard – Fisher- Rayner (Willard, 2012, p. 97)

- Clarity refers to understanding the project
- Relevance indicates the benefits of the project for the company
- Involvement points out the personal opportunity to shape and implement the project
- Meaning invokes the link between the project and the personal values of the employee

Sustainable development is having an impact on the economy, society and the environment – strong commitment aspects. More engaged employees translates by lower absenteeism, lower employee turnover and fewer safety incidents which is achieved when employees connect their passion and contribute to causes they care about. Kemp (2001) found that employee loyalty, commitment and productivity factors are indicating factors of satisfaction in the workplace. Less visible but nonetheless influencing factors that Kemp (2001) names are safe environment, environmental responsibility, diverse workforce, good human rights record, no slave/child labor, donating resources to the community.
4.1.4.6 Hiring and Attrition Expenses

According to a poll on MonterTRAK.com, "80% of young professionals are interested in securing a job that has a positive impact on the environment, and 92% would be more inclined to work for a company that is environmentally friendly" (Willard, 2012, p. 120). On the other side of recruitment, companies state that their biggest business imperative is attracting and retaining talent - "smart, sophisticated business people who are technologically literate, globally astute, and operationally innovative" (Willard, 2012, p. 120).

The ability to promote sustainable practices (support employees who carry out sustainable initiatives, broadcast internal sustainable news, environmental friendly contests, help employees live in greener homes...) attracts and retains talents. Involuntary turnover is the unfortunate event of downsizing or encouraging employees to pursue their career in a more suitable place according to their skills. The turnover cost can be estimated between 50% and 125% of an employee's salary – very costly for any business. In addition to losing an employee, the company has to set out expenses to find another candidate. So, the sustainable strategies, behaviors and reputation that a business sets for itself can save it noticeable involuntary turnover expense.

Here, Kemp (2001) confirms that the staff turnover rate is positively influenced through sustainable development activities. Kemp (2001) presents examples such as Novo Nordisk whose staff turnover dropped by half of the industry average after broadening its commitment to sustainability. Another example is B&Q who staffed a center with people over the age of 50 as an experiment and experienced an increase in profits. The staff turnover dropped by six times, lower absenteeism rate was recorded and a higher customer perception of the quality of service (Kemp, 2001, p. 25).

4.1.5 Sustainable Performance Measurement

A literature review presents the quantification of the links described in chapter 3.1. Based on these measures, an investment decision for the sustainable business case is taken. Sustainable performance measures are reviewed within this chapter from environmental, social and economic perspectives.
4.1.5.1 Economic Performance

The traditional business case issues an investment decision based on the expected financial performance.

Tools and KPI’s identified by Kemp (2001) are the drivers for shareholder value, cost-benefit analysis, return on capital employment (ROCE), economic value added, and discounted cash flow.

The drivers for shareholder value are identified by Alfred Rappaport (cited in, Kemp, 2001, p. 43) as:

- sales growth rate: defined by Horngren (2014) as the revenue from customers
- profit margin: defined as Net income/Sales (Brealey, 2014)
- fixed capital investment
- working capital investment
- competitive advantage period
- cost of capital
- cash tax rate

Cost-benefit techniques are suitable to assess proposed actions. The analysis includes qualitative and quantitative information. The benefits, justifications and risks as well as the project scope are generally qualitative information, while projected cash flows for the proposed project are quantitative information (Brealey, 2014). Regarding the timescale, it needs to be considered that environmental and social impacts might not be measurable within a business planning period (Kemp, 2001). According to Layard and Glaister (1994) the cost-benefit analysis usually includes two steps. First, the cost and benefits of each year of a project are valued. Second, all cost and benefits are discounted to get an aggregated present value and then added up.

The ROCE is defined as “pre-tax profit divided by net capital employed” (Kemp, 2001, p. 46). It is used to assess business performance regarding the use of capital to create financial returns. An increasing ROCE shows that the business is thriving whereas a declining ROCE indicates weaknesses. When evaluating a business case, it is insightful to test the impact on the company’s ROCE (Kemp, 2001).

Cash flow is the sales revenues after operating and related overhead costs, tax and investments in fixed and working capital. A common investment valuing method is to discount the cash flow by its capital costs. “Discounting is the process of adjusting future cash flows to their present values” (Pike, 2015, p. 58). According to Kemp (2001) cash flows for a project cover are:
• sales
• operating and related overhead costs
• required fixed capital expenditure
• required working capital expenditure

According to Brealey (2014) if the value of the future cash flow (net present value) exceeds the up-front costs, an investment is likely to create wealth.

4.1.5.2 Environmental Performance

According to Shaw et al. (2010) the global reporting initiative released “de facto” standards for measuring environmental performance for the transport and logistics sector. Main indicators are the following table 6.

<table>
<thead>
<tr>
<th>Environmental Indicator</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials</td>
<td>Used, recycled</td>
</tr>
<tr>
<td>Energy</td>
<td>Consumed</td>
</tr>
<tr>
<td>Water</td>
<td>Withdrawn, recycled, reused</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>Protected areas, red lists</td>
</tr>
<tr>
<td>Emissions</td>
<td>Greenhouse gas</td>
</tr>
<tr>
<td>Effluents and waste</td>
<td>Discharged, waste</td>
</tr>
<tr>
<td>Products and services</td>
<td>Environmental impact</td>
</tr>
<tr>
<td>Compliance</td>
<td>Fines, sanctions</td>
</tr>
<tr>
<td>Transport</td>
<td>Environmental impact</td>
</tr>
<tr>
<td>Overall</td>
<td>Protection expenditures, investments</td>
</tr>
<tr>
<td>Supplier environmental assessment</td>
<td>Percentage of new suppliers screened,</td>
</tr>
<tr>
<td></td>
<td>impact/action in the supply chain</td>
</tr>
<tr>
<td>Environmental grievance mechanisms</td>
<td>Number of grievances</td>
</tr>
</tbody>
</table>

The following table sets the inputs and outputs of cardboard production giving an overview on the used materials and produced emissions of the cardboard (Duong, 2017). The table excludes the raw materials, energy used a emissions and waste output of the pulp production itself.

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Unit</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude oil</td>
<td>GJ</td>
<td>0.94</td>
</tr>
<tr>
<td>Electricity supply</td>
<td>kWh</td>
<td>882.0</td>
</tr>
<tr>
<td>Water</td>
<td>m³</td>
<td>51.7</td>
</tr>
<tr>
<td>Wood</td>
<td>m³</td>
<td>3.0</td>
</tr>
<tr>
<td>Pulp</td>
<td>kg</td>
<td>154</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outputs</th>
<th>Unit</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardboard</td>
<td>T</td>
<td>1.0</td>
</tr>
<tr>
<td>Tall oil</td>
<td>kg</td>
<td>11.4</td>
</tr>
<tr>
<td>Waste for disposal</td>
<td>kg</td>
<td>8.6</td>
</tr>
<tr>
<td>Carbon dioxide (fossil)</td>
<td>kg</td>
<td>70.8</td>
</tr>
<tr>
<td>Waste water</td>
<td>m³</td>
<td>31.3</td>
</tr>
</tbody>
</table>
Mangiaracina et al. (2015) explain that factors such as additional packaging, transportation and warehousing influence the overall sustainability of the supply chain of online retailers. A big percentage of the greenhouse gas (GHG) emission is created by packaging. According to Mangiaracina et al. (2015), cardboard packaging is specifically responsible for GHG emissions. Online shopping generally uses more packaging “energy” than physical store packaging “energy” as the basic packaging is complemented with “a package, e.g. a corrugated board packaging” (Pålsson et al., 2017, p. 776). Van Loon et al. (2015) found that 100g (corrugated) cardboard plus 33g filling material accounts for 181g CO2. Whereas common shopping bags, which are used when the consumer does the shopping trip himself, results in 11g CO2. In addition, the manufacturing of cardboard accounts for 1040 kg CO2 per ton of cardboard (WRAP.org, 2010)

The following subchapters give a more detailed explanation on greenhouse gases, waste and water abstraction according to DEFRA (2006).

4.1.5.2.1 Greenhouse Gases (GHG)
They contribute to the greenhouse effect: increase of the Earth's temperature as heat is trapped under the surface. The combustion of fossil fuels through generation of energy in businesses and homes as well as transportation are the significant activities that lead to GHG emissions. Other activities such as agriculture, industrial processes, land-use change and forestry and waste management contribute to it. DEFRA (2006, p. 32) explains that GHG emissions are measured by "recording emissions at source by continuous emissions monitoring or by estimating the amount emitted using activity data and conversion factors".

4.1.5.2.2 Waste (Recycling, Recovery and Landfill)
There are four ways of managing non-hazardous waste (DEFRA, 2006):

- **Landfill**
  Waste material is contained according to its origin as to limit and avoid emissions such as methane and greenhouse gas. The landfill sites have the ability to capture and flare off the emissions.

- **Recovery – Energy from waste**
  Waste incineration can be source of renewable energy but it should be closely monitored as toxic gases are also released.

- **Recycling**
The process is more energy efficient than extracting virgin materials. Indeed, recycling aluminum is 95% more energy efficient than extracting virgin aluminum, recycling glass is 50% more energy efficient than producing virgin glass and recycling paper is 60% more energy efficient that producing virgin paper.

- **Re-use**
  
  It has been an initiative started by community groups more widely known under the "second-hand" term. The aim is to redistribute the products so as to give them a "second life".

Non-hazardous waste occurs on a daily basis and is not restricted to any business. Many businesses have recycling bins to facilitate sorting before reaching the structures that manage waste (landfill facilities, recycling facilities...). Differentiation can be made according to the type of waste (paper, plastic, carton, glass, food).

4.1.5.2.3 **Water Abstraction**

Water is used in the production and provision of numerous goods and services. Due to excessive use, over-consumption and climate change, water resource management has become difficult. To prevent this resource from disappearing, market and financial instruments such as abstraction charges, effluent consents and pricing mechanisms have been set up.

4.1.5.3 **Social Performance**

According to Weber (2008) there are direct and indirect financial benefits from CSR activities. In general, increased financial performance shows in cash flows. On the other hand the brand value can increase due to CSR activities. The financial effect is not direct but shown when the brand is sold. Other benefits are non-monetary such as customer attraction and retention. They are measured as non-monetary but impact the overall competitiveness of a company. Other non-monetary benefits can be improved access to capital and a secured license to operate through social acceptance. This is realized by improved stakeholder relations. Some non-monetary benefits can be measured quantitatively. For instance:

- Improved customer attraction, retention
- Improved reputation
- Employee recruitment, motivation, retention

Another way of measuring the value of CSR is the concept of stakeholder value added. It measures the value of the stakeholder relationships.
Nevertheless, Weber (2008) states that the stakeholder value added will not be suitable to measure the CSR performance of a company. Weber (2008) suggests to first evaluate the impacts qualitatively. In the next step KPIs are developed and measured to map the improvements of the company’s competitiveness according to its CSR activities. The following KPI’s are suggested:

<table>
<thead>
<tr>
<th>CSR KPIs</th>
<th>Possible quantitative indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brand value</td>
<td>Cost-oriented, Price oriented, or capital value-oriented brand value</td>
</tr>
<tr>
<td>Customer attraction &amp; retention</td>
<td>Repurchase rates, market share</td>
</tr>
<tr>
<td>Reputation</td>
<td>Reputation indices and rankings</td>
</tr>
<tr>
<td>Employer attractiveness</td>
<td>Applications per vacancy, hiring rate</td>
</tr>
<tr>
<td>Employee motivation &amp; retention</td>
<td>Fluctuation rate, absenteeism</td>
</tr>
</tbody>
</table>

Figure 31 KPI’s CSR (adapted from Weber, 2008)
4.1.6 Methodology
The methodology steps to implementing a business case are the following (Willard, 2012):

1. Identify an area of improvement
2. Visualize the workflow
3. Identify the relevant metrics
4. Attach data
5. Establish a desired future data
6. Execute

The first two steps have been answered in RQ1. Indeed, the first step is the basis for this thesis. The second step corresponds to the model that has been developed in RQ1. The third step compares to the measurement choices that were developed in the theory presentation of the business case. The measurement choices are made according to the expected availability of data. In fact, as the business case is not internal to a specific company, this means that it does not set forth the benefits which are gained directly by this company. Rather, as the aim is to assess the generic model created in RQ1, which relies on data collected from different businesses, the business case model also relies on measurement from these different businesses. It can then be understood that the companies may not feel inclined to share measurements that are seen as sensitive. Furthermore, as the model has the purpose to be used by different businesses, the latter should be able to relate and understand the use of the selected measurements. The elected measures are chosen from theory and filled with empirical data.

The fourth step requires for the researchers to gather data from previously interviewed companies (from RQ1). Data is also collected from secondary databases such as public financial records, in particular for environmental emission measurements. Data is either collected in a quantitative or qualitative form. Quantitative data is drawn from specific economic and environmental questions. On the other hand, qualitative data is mainly associated to social matters and non-monetary economic matters. An interview guide can be found in appendix B.

The fifth step is assimilated to the results drawn from the calculations. The conclusion answers RQ2 and takes into account the framework in which the business case for sustainability is set. In a simple way, the verdict should state whether the developed model (from RQ1) is sustainable or not. Going even further, researchers should be able to state the impact the model has on businesses that decide to adopt it.
They are able to clearly present the benefits for the company and the incurred costs. Willard (2012, p. 176) points out that "costs" should not be presented as such but rather as an investment. Additionally, a budget for sustainability measures should not be specifically taken out but a share of existing allocations to other departments could be allocated for the implementation of new sustainability measures. The sixth step refers to a business implementing the model. The business should achieve similar results to the ones obtained from the measures in the business case for sustainability.

4.2 Frame of Reference

4.2.1 Research Model

The research model is developed by researchers from theoretical analysis. The central parts are the economic performance, environmental performance and social performance that help to measure the overall sustainability. To each measurement is associated the most relevant indicators that researchers work out for the model while assessing the model in the business case for sustainability.

<table>
<thead>
<tr>
<th>Social Performance</th>
<th>Economic Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Attractiveness as employer</td>
<td></td>
</tr>
<tr>
<td>• Employee loyalty</td>
<td></td>
</tr>
<tr>
<td>• Commitment, motivation</td>
<td></td>
</tr>
<tr>
<td>• Cost (investment &amp; ongoing)</td>
<td></td>
</tr>
<tr>
<td>• Material cost</td>
<td></td>
</tr>
<tr>
<td>• Personnel cost</td>
<td></td>
</tr>
<tr>
<td>• Transportation cost</td>
<td></td>
</tr>
<tr>
<td>• Benefits</td>
<td></td>
</tr>
<tr>
<td>• Sales revenue</td>
<td></td>
</tr>
<tr>
<td>• Reputation</td>
<td></td>
</tr>
<tr>
<td>• Brand value</td>
<td></td>
</tr>
<tr>
<td>• Stakeholder relationships</td>
<td></td>
</tr>
<tr>
<td>• License to operate</td>
<td></td>
</tr>
<tr>
<td>• Customer attraction</td>
<td></td>
</tr>
<tr>
<td>• Customer satisfaction</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 32 Research Model BCS**

4.2.2 Operationalization

Operationalization is a step further, where definitions and measures are set forth in theory. This helps interviewees, but also researchers, have a practical understanding of the concepts and easily associate them to their business environment.
<table>
<thead>
<tr>
<th><strong>Table 8 Operationalization</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Business Case for Sustainability</strong></td>
</tr>
<tr>
<td><strong>Sustainability</strong></td>
</tr>
<tr>
<td><strong>Sustainable performance measurement</strong></td>
</tr>
</tbody>
</table>

**Economic performance**

| **Cost** | Include one-time cost such investment cost, and ongoing cost such as material cost (here: packaging cost), personnel cost (Weber, 2008) |
| **Benefits (monetary)** | Often business case benefits are intangible or indirect (Kemp, 2001). Benefits can include cost savings, higher sales, profit margin, market share, revenue etc. (DEFRA, 2006; Schaltegger et al., 2012; Willard, 2012) |
| **Sales revenue** | Revenue from customers (Horngren, 2014) |
| **Increased competitiveness** | Besides the monetary benefits, a BSC can have non-monetary benefits that increase a company’s competitiveness such as reputation, customer attractiveness etc. (Weber, 2008; DEFRA, 2006) |
| **Reputation** | Measured with indicators such as reputation indices and rankings (Weber, 2008) |
| **Brand value** | Measured by book value, ranking lists, or public opinion polls (Van Heel et al., 2001). |
| **Stakeholder relationships** | Evaluated qualitatively (Weber, 2008). |
| **License to operate** | Level of acceptance of the company by its stakeholders (e.g. by politicians, local communities, the public, media or civil society in general) (Van Heel et al., 2001). |
| **Customer attraction** | Can be measured by the repurchase rate and market share (Weber, 2008) |
| **Customer satisfaction** | Measureable by customer surveys, no. of complaints (Anthony et al., 2014) |

**Social performance**

| **Attractiveness as employer** | Measured by applications per vacancy or hiring rate (Weber, 2008) |
| **Employee loyalty** | Measured with fluctuation rate, staff turnover (Weber, 2008) |
| **Employee motivation** | Absenteeism is a measure which is used in order to draw conclusion on the employee commitment and motivation (Willard, 2012) |
### Environmental performance

<table>
<thead>
<tr>
<th><strong>Water abstraction</strong></th>
<th>The actual abstracted volume that should be measured (DEFRA, 2006)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Waste reduction</strong></td>
<td>Waste is measured by estimating the number and weight of waste containers that leave the facility over a period of time and measured in mT/annum. Differentiation can be made according to the type of waste (paper, plastic, carton, glass, food) (DEFRA, 2006)</td>
</tr>
<tr>
<td><strong>Material used</strong></td>
<td>For the manufacturing of cardboard, pulp, wood, water, crude oil is are used material (Duong, 2017)</td>
</tr>
<tr>
<td><strong>Emissions</strong></td>
<td>The manufacturing of cardboard accounts for 1040 kg CO2 per ton of cardboard (WRAP.org, 2010)</td>
</tr>
<tr>
<td><strong>Energy</strong></td>
<td>The energy consumption per ton of cardboard is 882 kW (Duong, 2017)</td>
</tr>
<tr>
<td><strong>Transport</strong></td>
<td>The environmental impact of transport is part of the environmental performance (Björklund et al., 2016)</td>
</tr>
</tbody>
</table>

### 4.3 Empirical Findings

The data builds on the four cases presented in chapter 3 as well as thoughts from the expert interview (Interviewee E) in order to answer RQ2. The lengths of each analysis vary due to the amount of collected data.

#### 4.3.1 Case A

According to Interviewee A (2018), the investment for implementing a reusable system is feasible if the business model leaves the possibility to expand and invest. Indeed, as a cleaning system needs to be implemented, a variable cost of 5 € needs to be integrated in the price of the box (so as the customer does not feel that he is paying extra). However, as company A operates on a small scale it does not have such a business model and therefore not the capacity, today, to handle such an investment.

Nonetheless, according to customer feedback and interaction, Interviewee A (2018) believes that this reusable packaging solution would attract the younger market, as customers of +45-year-old rarely ask for product changes. Interviewee A (2018) believes that their reputation and brand value would be positively affected with the implementation of a reusable transport packaging. When it comes to the stakeholder relationships, Interviewee A (2018) expects a very positive influence especially when it comes to media coverage such as press. Their attractiveness as an employer will be positively influenced whereas no change in employee loyalty is anticipated. But, employee motivation is likely to grow (Interviewee A, 2018).
As of today, a single client has shown interest in returning a box. The implementation of such system is predicted to have a 50% return rate if the customer has to send it back himself or 100% if no additional work is expected from the customer (Interviewee A, 2018).

4.3.2 Case B
Interviewee B (2018) cannot estimate any economic consequences as there is no chosen supplier and no market study. Interviewee B (2018) expects that with a model as suggested within chapter 3 reputation will not be influenced. Whereas the brand value and the stakeholder relationship will be positively influenced.
The customer satisfaction could be either positive or negative depending on the acceptance of the new packaging.

4.3.3 Case C
Interviewee C (2018) has not commented on any investment costs, only that transportation costs double: from 3 euros (30 SEK) to 6 euros (60 SEK). As company C is run by only one person no answers regarding employee loyalty, employer attractiveness and motivation could be given.
Impact on brand value, reputation and customer attraction can either have a positive or negative effect according to acceptance from customers (Interviewee C, 2018). However, Interviewee C (2018) does foresee a rather high positive acceptance of the system from its customers, especially as he estimates a return rate of 70%. Yet, he points out the opportunity of implementing the reusable system in northern European countries due to their high awareness on environmental issues (Interviewee C, 2018).

4.3.4 Case D
Interviewee D1 (2018) calls out the reusable system as "very interesting" even though several aspects of it require attention. Indeed, he feels quite positive about it if it does not incur any additional costs. The barrier to implementing the system is the investment costs linked to the cleaning systems and the return transportation costs. And, with the small margins the business currently achieves, costs would be reflected in the price paid by customers. This would have an impact on sales revenue, market share and brand value. Naturally, an increase on the price of the box would attract less and impact the number of sold boxes.
On the contrary, if no additional costs are perceived by the customer, Interviewee D1 (2018) expects a 30% to 40% return rate. When Interviewee D2 (2018) projects a
possibility between 5% and 10%. In this case, Interviewee D1 (2018) thinks customer attraction and satisfaction will increase positively. Similarly, the stakeholder relationship would be impacted positively, if the system does not induce costs on their end. Interviewee D1 (2018) believes that giving a positive environmental image of the company with such system would influence their attractiveness as employers.

4.3.5 Expert Interview
Interviewee E (2018) considers the transport return costs to be similar to those of forward shipping. The expert points out that the boxes are in fact "quite cheap", therefore in comparison, the shipping cost are higher than the actual cost of the box. To illustrate:

- cleaning fee of ca 0.5 €,
- handling of ca. 0.5 €,
- return cost via transport provider ca 2 €

This reusable system has already been tried within Interviewee E's business and the box return rates were between 20% and 30%. The reason for it to not have followed through was the price of the boxes. As, the cardboard is so cheap (in comparison to transportation costs), it was not seen more economical to have it sent back. (Interviewee E, 2018).
4.4 Data Analysis

The data analysis is dedicated to evaluating the sustainability of the model below, created in chapter 3. Insights from the interviews are analyzed and own calculations conducted in order to present an evaluation at the end of the chapter. Researchers remind that the scope of the model does not include the boxes nor the customers even though assumptions are made. Indeed, the aim of the thesis is not to develop a new reusable box. The presented boxes are the ones currently in use by the companies or on the market.

4.4.1 Economic Performance

This subchapter focuses on the economic performance of the closed-loop SC model. First, the qualitative data is analyzed, and then the economic performance is quantified.
4.4.1.1 Analysis Qualitative Data

While some economic performance aspects such as packaging cost and transportation cost are quantified in calculations, other aspects of the economic performance can only be qualitatively evaluated. An overview per case is shown in table 9 on page 80.

Even though each company case operates on different markets, they have a more or less common speech: it depends on the cost. With no certainty on the return on investment, companies are not willing to take a risk. They put forth the size of their business model as a barrier to implementing the closed-loop. Indeed, investing in a reusable system suggests more expensive boxes. Furthermore, according to the cleaning needed, product or machinery investment may be required. More than just initial investment, it is also the sales revenue which preoccupies them. Currently, due to the size of the company and their customer market, they have a rather small margin (Interviewee A, 2018; Interviewee C, 2018; Interviewee D1, 2018).

As shown in table 9, sales revenues may be positively affected. Nevertheless, higher costs which are reflected in higher prices could generate negative backlashes and similarly impact sales revenues. This aligns with Willard's (2012) saying that suggests that consumers can be attracted to green products, which reflects in higher sales revenues, but only when the green products achieve similar prices to the regular ones. Even though some customers are prepared to invest in green products, they are generally not willing to do so to a much higher price. Customer attraction and satisfaction is likely to be influenced according to the extra efforts or costs required by customer.

Even though sustainability is a growing matter, when it comes to paying more in order to support sustainability, not everyone is willing to. However, each interviewed company does believe that this initiative, if correctly inputted, would be widely accepted by its customers.

Additionally, it would largely influence the company's reputation, brand value, stakeholder relationships. The impact is expected to be positive to very positive as long as no additional costs are incurred (Interviewee A, 2018; Interviewee B, 2018; Interviewee C, 2018; Interviewee D1, 2018). Table 9 shows the discussed performance indicators according to the statements of the interviewees.
### Table 9 Economic Performance Qualitative

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment Cost</td>
<td>Feasible with a significant business model; Case A does not have such model</td>
<td>There is no chosen supplier and no market study, therefore costs are not clear yet</td>
<td>Unable to estimate</td>
<td>Unable to estimate</td>
</tr>
<tr>
<td>Personnel Cost</td>
<td>Personnel cost for cleaning needs to be integrated in the price of the box</td>
<td>Unable to estimate</td>
<td>Unable to estimate</td>
<td>Handling is feasible with current amount of personnel</td>
</tr>
</tbody>
</table>
| Sales Revenue                | • Help attract younger customer  
• Better brand image                                                                                | Unable to estimate                                                                          | Positive but risk of negative backlash                                                      | With a current small margin, the cost would probably be reflected in the price                                 |
| Reputation                   | +                                                                                           | neutral                                                                                     | +/-. Positive but risk of negative backlash                                                 | ++/- Only as long as the cost are the same, otherwise negative backlash                                       |
| Brand Value                  | +                                                                                           | +                                                                                           | +/- Positive but risk of negative backlash                                                  | ++/- Only as long as the cost are the same, otherwise negative backlash                                       |
| Stakeholder Relationships    | ++ (due to positive press)                                                                 | +                                                                                           | Unable to estimate                                                                          | + Acceptance from partners unless extra incurred cost                                                          |
| Level of Acceptance          | ++                                                                                           | Unable to estimate                                                                          | Unable to estimate                                                                          | + (except if extra cost)                                                                                     |
| Customer Attraction          | +                                                                                           | Unable to estimate                                                                          | +/-. Positive but risk of negative backlash                                                  | + (except if extra cost)                                                                                     |
| Customer Satisfaction        | +                                                                                           | +/- (depends on client acceptance with the new packaging)                                    | Unable to estimate                                                                          | “customers would love it” (except if extra cost)                                                               |

#### 4.4.1.2 Analysis Quantitative Data

As pointed out by interviewees, it is important to differentiate expensive packaging and cheap packaging, which impacts the level of reusability. Expensive packaging is often of higher durability, such as in case A, and may be reusable more times than cheaper packaging, as in case D, where reusability is questionable (Interviewee A, 2018; Interviewee E, 2018).

A total of three calculations is made: one with the cheapest packaging cost of 1,18 € (in case C), an average packaging cost of 2,31 € and the most expensive packaging with 4,30 € (case A). Transport is ca. 5 € in case A and ca. 2,85 € (30 SEK) in case C and D, which leads to an average transportation cost of 3,57 €. As stated earlier, Interviewee E (2018) explains that the return and forward transport cost are approximately the same, since it is the same length.
Interviewee E (2018) states that return transportation cost can be estimated at 2 € per box, which is used as an assumption within calculation. Further, Interviewee A (2018) and Interviewee E (2018) point out the necessity to calculate a cleaning fee and handling cost in addition to the return cost. Interviewee E (2018), from experience, calculates cleaning cost to about 0.50 € and handling cost 0.50 € (summarized in the calculation as cleaning cost of 1 €). As no further details could be gathered from the cases, the cleaning cost is assumed to be 1 €.

The calculations show the sum of all costs per cycle of (re-)use. A cycle is considered as the course of the box: from the retailer to the customer (forward flow) and back again to the retailer or logistician (return flow). From the 2nd cycle on, the return flow and cleaning are added, whereas the packaging cost is divided by the number of cycles. Therefore, the packaging is divided by the number of reuse cycles. In practice, the costs incur only when the package is bought from a supplier. In the following use cycles there are no additional packaging cost.

The expensive packaging scenario (table 11) reveals that the overall costs decline after the 4th cycle of (re-)use. The more cycle the box goes thru, the lower the cost of the cardboard. In comparison, the extra cost of return transportation and cleaning is not compensated by packaging material cost savings in the other scenarios (table 10 & table 12).

<table>
<thead>
<tr>
<th>no. of use cycles</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>packaging material</td>
<td>1.18</td>
<td>0.59</td>
<td>0.39</td>
<td>0.30</td>
<td>0.24</td>
<td>0.20</td>
<td>0.17</td>
</tr>
<tr>
<td>transportation</td>
<td>3.57</td>
<td>3.57</td>
<td>3.57</td>
<td>3.57</td>
<td>3.57</td>
<td>3.57</td>
<td>3.57</td>
</tr>
<tr>
<td>return transportation</td>
<td>0.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
</tr>
<tr>
<td>cleaning</td>
<td>0.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>total</td>
<td>4.75</td>
<td>7.16</td>
<td>6.96</td>
<td>6.86</td>
<td>6.80</td>
<td>6.76</td>
<td>6.74</td>
</tr>
<tr>
<td>relative cost</td>
<td>100%</td>
<td>151%</td>
<td>147%</td>
<td>145%</td>
<td>143%</td>
<td>142%</td>
<td>142%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>no. of use cycles</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>packaging material</td>
<td>4.30</td>
<td>2.15</td>
<td>1.43</td>
<td>1.08</td>
<td>0.86</td>
<td>0.72</td>
<td>0.61</td>
</tr>
<tr>
<td>transportation</td>
<td>3.57</td>
<td>3.57</td>
<td>3.57</td>
<td>3.57</td>
<td>3.57</td>
<td>3.57</td>
<td>3.57</td>
</tr>
<tr>
<td>return transportation</td>
<td>0.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
</tr>
<tr>
<td>cleaning</td>
<td>0.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>total</td>
<td>7.87</td>
<td>8.72</td>
<td>8.00</td>
<td>7.64</td>
<td>7.43</td>
<td>7.28</td>
<td>7.18</td>
</tr>
<tr>
<td>relative cost</td>
<td>100%</td>
<td>111%</td>
<td>102%</td>
<td>97%</td>
<td>94%</td>
<td>93%</td>
<td>91%</td>
</tr>
</tbody>
</table>
Table 12 Average Packaging Scenario Cost in €

<table>
<thead>
<tr>
<th>no. of use cycles</th>
<th>packaging material</th>
<th>transportation</th>
<th>return transportation</th>
<th>cleaning</th>
<th>total cost</th>
<th>relative cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.31</td>
<td>3.57</td>
<td>0.00</td>
<td>0.00</td>
<td>5.88</td>
<td>100%</td>
</tr>
<tr>
<td>2</td>
<td>1.16</td>
<td>3.57</td>
<td>2.00</td>
<td>1.00</td>
<td>7.72</td>
<td>131%</td>
</tr>
<tr>
<td>3</td>
<td>0.77</td>
<td>3.57</td>
<td>2.00</td>
<td>1.00</td>
<td>7.34</td>
<td>125%</td>
</tr>
<tr>
<td>4</td>
<td>0.58</td>
<td>3.57</td>
<td>2.00</td>
<td>1.00</td>
<td>7.14</td>
<td>122%</td>
</tr>
<tr>
<td>5</td>
<td>0.46</td>
<td>3.57</td>
<td>2.00</td>
<td>1.00</td>
<td>7.03</td>
<td>120%</td>
</tr>
<tr>
<td>6</td>
<td>0.39</td>
<td>3.57</td>
<td>2.00</td>
<td>1.00</td>
<td>6.95</td>
<td>118%</td>
</tr>
<tr>
<td>7</td>
<td>0.33</td>
<td>3.57</td>
<td>2.00</td>
<td>1.00</td>
<td>6.90</td>
<td>117%</td>
</tr>
</tbody>
</table>

Investment cost can hardly be estimated as there is no concrete idea on the type of expected cleaning. Similarly, ongoing personnel cost are difficult to predict due to the unknown cleaning system and whether current personnel can complete the tasks or if additional personnel is needed. Sales revenue, reputation, brand value, stakeholder relationships, customer attraction, customer satisfaction are positively to very positively influenced. Nevertheless, the direct economic benefits of these measures cannot be quantified within this research. About transportation and packaging cost changes the impact is rather negative, as current boxes are rather cheap. With more expensive cardboard packaging, which lasts longer and allows more reuses, costs may be less at the 4th reuse cycle.

Longer lasting packaging, other than cardboard, such as recycled plastic presented within chapter 3.3.6, would most likely improve transportation and packaging costs after a number of reuse cycles.
4.4.2 Social Performance

This subchapter focuses on the social performance of the closed-loop SC model. It contains only an analysis of qualitative data as the social performance cannot be quantified within this research.

### Social Performance

- Attractiveness as employer
- Employee loyalty
- Commitment, motivation

### Environmental Performance

- Water abstraction
- Waste reduction
- Material used
- Material reused
- Emissions
- Energy
- Transport

### Economic Performance

- Cost (investment & ongoing)
  - Material cost
  - Personnel cost
  - Transportation cost

- Benefits
  - Sales revenue
  - Reputation
  - Brand value
  - Stakeholder relationships
  - License to operate
  - Customer attraction
  - Customer satisfaction

The level of change on a social scale is quite difficult to evaluate specifically due to the fact that the interviewed companies are very small (generally 1 or 2 employees including the founder). Therefore, some interviewees were unable to give statements or assumptions for employer attractiveness, employee loyalty or motivation. However, as sustainability is an issue that matters to them, and more and more to employees, they believe that this initiative will attract people with similar interest. Social performance cannot be quantified within this research, therefore no calculations are made. However, some non-monetary benefits are identified, such as employer attractiveness and motivation of employees, as suggested by Willard (2012) and Weber (2008). They are described as carrying positive or very positive influence, especially within 2 cases. An overview of the social performance indicators and the related statements of the interviewees are summarized in the following table 13:

#### Table 13 Social Performance Qualitative

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Employer Attractiveness</td>
<td>+</td>
<td>Unable to estimate</td>
<td>Unable to estimate</td>
<td>++</td>
</tr>
<tr>
<td>Employee Loyalty</td>
<td>neutral</td>
<td>Unable to estimate</td>
<td>Unable to estimate</td>
<td>Unable to estimate</td>
</tr>
<tr>
<td>Motivation</td>
<td>+</td>
<td>Unable to estimate</td>
<td>Unable to estimate</td>
<td>++</td>
</tr>
</tbody>
</table>
4.4.3 Environmental Performance
This subchapter targets the environmental performance of the closed-loop SC model. First, qualitative data is analyzed and further, the environmental performance is quantified with calculation examples.

**Figure 36 Environmental Performance Overview**

4.4.3.1 Analysis Qualitative Data
The chosen measures validate or invalidate the environmental improvements the closed-loop SC model says to set forth. However, as an innovative subject, research is quite scarce, especially on the environmental savings that re-using the box could perform. Re-using the boxes not only reduces the quantity of cardboard produced but also sets forth the use of materials which lasts longer and is less harmful for the environment. Recycling cardboard is a first step, but not all cardboard is made from recycled material. Indeed, new cardboard produces a lot of waste, specifically related to water. The ability to reuse a manufactured product not only reduces waste needed to produce it but also the waste it would have generated for a single use.

Furthermore, eliminating the use of cardboard would considerably decrease waste and pollution, previously related to it. For the closed-loop model to work, it is necessary for it to be adopted by the consumers. The interviewed companies are quite positive regarding the return rate, on general terms (between 30-100%) (Interviewee A, 2018; Interviewee C, 2018; Interviewee D1, 2018). However, the return rate is more or less high according to the level of involvement (time-consuming, monetary) that can be demanded on the consumer’s behalf. An overview of the estimations can be seen in the following table 14.

**Table 14 Environmental Performance Qualitative**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Return Rate</td>
<td>● 50% if costs are incurred</td>
<td>Unable to estimate</td>
<td>70%</td>
<td>● 5% - 10% no additional fees (D2)</td>
</tr>
<tr>
<td></td>
<td>● 100% no additional fees</td>
<td></td>
<td></td>
<td>● 30% - 40% no additional fees (D1)</td>
</tr>
</tbody>
</table>
4.4.3.2 Analysis Quantitative Data
In the following, CO2 emissions and waste per box are calculated. As a basis for calculation, the following assumptions are made:

- Cardboard weight: 250 g (Val-I-Pac., 2014)
- CO2 emissions by kg per ton of cardboard: 1040 (WRAP.org, 2010)

After 5 reuses, savings on CO2 emissions are of 1.04 kg and of 1kg of waste, as shown in table 15:

<table>
<thead>
<tr>
<th>no. of use cycles</th>
<th>waste cardboard in kg</th>
<th>emissions GHG/CO2 in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>reuse</td>
<td>single-use</td>
</tr>
<tr>
<td>1</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>2</td>
<td>0.25</td>
<td>0.50</td>
</tr>
<tr>
<td>3</td>
<td>0.25</td>
<td>0.75</td>
</tr>
<tr>
<td>4</td>
<td>0.25</td>
<td>1.00</td>
</tr>
<tr>
<td>5</td>
<td>0.25</td>
<td>1.25</td>
</tr>
</tbody>
</table>

The following table 16 provides an overview of the additional direct input material for cardboard production.

<table>
<thead>
<tr>
<th>Inputs</th>
<th>per ton cardboard</th>
<th>per kg cardboard</th>
<th>per box</th>
<th>per 100 boxes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude oil (GJ)</td>
<td>0.900</td>
<td>0.001</td>
<td>0.000</td>
<td>0.024</td>
</tr>
<tr>
<td>Electricity (kWh)</td>
<td>882.000</td>
<td>0.882</td>
<td>0.221</td>
<td>22.050</td>
</tr>
<tr>
<td>Water (m3)</td>
<td>51.700</td>
<td>0.052</td>
<td>0.013</td>
<td>1.293</td>
</tr>
<tr>
<td>Wood (m3)</td>
<td>3.000</td>
<td>0.003</td>
<td>0.001</td>
<td>0.075</td>
</tr>
<tr>
<td>Pulp (m3)</td>
<td>154.000</td>
<td>0.154</td>
<td>0.039</td>
<td>3.850</td>
</tr>
</tbody>
</table>

The overall waste reduction, water, material, and energy savings are calculated relying on different assumptions. It is stated that a package is reusable 5 times with a return rate of 70%. The return rate is the average of total estimations from data collection considering that the option is free of charge for the customers.

The following example is taken to illustrate previous calculations: a single shipment of 100 boxes is sent out every month. Over the course of a year, a total of 1200 boxes are shipped. As 70% of the boxes are returned and a box is trashed every 5th reuse, a waste reduction rate of 67% can be achieved (for calculation and explanation see appendix C):

- 459 new boxes need to be bought
- only 394 transport packaging boxes go to waste after a year
- while 66 are still in a reusable state
The following table 17 includes the savings made for buying only 459 new boxes (and not 1200, as the current system compels to buy), based on the figures within table 15 which does not include the emissions and material input that goes into the pulp production. The water, material and energy input savings over a year are the following. The savings are the material input for 1200 boxes minus the material input for 459 boxes. A more extensive version of table 17 can be found in appendix D.

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude oil (GJ)</td>
<td>0.17</td>
</tr>
<tr>
<td>Electricity (kWh)</td>
<td>163.39</td>
</tr>
<tr>
<td>Water (m3)</td>
<td>9.58</td>
</tr>
<tr>
<td>Wood (m3)</td>
<td>0.56</td>
</tr>
<tr>
<td>Pulp (m3)</td>
<td>28.53</td>
</tr>
</tbody>
</table>

What has not been possible to include in the calculations is the emissions related to transportation. PostNord (2017) indicates that shipping of a package is responsible for 399 gram of CO2. While this refers to regular shipping, the return flow of an empty box would have different requirements. An empty package is lighter and probably accounts for less emissions. This could be possible by minimizing the volume of the empty boxes. By folding it, the emissions and cost could be similar to those of a letter. According to PostNord (2017) a letter accounts for 37 g of CO2. This option is already pursued by startup companies such as the ones that have been introduced in chapter 3.3.6.
4.5 Findings

The answer to RQ2: “How can a business case for the closed-loop SC model be developed to evaluate the model’s sustainability?” is submitted by developing the business case for sustainability, filled with various indicators used to assess the sustainability of the model. However, the assessment of the sustainable performance of the model is built on assumptions as there has been no implementations.

The evaluation is based on the research model introduced in chapter 4.2.1. Some measures are not included due to unsatisfactory amount of related data. The colors as well as the +, - and +/- symbols indicate whether a positive impact (+, green), negative impact (-, red) or an unpredictable impact (+/-, orange) is expected. Positive impacts dominate when it comes to social and environmental performance. The economic performance is impacted in different ways. There is a possibility of cost increase, excluding packaging cost. Nevertheless, the positive impacts regarding economic performance have the potential to balance out the negative impacts. This needs to be evaluated in a real-life situation or pilot study that uses the model as a basis.

![Figure 37 Overview Business Case for Sustainability](image-url)
5 Conclusion

This chapter summarizes the main content and findings. Further, practical, theoretical and societal implications are identified as well as research limitations and suggestions for further research.

5.1 Summary

An exploratory research with a multiple case study was the most appropriate approach to conducting the thesis. Indeed, research in this area is rather scarce and even less on sustainability and reverse logistics. The purpose was to first develop a closed loop supply chain where a reverse flow of the cardboard box is set up.

Then, the model was assessed in a business case for sustainability in order to give it legitimacy in front of companies. Economic, environmental and social indicators were chosen and filled with collected company data. Both research questions were answered. Referring to RQ1, a closed-loop SC model was created with regards to transport packaging. The model suggests that once the package is received by the consumer it can be returned in an empty state via parcel delivery service. After cleaning, the package should be reused by 3PL.

RQ2 was answered by developing a business case that evaluates the sustainability of the model. Therefore, sustainable performance measures with regards to economic, social and environmental practice have been assembled.
On a very concise level, the model enhances social performance and environmental performance, but with a veto on transportation. Economic performance is mostly positively influenced. Indeed, a consequent investment is needed and, personnel and transportation cost also represent a fair share. The findings are summarized in figure 37. Options for cost savings in order to improve the economic performance of the model are suggested by the researchers.

5.2 Practical Implications
The practical implications of this research for the business world is the research model developed in order to answer RQ1. Those who can benefit from the model are the interviewed companies. The created model can act as a basis for a closed-loop supply chain implementation project within transport packaging. Indeed, the collected data allowed to build a generalized research model which should fit within their structure. Going even further, as brands in that sector have a common business model, the closed loop supply chain is adaptable to any of these companies. More than the development of a model with a focus on reverse flows, it is also the necessity of looking into costs and in particular packaging and transportation costs. It also implies gathering knowledge on packaging, an essential component to the model, and being aware of the different solutions that are being developed throughout the years. Indeed, the supply chain can be significantly impacted, in a positive or negative manner, according to the type of packaging used. And so, the packaging strategy is an element that should be rethought and worked upon. The closed loop supply chain model has set forth the need for costs to be closely investigated but it must not be forgotten that it is the customers who support the system. Therefore, while a review on costs is necessary in order to generate revenue, a share should be allocated to customer incentives to promote the model. The research model, qualitative analysis and quantitative calculation can be a practical guideline or example for assessing the sustainability of a pilot implementation project of a closed-loop SC model.

5.3 Theoretical Implications
The main theoretical contribution that emerges from this research is the created closed loop supply chain model. Indeed, the model is conceptualized by using input from theory, from both the B2B business model and return flow concepts, and from practical data. With supplementary data from extended research and practical implementation, the model could reveal its benefits in a more concrete manner.
It can be the support for similar models in other industries, business areas or contexts but also to more sophisticated and intricate closed loop supply chain models. In addition, the business case for sustainability, which is used as a practical method by management and not commonly found in theory also presents as theoretical contribution. Actually, through the operationalization method and frame of reference, the researchers set a clear basis for evaluating the sustainability performance of an innovative project. The guidelines and methodology can be applied in any industry and business model in order to give credibility and validity in front of corporations.

5.4 Societal Implications
The societal implications the research outlines are mainly attributed to environmental awareness. Undoubtedly, the desire of the researchers is to bring attention to the impact that companies have on the environment and the possibilities there are to reduce it. Moreover, as researchers evolve in the business and economic world the intent was not to sacrifice economic performance for environmental performance but, quite the reverse, demonstrate how environmental (and societal) go hand in hand with economic performance. Further, how the former can go as far as enhance the latter. This research demonstrates the possibility to reduce water and material waste as well as manufacturing emissions. On a lesser level, but nonetheless meaningful, the implementation of the closed-loop SC model, and in more general terms of sustainability, has reported the attractiveness it gives companies in terms of recruitment, motivation and retention of its employees (social aspects).

5.5 Research Limitation
Due to limited resources, the scope of the thesis excluded customers and suppliers. Nevertheless, these actors are important in the acceptance of the model. Indeed, the customers are the ones who will push the system away or if they accept it, make it thrive. Even though the closed-loop supply chain system is feasible, it fully depends on the willingness of the clients of sending the box back. Also, the research calculations are currently made with the assumptions that the boxes in use can be cleaned and reused a certain number of times. However, no tests have been conducted on the viability of the cardboard and the new possibilities which cardboard manufacturers could offer. Therefore, a set of assumptions are made according to common sense and personal experience of the interviewees and researchers and not absolute data. In addition, investigation on the subject is limited to a geographical context (France, Germany and Sweden) and a certain type of companies (very small sized enterprises).
From that emerges limited data with gaps. Furthermore, no practical implementation of the closed-loop SC model was done in a company in order to prove the trustworthiness of the performance indicators.

5.6 Further Research
The implementation of the closed loop supply chain model in a company with a business model able to support the costs would give practical insights. The company case studies are of very small sized companies. Even though, all companies on this market operate in the same way, the costs and margins are not similar for all.

Conducting this research with leading brands and in a more global environment would refine and strengthen the performance indicators. Additionally, the business case for sustainability guidelines would be supported by more concepts as mature companies have a steadier and stronger relationship with sustainability incorporated to the business world. More specifically, for the economic performance, it would exactly state if the positive impacts could balance out the indicators with a current negative impact. Also, this would allow a verification of the found results and going even further, more data would be available which means a higher level of quantification and therefore more in-depth details. As the scope does not include manufacturers and therefore packaging, a need for the available options on pre-defined and tested reusable packaging is necessary. Indeed, plastic boxes, foldable boxes already exist on the market but have not yet been used in the case studies of this research. Furthermore, as innovative solutions, costs are probably higher than what can be accepted by companies nowadays. But, a thorough study on these solutions could give more accurate observation on costs and accordingly, the profits generated from it. Additionally, as the customers are out of scope in this research, a serious market study on them would be of valuable input in order to objectively state acceptance of the model from their part.
References

ALLWHITEBACKGROUND. 2018. Available:


DUONG, T. 2017. Comparative life cycle assessment of energy and material recovery of cardboard in municipal solid waste.


INTERVIEWEE B.2018. interviewed by GIROT, L. semi-structured. 2018-04-12
INTERVIEWEE C.2018. interviewed by GIROT, L. semi-structured. 2018-04-00
INTERVIEWEE E.2018. interviewed by KOPF, C. semi-structured. 2018-03-23


Appendices

Appendix A Interview Guide I

General information
1. How many employees?
2. How many shipping per month/year?
3. How does the subscription work, do customers order frequently?
4. What is the target customer group?

Supply Chain
5. How many boxes do you send per shipping?
6. How does the shipping process of the box look like, from order placement to reception by consumer?

Transport packaging
7. How much do you pay for packaging (average cost of box)?
8. What kind of package do you use? (e.g. cardboard box, filling material, cooling pads = material composition)
9. How is the disposal/recycling handled? Is there information for the consumer /do you have any experience or feedback on their behavior?
10. Do you think the package is in a reusable state after one shipping? After how many shippings does the packaging enter its end of life cycle?
11. Have you ever reused packaging that was returned from the customer? If so, how? Do you have any numbers (cost of implementation; cost of packaging, cost of transportation) you could share with us? If not, what stopped you from doing it?

Reverse flow
12. Could a 3PL be a partner in the chosen return model? (possible models: delivery and pick up of empty box by transport provider; or customer sends it back via mail)
13. How can packages be tracked with the help of your current solutions in order to manage the packaging inventory? Other solutions?
14. Could a reusable packaging actually work with the chosen model?
15. If no, what needs to be done? Cleaning, other type of material, other conception/manufacturing of the box?
16. Other options/thoughts? E.g terracycle, leasing of boxes (do you know any sustainable packaging provider?)

Appendix B Interview Guide II

1. A big barrier for implementing such a system would be the investment. What do you think about that? (estimate costs if possible)
2. Are there additional personnel cost for managing/carrying out the return? E.g hiring new staff
3. How will transportation cost change? (via transport provider; or customer sending package back individually)

*Often business case benefits are intangible or indirect, Benefits can include cost savings, higher sales, profit margin, market share, revenue etc.*

4. Which cost reduction do you expect?, e.g. packaging cost, Energy savings, less material at the producers side
5. Do you expect changes within sales revenues if customers are interested in sustainable solution? (long-term, short term changes; if possible give a percentage
6. Do you expect your market share to change? (long-term, short term changes; if possible give a percentage)

*Besides the monetary benefits, a BSC can have non-monetary benefits that increase a company’s competitiveness such as reputation, customer attractiveness etc.*

*Please answer on a scale of neutral; very positive changes ++, positive changes +, negative changes -, very negative changes- -*

*And feel free to explain shortly why*

7. How do you think your **reputation** would be affected of implementing reusable transport packaging?
8. How do you think the **brand value** will be affected by implementing reusable transport packaging?

9. Can you evaluate how your **stakeholder relationships** (give examples) will be influenced?

10. Do you think the **level of acceptance of your company** by the stakeholders (e.g. by politicians, local communities, the public, media or civil society in general) will be affected?

11. Do you expect changes within **customer attraction**?

12. Do you expect changes within the **customer satisfaction**?

13. How do you think the **attractiveness as employer** will change? Do you expect more applications per position?

14. Do you think the **staff turnover, fluctuation rate** will be affected? (employee loyalty)

15. Do you think it can be **motivating** for you employees? Do you expect higher commitment at work?

16. What percent of customers would return the box?
Appendix C Waste Generation Reuse

The calculation is based on the assumption that after every delivery, 70% of the boxes are sent back to be reused. In the example, 70 boxes are returned and 30 are trashed. The return is equally spread among the reused boxes and the new boxes, in order to simplify calculation. Indeed, not all return models are expected to be spread similarly.

After the first shipment is carried out, the ones that are not returned (30) need to be replaced by new ones. The columns show for each shipping cycle: the number of bought boxes (column “new boxes”), the ones still in reuse and in which cycle they currently are (columns “1st reuse” to “5th reuse”) and, the remaining ones are trashed. The red columns indicate the box is trashed. If it is disposed of after the first use, the column name indicates “new waste”, after the first reuse “waste 1”, after the second reuse “waste 2” and so on. Every box, when reaching the 5th reuse cycle, is disposed of afterwards. The boxes enter and finish a cycle delayed one from another.

It is a very basic calculation with the assumption that the return rates remain the same after every shipping: the same shares of new boxes are bought and reused boxes are returned. The calculations tries to estimate a rough number of possible waste reductions.

Appendix D Material Input Cardboard Boxes

<table>
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<tr>
<th>shipping no.</th>
<th>new boxes</th>
<th>1st reuse</th>
<th>2nd reuse</th>
<th>3rd reuse</th>
<th>4th reuse</th>
<th>5th reuse</th>
<th>new waste</th>
<th>waste 1</th>
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<th>waste 3</th>
<th>waste 4</th>
<th>waste 5</th>
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<th>per 100 boxes</th>
<th>1200 boxes</th>
<th>459 boxes</th>
<th>savings</th>
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<td>264,60</td>
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xix
## Appendix E: Timeplan

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