Internal barriers for moving towards circularity

– An industrial perspective

LIZA ANDERSSON TORSTENSSON

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FACTS AND FIGURES

"Consider this: all the ants on the planet, taken together, have a biomass greater than humans. Ants have been incredibly industrious for millions of years. Yet their productiveness nourishes plants, animals and soil. Human industry has been in full swing for a little over a century, yet it has brought about a decline in almost every ecosystem on the planet. Nature doesn’t have a design problem. People do."

William McDonough and Michael Braungart

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Sammanfattning

För organisationer som siktar på att bli hållbara är det hävdat att en organisatorisk övergång snarare än en optimering av den nuvarande organisationen är nödvändig (Loorbach & Wijsman, 2013). Detta leder till att när en Cirkulär Ekonomi (CE) modell appliceras och materialflöden sluts innebär det förändringar som påverkar affärsmodeller, logistik, tillhandahålla erbjudanden, service, tillverkning och processer. Företag idag brottas med att applicera CE eftersom det idag saknas en generell bild av hur firmar borde inkludera hållbarhet i sina affärsmodeller, på grund av en brist på kunskap inom fältet (Bocken, Short, Rana, & Evans, 2013). För att kunna röra sig mot en hållbar cirkulär affärsmodell så behöver organisationer övervinna interna barriärer för att genomföra förändringen och hitta transformeringsstrategier för att övervinna dem.


Den här studien bidrar till att förstå de barriärer som stora mogna organisationer står inför när dom applicerar CE. Studien presenterar en intervju utredning som utforskar ett företags styrkor och svagheter kopplade till deras kapacitet att applicera CE, genom att identifiera barriärer i syfte att kunna använda som en grund för företag att bemöta utmaningarna med en transformation, att ge dom riktningar av var och ge dom riktningar om var och hur dom kan påbörja en transformerings. Genom att identifiera barriärer mot en förändring så blir det möjligt att identifiera möjligheter att överkomma dem (Grant, 2010). Studien presenterar sedan områden barriärer befinner sig inom, som författaren anser viktigast, samt förslag på hur man kan bemöta dem.

Den här studiens främsta bidrag till forskningen är en detaljerad och övergripande inblick i ett inflytelserikt företags inställning till Cirkulär Ekonomi, samt de barriärer de kan stå inför vid en eventuell övergång.

Nyckelord: cirkulär ekonomi, applicera CE, barriärer, industri företag, mogna företag
Abstract

For organizations that aim to become sustainable, it is argued that an organizational transition is required rather than an optimization of the existing firm (Loorbach & Wijsman, 2013). Hence, applying a Circular Economy (CE) model and closing material loops implies changes that affects business models, logistics, offerings provided, services and manufacturing processes. Companies are currently struggling with applying CE since there is no general view today of how firms should include sustainability into their business models due to a lack of knowledge within the field (Bocken, Short, Rana, & Evans, 2013). In order to move into a sustainable circular business model, organizations needs to overcome internal barriers for performing the change and find transformation strategies for overcoming them.

Based on extent literature eleven explorative in-depth interviews were conducted within one large, mature manufacturing business-to-business company in Sweden. The investigated company (hereinafter the Company) has an interest in CE but is still novel in the area and has its businesses based on a linear economy.

This paper contributes to understanding the barriers that large mature organizations face when applying CE. The paper presents an interview investigation which explores a company’s strengths and weaknesses based on its capacity to apply CE. The aim is to provide a base for companies to tackle the challenges of transformation, to give them directions of where and how to start. By identifying the barriers of change it becomes possible to identify opportunities to overcome them (Grant, 2010). The study presents areas where barriers are located which the author considers most important, and provide suggestions for how to meet them.

The foremost contribution of this study to science is a detailed and all-embracing insight into a powerful company’s attitude to CE, and barriers they might face in a potential transition.

Keywords: Circular Economy, applying CE, barriers, industrial organization, mature organization
This Master’s Thesis was conducted for the School of Industrial Engineering and Management at KTH Royal Institute of Technology, it was also created in cooperation with a Swedish manufacturing company.

I would first like to thank the supervisor of this thesis, Gunilla Ölundh Sandström, who provided valuable help and guidance throughout the whole project. Further I would like to thank the contact person at the investigated company who was key in the cooperation, and Sofia Ritzén who was part of many discussions regarding the work along the way. Last but not the least I would like to thank all employees at the investigated company who took their time to participate in interviews.

Liza Andersson Torstensson

Stockholm, June, 2016
## Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>CE</td>
<td>Circular Economy</td>
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<tr>
<td>BM</td>
<td>Business Model</td>
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<td>BMI</td>
<td>Business Model Innovation</td>
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<td>PSS</td>
<td>Product - Service Systems</td>
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<td>CBM</td>
<td>Circular Business Model</td>
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<td>SBM</td>
<td>Sustainable Business Model</td>
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<td>CP</td>
<td>Cleaner Production</td>
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<tr>
<td>ROI</td>
<td>Return of Investment</td>
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<td>LBM</td>
<td>Linear Business Model</td>
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<tr>
<td>B2B</td>
<td>Business to Business</td>
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<tr>
<td>PO</td>
<td>Product Oriented</td>
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<td>UO</td>
<td>User Oriented</td>
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<td>RO</td>
<td>Result Oriented</td>
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<td>B2B</td>
<td>Business-to-business</td>
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<td>LCA</td>
<td>Life-cycle assessment</td>
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1 INTRODUCTION

In this section the background, purpose, limitations and methods used in this study are described.

1.1 Background

It is shown that the current linear business model (LBM) dominating the industry today is not sustainable for the planet we live on. The current population need approximately 1.5 planets to support its activities (Bocken, Short, Rana, & Evans, 2013). With a population which is rapidly growing, the world is facing an immense global sustainability crisis (Cohen, DeFrancia, & Martinez, 2016).

The financial markets today favors short-term payback periods, this is something that does not work in favor for ecological and social systems. Further the financial markets undervalue environmental resources, ignores human impacts and discount the future in favor of accounting and reporting systems that do not reflect true environmental and social risks and opportunities (Hoffman & Bazerman, 2007), it’s easy to draw the conclusion that this is not a feasible approach to continue with. An approach that would be less harmful to the planet would be to apply a Circular Economy (CE), since CE aims to decouple global economic development from using up the world's resources. It’s also more holistic than a linear economy, and it has the potential of generating growth and reducing environmental impacts, it’s designed to be restorative and regenerative by keeping products and materials at their highest utility and value at all times (Ellen MacArthur Foundation, 2015).

It seems to be a challenge for sustainability in general to achieve a large enough scale where firms might make a significant difference to environmental and social sustainability on a global level. Bocken et al (2013) suggests that sustainable solutions should be delivered at a large scale to maximize benefits for the environment, and that large multinationals are best suited to drive sustainability at such scale, but the emerging examples of businesses based on sustainable principles are often in a small scale (Bocken, Short, Rana, & Evans, 2013).

For organizations with the aim of becoming sustainable it is argued that an organizational transition is required rather than an optimization of the existing firm (Loorbach & Wijsman, 2013). Hence applying a Circular Economy (CE) model and closing material loops implies changes that affects business models, logistics, offerings provided, services and manufacturing processes. Companies today struggle with applying CE since there is no general view today of how firms should include sustainability into their business models, due to a lack of knowledge within the field (Bocken, Short, Rana, & Evans, 2013). In order to apply a sustainable circular business model, organizations need to overcome internal barriers for performing the change and find transformation strategies for overcoming them. This paper contributes to understanding the barriers that large mature organizations face when applying CE, by identifying barriers in order to be used as a base for companies to tackle the challenges of transformation, to give them directions of where and how to start a transformation. By identifying the barriers of change it becomes possible to identify opportunities to overcome them (Grant, 2010). Since this paper focuses on the transition issue for large established firms, it also takes a focus on change. The study is focused on internal barriers for applying CE, the initial barriers from a firm’s perspective, on what a firm can do today in the system as it works now.
1.2 Purpose

The purpose of this study is to identify barriers that large mature organizations face when applying CE, to open up possibilities and opportunities to overcome them.

Research Question:

*What are the main barriers for large, mature, industrial, B2B organizations wanting to apply CE?*

1.3 Delimitations

The study is an interview investigation of one large, mature industrial B2B company. The investigated company is a manufacturing company that consists of four business areas, in this study one of these business areas was investigated, and interviews were conducted with eleven employees.

The literature has been focused at finding barriers of transitioning to Circular Economy, since the field is relatively new and somewhat of a phenomenon, keywords connected to this was used to find a base (Product Service Systems (PSS), Disruptive Innovation, Cleaner Production, Sustainability, Radical Innovation etc.).

The study takes a micro focus on CE, i.e. it focuses on the company, it explores what a company can do themselves in the market and surrounding world as it is today, this differs from a macro focus which is more about law and regulations and what countries and cities can do. It also takes an industrial view, of mature, well established organizations and how they can handle change in the environment, which is a large difference from how new players, such as small venture companies, can come up with creative CE business models.

The study is focused on the barriers of transition towards CE rather than how the final application of CE would look, i.e. the study focuses on the beginning of change instead of speculating of how the company would look, in detail, with CE applied.

The study is also focused on psychological and conceptual factors, such as knowledge level and attitude towards CE within the company, and how the respondents imagine that a transition to CE could take shape.

1.4 Method

A combination of primary and secondary data was used to carry out the research. The secondary data consisted mainly of published articles in scientific journals, other material include academic books, research applications and papers such as policy briefs and agendas by interest organizations, and the primary data was collected through interviews. The interview data provides a direct source to the problem and complements the secondary data with company-specific information that makes it possible to identify barriers within the industry the Company operates in.

1.4.1 Review of literature

An extent review of literature was carried out to find general enablers and barriers when applying a circular economy. Several aspects of circular economy were included, whereof the main parts identified in this study was the following:
• The basic principles of circular economy
• Product Service Systems (PSS)
• Business Models
• Disruptive Innovation
• Company Transformation
• Barriers for implementing CE
• Barriers to CE related areas

1.4.2 Interviews
Information was also collected from interviews with one selected company who today have an interest in circular economy. The aim of the interviews was to find barriers the Company would face when approaching CE, amongst others the following areas was investigated:

• How the Company work with business models
• How the Company work with circular economy related subjects, such as reuse, remanufacture, recycle etc.
• How the Company work with PSS
• The attitude to CE within the Company
• How the employees thought CE would be implemented and how it would affect their personal role
This chapter presents a review of literature used in this study. Initially circular economy as a phenomenon will be explained, secondly topics in strong relation to a circular economy will be presented and literature in relation to how a company should transform. Last the barriers towards CE and related areas are presented.

2.1 Research gap

Literature on CE is extensive but fragmented, and it’s lacking in how CE should be applied, there is also no common source of information regarding Business Model Innovation (BMI), which makes it hard to gain an overview of BMI for sustainability (Bocken, Short, Rana, & Evans, 2013). Lieder and Rashid agree that the coverage of the investigated CE research landscape is fragmented, and that the level of discussion is highly granular and rarely touching implementation level (Lieder & Rashid, 2015). To put CE into practice, there is a need for expanded pilot and demonstration programs and for exploration of effective CE models that ultimately helps the overall development of such an economy (Zhijun & Nailing, 2007). It’s suggested that case studies and best practice examples should be collected and spread to inspire and create dialogue (Kiørboe, Sramkova, & Krarup, 2015).

Literature and best practice on how a large company could apply CE appears to be lacking, with mainly small businesses moving towards CE. Due to the lack of knowledge within the field companies also struggle with the application of CE since there is no general view of how firms should include sustainability into their business models (Bocken, Short, Rana, & Evans, 2013).

2.2 Overview of circular economy

In the following sections an overview of circular economy and related areas identified in this study will be presented. An introduction to the fields approached in the study is provided.

2.2.1 Introduction to circular economy

When discussing Circular Economy (CE) it can be good to keep in mind that the concept is relatively new, and that there is yet no comprehensive view of exactly how it works, what it implies or how it should be implemented. In this paper the definition of CE from the Ellen MacArthur Foundation will be used as the main base.

Circular Economy is defined as a system that is designed to be restorative and regenerative (Ghisellini, Cialani, & Ulgiati, 2015), and in a CE the speed of resource depletion and waste generation are reduced (Lieder & Rashid, 2015). The aim of a circular economy is to decouple global economic development from finite resource consumption (Ellen MacArthur Foundation, 2015), it drives environmental sustainability by emphasizing the idea of transforming products in such a way that there are workable relationships between ecological systems and economic growth (Genovese, Acquaye, Figueroa, & Koh, 2015). To create possibilities to generate profit without generating a damaging environmental impact. CE provides a framework that could radically improve the present BM towards a regenerative industrial development (Ghisellini, Cialani, & Ulgiati, 2015). CE provides solutions for resource related challenges for business and economies, and it could reduce environmental impacts, including carbon emissions (Ellen MacArthur Foundation, 2015). CE concerns the creation of self-sustaining production systems in which materials are used over and over again (Genovese, Acquaye, Figueroa, & Koh, 2015), and it strives to keep products, components, and materials at their highest utility and value at all times (Ellen MacArthur Foundation, 2015). It is of high importance that the whole ‘Supply
A circular economy consists of two main parts, one is to lower the impact on the environment, and the other is to create Business Models (BMs) for the activities required to perform the first part. The Ellen McArthur Foundation (2015) provides an overview of how a circular economy can take shape, through activities that can lead to lowering the impact on the environment, this is shown in Figure 1 below.

This study focuses on industry, hence the right/blue side of the figure. The basics in industry is for a company to create circular flows and minimizing waste and energy consumption through maintaining and prolonging product lifespans, reusing and distributing products, refurbishing, manufacturing and recycling. The inner circles are the most desirable, since they have the most potential to save energy. When moving towards CE, production should focus on raw materials and energy, on phasing out toxic materials and in reducing the quantity and toxicity of waste, when considering products the emphasis should be on minimizing negative effects that results from a product’s entire life cycle; from the extraction of raw materials to the products disposal (Zhijun & Nailing, 2007). To make the required activities in a CE economically feasible, new business models are in need, one type of business model is the Circular Business Model. Circular
Business Models (CBMs) can be contrasted with Linear Business Models (LBMs), which are the current standard in most manufacturing industries, CBMs are based on re-manufacturing and reuse and they promise significant cost savings as well as radical reductions in environmental impact (Linder & Willander, 2015). Further CE can be viewed from different perspectives, where for example, whilst a micro perspective may refer to the level of a firm, macro perspective refers to regions and countries (Ghisellini, Cialani, & Ulgiati, 2015). This paper takes a micro level approach, which implies that the focus is at level of the organization.

2.2.2 Implementing a circular economy

To apply circular economy requires a radical change in the way a business is run, in industry it needs commitment from higher management (Lieder & Rashid, 2015). When applying CE at an industrial level, one needs to consider business perspectives, technological aspects and policies. In the context of industry, the implementation of CE should begin with organizational development with a focus on change management and managerial mindset, the technological developments appears to be sufficiently mature to support CE implementation at a large scale (ibid).

Lieder and Rashid (2015) suggest that CE should either be implemented through a top down approach from the society through legislation and policies or through a bottom up approach from the manufacturing industries through competitiveness and profitability. This thesis is hence approaching a bottom up approach starting from the industries. A transition from a linear to a circular economy should be implemented focusing on three aspects simultaneously (Lieder & Rashid, 2015):

1. **Environmental impact**: Decrease environmental impact through reducing solid waste, landfill and emissions through activities such as reuse, remanufacturing and/or recycling.
2. **Economic benefits**: To gain economic benefits for companies in CE requires an integrative approach towards BMs, product design, supply chain design and choice of materials.
3. **Resource scarcity**: Regenerative use of resources is required in CE realization since social prosperity depends on the planets finite resource supply. Factors related to this includes circularity of resources (closing material loops), material criticalness and unpredictability of resources.

Their framework underlines the need of a systematic perspective of waste, environmental and natural resources as well as economic aspects (ibid).

2.2.3 Vital parts of a circular economy

To become circular a company need to take several parts into consideration, the author identified the following areas to be the core parts of a circular economy.

**PRODUCT DESIGN**

When applying CE the focus on products should be to minimize negative effects resulting from a product’s entire life cycle, i.e. from the extraction of raw materials to disposal of the product (Zhijun & Nailing, 2007). When doing CBMs the products need to be adapted for multiple lifecycles and to be possible to update, upgrade and to be used in new offerings (Produktion2030, 2014). Product design is essential in the design of sustainable circular systems and some suggestions on product design strategies for improved material efficiency includes the
development of longer-lasting products, increased modularization and re-manufacturing, reusing components and to design products with less material (Lieder & Rashid, 2015). These design strategies also needs to be linked to material criticality (ibid). According to Zhijun and Nailing (2007) research related to CE should, amongst other areas, focus on developing technologies that boost the lifespan of materials and researching new materials that could replace toxic and polluting ones. Also Kiørboe et al (2015) argues that the design for long life is key for CBMs. The products need to be adapted for multiple lifecycles and upgrading, which partly requires how the product is constructed, but also requires the products to hold necessary information to create good conditions for circular activities such as updating, maintenance, re-manufacturing and recycling, in order to make the right information easily accessible for the right participant in the circular system (Produktion2030, 2014).

**CLOSING MATERIAL LOOPS**

A part of accomplishing CE is to closing material loops, to go from the linear cradle-to-grave approach towards cradle-to-cradle systems, in closed-loop supply chains the entire flow of materials, i.e. forward supply chain and reverse supply chain is considered (Lieder & Rashid, 2015). To close material loops implies the activities of reuse, re-manufacture and recycle, see Figure 1, and to implement these a company will need to incorporate take-back systems. According to Bocken et al (2013) concepts such as closing material loops are still emerging, and hence might not yet be broadly understood by industry. According to Produktion2030 (2014) companies should get better at using Big Data (methods to extract value from large/complex sets of data) in order to be able to circulate used products in recycling and re-manufacturing, to keep up performance of the products and to improve offers and services to customers, and to use in systems to optimize solutions of the products and production to reach better quality. Companies are also in need of methods to support them in handling lifecycle-related data (ibid). Lieder and Rashid (2015) also highlight information and communications technology (ICT) as a potential enabler for product life management systems for products and parts in multiple lifecycles.

To create BMs for CE forward and reverse supply chains need to be considered, this requires value recovery activities that are economically feasible and are a part of efficient closed-loop supply chains (Lieder & Rashid, 2015). The actors in a circular system is partly the manufacturers but also customers and different actors that enable the solution and circular flows, often a network of actors are required to optimize a solution over multiple lifecycles (Produktion2030, 2014).

**CLEANER PRODUCTION**

According to Ghisellini et al (2015) a transition at micro level towards CE implies the usage of Cleaner Production (CP), and CP can be the first strategy towards achieving CE goals. CP introduces cleaner products, processes and services with the aim of reducing waste and emissions flows as well preventing the use of non-renewable and harmful input flows. Therefore, the introduction of CP can provide economic benefits to companies, as it reduces the costs of disposal of waste by reducing the actual waste (ibid). An obstacle for implementing CP is high costs and risks involved in developing cleaner production alternatives (Moors, Mulder, & Vergragt, 2005).

**PRODUCT SERVICE SYSTEMS**

In a Product Service Systems (PSS) business model functionality is sold rather than ownership (Lieder & Rashid, 2015), and PSS have been put forward as one of the most effective
instruments for moving society towards a resource-efficient, circular economy and creating a ‘resource revolution’ (Tukker, 2013). An increasing number of manufacturing firms are shifting their focus from pure manufacturing to a combination of manufacturing and services (Lay, Copani, Jäger, & Biege, 2010). PSS business models has also been put forward as a way of creating resource conservative BMs and the field of PSS is connected to economic prosperity and sustainable resource management (Lieder & Rashid, 2015). It is argued that an increase in service orientation, rather than product orientation will facilitate design of systems with significantly lower environmental impacts while maintaining economic prosperity (ibid).

A company that offers solutions must become customer-centric, although customer-centric companies need not offer solutions (Galbraith, 2002). According to Produktion2030 (2014) value creation for customers is in the centre of integrated product and service offerings, and developing methods are of need where the whole products physical lifecycle and its parts are included when taking customer need in account. Hence innovation is needed not only in the product, but also in the offering in the circular system that the product is included in (ibid). Lay et al (2010) argues that service strategies are not fully developed yet because they involve price bundling and mainly focus on basic product-related services.

According to Reim et al (2014) a PSS can be Product Oriented (PO), User Oriented (UO) or Result Oriented (RO):

- In a product oriented BM, a provider, in addition to selling a product, commits to deliver a service related to the product, the customer owns the product, and the provider's responsibility is to undertake agreed-upon services related to the product. Contracts can be almost the same for each customer, since companies can offer standardized solutions, and formalization is high.
- In the user oriented BMs, a provider does not sell a physical product but instead makes the product available under rental or leasing agreements.
- In a result oriented BM, a provider agrees to provide the customer with a certain result or outcome rather than a specific product or service. Here the provider has complete responsibility for delivering the agreed-upon result, and offers must be customized to each customer (ibid).

In order to become a solution provider it is required that the leaders of an organization creates a solution organization and manage it actively (Galbraith, 2002). Olivia and Kallenberg (2003) suggest that a transition towards services should happen in different stages, and that during each stage the organization should focus on a set of issues and address them through the development of new capabilities. Where the first step should be to put all service offerings under the same organizational unit, since they are usually spread out in different parts of the organization (ibid). Difficulties that arise when changing manufacturing towards services are, for example, that services in contrast to products, require the customer to be motivated to co-produce and the value creation is interactional (Vargo & Lusch, 2007). In contrast to products, a service must be adapted for different cultures, and all parties must understand the concept of the service. In order to develop high quality services, the service must be viewed as more than just an add-on. Further effective information management is required to provide services (ibid).
BUSINESS MODELS

In this section Sustainable Business Models (SBM), Circular Business Models (CBM) and Business Model Innovation (BMI) are introduced.

For manufacturing companies the development of new innovative business models adapted for CE is crucial (Lieder & Rashid, 2015). Including re-thinking of partnerships to open up for new collaborative BMs. In practice that could mean to incorporate re-manufacturing and similar activities. These activities are generally known to be beneficial from an economical point of view, but today they are nevertheless considered to be side businesses, and often outsourced and operated by third-party companies (ibid).

Innovation is often connected directly to products, but one can also work with innovation regarding the business model, and to transform a company into one based on CE, Business Model Innovation (BMI) is required. For example, it is argued that when doing CBMs the products need to be adapted for multiple lifecycles and they need to be used in new offerings (Produktion2030, 2014). This implies that innovation is needed not only in the product, but also in the offering in the circular system that the product is included in (ibid). The existing BMs, products and supply chains have been developed for operating in linear systems, and they are unable to cope with the dynamics of closed loop systems (Lieder & Rashid, 2015). BMI for sustainability aims to create a significant positive and/or a significant reduction in negative impacts on the environment and/or society, this is done through changing the way an organization creates economic value, or through changing value propositions (Bocken, Short, Rana, & Evans, 2013). Bocken et al also developed eight Sustainable Business Model (SBM) archetypes, which they view as a starting point to broaden and unify the research agenda for SBMs, the eight archetypes are (Bocken, Short, Rana, & Evans, 2013):

1. Maximize material and energy efficiency
2. Create value from “waste”
3. Substitute with renewables and natural processes
4. Deliver functionality, rather than ownership
5. Adopt a stewardship role
6. Encourage sufficiency
7. Re-purpose the business for society/environment
8. Develop scale-up solutions

Collaborations across industry boundaries and non-industry actors is key to a number of the archetypes above (ibid). Closing loops and applying circularity in a company, also implies the use of circular business models. A CBM can according to Linder and Williander be defined as a business model where the value creation builds on using the economic value still residing in products after use, by implementing them in new offerings (Linder & Williander, 2015). I.e. a CBM relies on a return of the products from the user back to the producer, with or without intermediaries between them. CBMs therefore always involve activities related to closing loops such as recycling, re-manufacturing, reuse, or the similar refurbishment, renovation or repair. Linder and Williander (2015) hence suggests that managers need to adapt to the difficulty of risk management for investments in CBM innovation, since validating a CBM always has a higher business risk than validating a corresponding LBM. The reason is that such a validation cannot be achieved without a second (or third etc.), and hence later, sale, and that this second cycle requires resources exposed to risk. Retained ownership further increases the impact from failure, since the stock of resources at risk grows during the validation time with additional sales (ibid).

CE also has a need for new economic models, which for manufacturers implies a shift from quick returns on investment towards a constant stream of money, with a need for major upfront
financing (Schulte, 2013). This leads to a more service focused system (PSS) rather than a product focused one.

A BMI is more than just changing the product and serving offerings for the customer, a BMI involves changing ‘the way business is done’, rather than ‘what you do’, and the focus is shifted from developing individual technologies towards creating new systems (Bocken, Short, Rana, & Evans, 2013). A BM does not only have company focus, but involves a wider set of stakeholders, making a broader value-network perspective from innovating and transforming the BM necessary. Similarly SBMs capture economic, social and environmental value for a wide range of stakeholders (ibid). Business model innovation is crucial, but at the same time very complicated (Chesbrough, 2010). Although BMI is shown to be hard to manage since it transcends a firm’s boundaries, it is not impossible, some examples for what a firm can do to manage BMI is to target certain actors and avoid others, experiment with different value propositions, change revenue models and try new distribution channels (Sandström, Berglund, & Magnusson, 2014). Companies must take on an adequate attitude toward business model experimentation, and internal leaders for changes in the BM are in need to manage results and deliver a new and improved BM for the company (Chesbrough, 2010). In the quest for a new BM it might imply extended co-existence between the current and the new models, and to know when to shift resources towards the latter BM is a fragile balancing act. At the same time, the organization’s culture must find ways to embrace the new model, while maintaining the effectiveness of the current business model until the new one is ready to take over completely (ibid). To create a new BM for an organization is also something which requires a nuanced and creative relationship with external stakeholders, especially if the environment is characterized by a high degree of complexity (Sandström, Berglund, & Magnusson, 2014).

2.3 Fields related to CE

Here areas identified by the author to be connected to CE will be introduced.

2.3.1 Company transformation

In this section literature related to transformation of a company is presented, such as change management, company culture, risk management and company structure.

The broader context of societal transitions to sustainability can be linked explicitly to businesses with transformative strategies, when businesses actively pursue a transformative role they can help shift the market they compete in and simultaneously transform their own business, doing so they can contribute to actively shape transitions towards sustainability (Loorbach & Wijsman, 2013).

As stated before, for organizations with the aim of becoming sustainable it is argued that an organizational transition is required rather than an optimization of the existing firm (Loorbach & Wijsman, 2013). Grant argues that for a firm to respond to a change in its external environment, it is not enough to make incremental changes in a few dimensions of its strategy, but that instead the firm will likely need to find a new configuration (Grant, 2010). Hence applying a CE model and closing material loops implies changes that affects business models, logistics, offerings provided, services and manufacturing processes. A transition towards a sustainable economy is further argued to be a challenging process since it is affected by many constraints including political, cultural, economic structures and technological limitations (Genovese, Acquaye, Figueroa, & Koh, 2015). Change in itself is difficult since it is both costly and disruptive, it is uncomfortable for individuals and hence even more difficult for organizations, since they consist
of multiple individuals who must change in a coordinated way (Grant, 2010). Thus, changes at industry level tend to occur through the death of existing firms and birth of new firms (ibid).

Restructuring, considering complex organizational structure, is a costly exercise which requires careful preparation (White, 2004). Structure develops life and history on its own, and can therefore sometimes determine strategy. Structure and strategy is a two-way interaction, structure is often a given part of the internal context which must be taken into account in the beginning of a process of making a strategy (ibid). An organizational culture establishes a structure of power, and when threatening this established structure of power with attempts of restructuring, it will likely be met with resistance from those currently benefiting from the existing system, also the self-preservation of managers taking the decisions might rule out environmental, social or economic objectives (Hoffman & Bazerman, 2007). Smaller and younger organizations are more flexible (White, 2004), which correlates with Bocken et al’s prediction that in the nearer future, it is likely to be new start-ups and small businesses undertaking more radical innovations for sustainable solutions (Bocken, Short, Rana, & Evans, 2013).

Risk management is an essential part of strategy making, an effective risk management requires that one takes an explicit attitude to risk and careful consideration of the actual riskiness of possible outcomes (White, 2004). The personality, confidence and motivation of strategists themselves is critical. A single dominant person can be determinant in the willingness to accept a risky project. Without a champion that has faith of a successful outcome the project would never be undertaken, it is often the role of the leader to provide such confidence. Another influence is the culture of the organization which can either encourage or discourage risk taking. Whatever the views of a powerful CEO, that person needs support, and an appropriate corporate culture helps (ibid). With new processes that are not yet a fully proven technology, it is always a question of who dares to do it first (Moors, Mulder, & Vergragt, 2005).

2.3.2 Life Cycles, Dominant Design & Eco Systems

One could say that linear business models make out the dominant design today, and that circular solutions are disruptive.

Industries and products have life cycles and the industry life cycle is typically longer than the one of a single product (Grant, 2010). A life cycle consists of four phases: emergence, growth, maturity and decline, and during the growth phase a dominant design usually emerges. Dominant design refers to the overall configuration of a product or system, and dominant designs are also present in business models (ibid). A dominant design is a standard for the market even if it is not officially enforced or acknowledged and firms can attempt to influence the selection of a dominant design through coalitions around a preferred technology (Schilling, 2010). Mostly dominant designs emerge through market forces, but occasionally a dominant design is put in place through government regulation (ibid). An innovation within an ecosystem is a component of a larger solution and the success of the innovation is dependent on successful development of all the other components in the system, failure within ecosystems often happen because of the market not emerging within a required timeframe to support the investment (Adner, 2006).

2.3.3 Disruptive Innovation

A disruptive innovation is an innovation that creates a new market, and eventually disrupts an existing market. The author contemplates that the linear economy might be disrupted by the circular economy.
In section 2.3.1 it was mentioned that when actively approaching a transformative role, businesses can help shift the market they operate in, also section 2.3.2 argues that failure within eco systems can happen due to a market not emerging in time. For example, there is a need to create markets where products are designed for long life (reuse, repair) and service- and function based BMs are desirable (Kiørboe, Sramkova, & Krarup, 2015). This is connected to the field of disruptive innovation, since according to Christensen (2001) a disruptive technology can serve to create new markets. It is also argued that disruptive innovation is a business model problem and not a technology problem (Sandström, Berglund, & Magnusson, 2014), this also correlates to CE, since CE to a certain extent consists of new business models.

A challenge with disruptive innovations is that they’re often incompatible with existing preferences, incentives and competencies of actors in a firm’s value network, and hence they may be met with resistance (Sandström, Berglund, & Magnusson, 2014). To overcome the resistance, it is suggested for the organization to design a new business model. It has also been argued that firms with a history of exploring new markets and value propositions would be better at introducing disruptive innovations. Attempts to develop managerial solutions concerning disruptive innovation have one thing in common, they highlight the importance of pro-actively managing and sometimes actively influencing the environment (ibid).

2.4 Barriers identified in secondary data

Here the barriers explicitly linked to implementing CE, barriers linked to parts of CE (here PSS & CP), and barriers linked to areas connected to CE (here change, disruptive innovation, BMI & becoming a sustainable organization) that was identified when reviewing the secondary data will be presented.

In this section the barriers found to CE and in relation to CE is presented, these barriers consist of many different types of barriers, including cultural, such as a risk aversion of managers, and more concrete barriers such as high initial costs. Something interesting to keep in mind is that according to Liu and Bai (2013) a firm’s behavior in operating a circular economy is an extremely complex process that is affected by a multitude of factors, including a lack of skills. They further argue that institutional and cultural barriers play a more important role than skills, and suggest that psychological factors, such as perceived adaptive capacity, and the normative or motivational context of responses are more important than resource constraints (ibid).

Below in Table 1 barriers that were found in the review of literature directly related to CE are presented. With this it means that the barriers were stated to explicitly be barriers for applying CE.
<table>
<thead>
<tr>
<th>Source</th>
<th>Category</th>
<th>Barrier to implementing CE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Structural</td>
<td>Employment term limits imposed on managers affect long-term CE strategies. Staff must demonstrate to boss the ways in which new recommendations are consistent with past ways, thereby entrenching a particular path. No incentives are built into the budgetary system that stimulates circular economy innovation. Hierarchical systems inhibits flexibility and innovation.</td>
</tr>
<tr>
<td></td>
<td>Cultural</td>
<td>Silos exist between planning and production. Strong risk aversion of managers.</td>
</tr>
<tr>
<td></td>
<td>Contextual</td>
<td>Competing priorities inhibit commitment to circular economy. Uncertainty about the market place.</td>
</tr>
<tr>
<td></td>
<td>Reduction</td>
<td>Overcome rebound effect of eco-efficiency and eco-sufficiency strategies.</td>
</tr>
<tr>
<td></td>
<td>Reuse</td>
<td>Technical maximum reusability of materials. Development of take-back mechanisms from the companies. Ensuring repair and secondary use of products and their original use. Taxation based on non-renewable energy rather than labor and renewable energies.</td>
</tr>
<tr>
<td>Ghisellini, Cialani, &amp; Ulgiati, 2015</td>
<td>Recycle</td>
<td>Reinforcement of local markets of recycled materials. Risks of global trade of materials, plastic waste; unfeasibility due to the mixing of materials. Rare metals (lack of economies of scale). Appropriate LCA modelling for reuse and recycling.</td>
</tr>
<tr>
<td></td>
<td>Reclassification of materials</td>
<td>Reuse after the first cycle.</td>
</tr>
<tr>
<td></td>
<td>Renewable energy</td>
<td>Increase their share compared to the share of fossil fuels.</td>
</tr>
<tr>
<td></td>
<td>Financial</td>
<td>Major up-front investment costs. Environmental costs are not taken into account. Recycled materials are often still more expensive than virgin. Higher costs for management and planning.</td>
</tr>
<tr>
<td></td>
<td>Institutional</td>
<td>Unleveled playing field created by current institutes. Financial governmental incentives support the linear economy. Circularity is not effectively integrated in innovation policies. Competition legislisation inhibits collaboration between companies. Recycling policies are ineffective to obtain high quality recycling. Governance issues concerning responsibilities, liabilities and ownership.</td>
</tr>
<tr>
<td></td>
<td>Infrastructural</td>
<td>Limited application of new BMs. Lack of an information exchange system. Confidentiality and trust hamper exchange of information. Exchange of materials is limited by capacity of reverse logistics.</td>
</tr>
<tr>
<td>Amsterdam, 2013</td>
<td>Societal</td>
<td>Lack of awareness and sense of urgency, also in business. GDP does not show the real progress or decline of society. Resistance from powerful stakeholders with large interest in status quo.</td>
</tr>
<tr>
<td></td>
<td>Technological</td>
<td>Limited attention for end-of-life phase in current product designs. Limited availability and quality of recycling material. Linear technologies are deeply rooted.</td>
</tr>
</tbody>
</table>
Cleaner Production (CP) is a part of CE, therefore barriers towards CP will indirectly be a barrier towards CE, barriers towards implementing CP found in this work is presented in Table 2 below.

Table 2. Barriers to implementing Cleaner Production

<table>
<thead>
<tr>
<th>Source</th>
<th>Category</th>
<th>Barrier to implementing Cleaner Production</th>
</tr>
</thead>
</table>
| (Moors, Mulder, & Vergragt, 2005) | Mixed barriers in the base metal industry | • Systemic characteristics  
• Knowledge infrastructure  
• Legislative context  
• Organization and culture of the firm  
• Stage of technology development |
| (Shi, Peng, Liu, & Zhong, 2008) | Economic barriers | • High cost of investment when developing CP alternatives  
• High risk involved in committing capital to unproven technology |
| (Shi, Peng, Liu, & Zhong, 2008) | Logistics | • The intertwinement of the current production system |
| (Shi, Peng, Liu, & Zhong, 2008) | Managerial and organizational | • Higher priorities to production/market share  
• Concern about competitiveness  
• Management resistance to change  
• Lack of awareness of CP  
• Inadequate management capacity |
| (Shi, Peng, Liu, & Zhong, 2008) | Financial and economic barriers | • High initial capital cost  
• Difficulty in accessing financial capital  
• Poor financial performance of CP  
• Lack of effective evaluation measures for CP |
PSS has also been identified to be a vital part of CE, therefore barriers to implementing CE are indirect barriers to implement CE. Barriers found in this work to PSS are presented below in Table 3.

### Table 3. Barriers to implementing PSS-systems

<table>
<thead>
<tr>
<th><strong>Barrier</strong></th>
<th><strong>Description</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Managerial challenge</td>
<td>Transitioning from product manufacturer into service provider constitutes a major managerial challenge, since services require organizational principles, structures and processes new to the product manufacturer (Olivia &amp; Kallenberg, 2003). Services require a different organizational setting than products, therefore industrial product services are difficult to manage (Vargo &amp; Lusch, 2007).</td>
</tr>
<tr>
<td>Cultural change</td>
<td>Services require support and a change of thinking within the companies (Vargo &amp; Lusch, 2007). The consumers are unaccustomed to using products without owning them, and the providers are unaccustomed to offering a product while maintaining ownership while they offer support services (Beuren, Ferreira, &amp; Miguel, 2013). The required cultural change going from a product-centered organization to a service-oriented organization is complicated, an organization built to design and deliver devices has a hard time becoming enthusiastic to repairing them (Olivia &amp; Kallenberg, 2003).</td>
</tr>
<tr>
<td>Customer wants to have ownership</td>
<td>Consumers highly values to have control over products, but worth noting is that B2B is less concerned with having ownership and control of products than consumers are (Tukker, 2013).</td>
</tr>
<tr>
<td>Customer is careless when leasing</td>
<td>Leased products tend to be used less carefully than products that are owned, hence rented, leased or shared products may be returned earlier to the service provider in comparison to the lifetime of a product sold in the traditional manner (Tukker, 2013).</td>
</tr>
<tr>
<td>Higher risk for CBM than LBM</td>
<td>A CBM always has a higher business risk than validating a corresponding LBM, because such a validation cannot be achieved without later sales, this second cycle requires resources exposed to risk, in addition, retained ownership increases the impact from failure, since the stock of resources at risk grows during the validation time with additional sales (Linder &amp; Willander, 2015).</td>
</tr>
<tr>
<td>Cost of transition</td>
<td>The costs to transition from product-oriented to PSS-oriented, particularly for result-oriented PSS which requires a completely different skill set and organization than in the case of product sales, due to the high labor intensity, PSS can also be more expensive than having a product operated by the customer (Tukker, 2013).</td>
</tr>
<tr>
<td>Lack of methods for handling LCA data</td>
<td>It’s a lack of methods for the companies to use to handle life-cycle-related data, traditional methods used today are not adapted for the challenges that comes with a circular business model thinking (Produktion2030, 2014).</td>
</tr>
<tr>
<td>Pricing models</td>
<td>Pricing is a major policy issue for solutions providers (Galbraith, 2002).</td>
</tr>
</tbody>
</table>
In has been argued that to become a sustainable organization requires an organizational transition (Loorbach & Wijsman, 2013), hence applying CE will require an organizational transition. Therefore barriers related to transitioning and change in general was searched for, the following barriers presented in Table 4 are related to conducting an organizational change in general.

<table>
<thead>
<tr>
<th>Categories</th>
<th>Challenge/barrier</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural</td>
<td>Fear of the unknown</td>
<td>Fear of the unknown can drive organizational inertia &amp; change can be upsetting for organizations, especially when the outcome of the change is unpredictable (Hoffman &amp; Bazerman, 2007).</td>
</tr>
<tr>
<td>Managerial/organizational</td>
<td>Change is difficult</td>
<td>Change is disruptive &amp; costly, it’s uncomfortable for individuals and even more difficult for organizations, since they consist of multiple individuals who must change in a coordinated way (Grant, 2010).</td>
</tr>
<tr>
<td>Structural</td>
<td>Company structure and age Upsetting a structure of power is likely met with resistance</td>
<td>Restructuring, considering complex organizational structure, is a costly exercise which requires careful preparation (White, 2004). When threatening an established structure of power with attempts of restructuring it will likely be met with resistance from those benefiting from the existing system, the self-preservation of managers taking the decisions might rule out environmental, social or economic objectives (Hoffman &amp; Bazerman, 2007).</td>
</tr>
<tr>
<td>Cultural</td>
<td>Risk culture</td>
<td>The culture of a firm can either encourage or discourage risk taking, even a powerful CEO needs support (White, 2004).</td>
</tr>
<tr>
<td>Organizational</td>
<td>Lack of champion</td>
<td>The personality and motivation of strategists themselves is important, a single dominant person can be the determinant in the willingness to accept a risky project (White, 2004).</td>
</tr>
</tbody>
</table>
Presented in Table 5 are barriers that were found in areas that are related to CE, becoming a sustainable organization, disruptive innovation and business model innovation, they can therefore be viewed as indirect barriers to implementing CE.

Table 5. Barriers to becoming a sustainable organization, disruptive innovation & business model innovation

<table>
<thead>
<tr>
<th>Source</th>
<th>Categories</th>
<th>Barrier to related CE areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Sandström, Berglund, &amp; Magnusson, 2014)</td>
<td>Disruptive innovations may be met with resistance</td>
<td>Disruptive innovations are often incompatible with existing preferences, incentives and competencies of actors in a firm’s value network, and may be met with resistance</td>
</tr>
<tr>
<td></td>
<td>Difficult to manage BMI</td>
<td>It’s difficult to manage BMI because it transcends the firm’s boundaries</td>
</tr>
<tr>
<td>(Hoffman &amp; Bazerman, 2007)</td>
<td>Rewarding &amp; measuring success</td>
<td>Misaligned reward systems can lead individual managers toward fulfilling immediate personal goals that diverge from the broader, long-range goals of the sustainable organization. Reward and incentives systems within an organization can hinder opportunities available through change, a company might claim to hold sustainability as important in its mission statements but still have misaligned reward systems that can lead individual managers towards fulfilling immediate personal goals that differs from broader, long-range goals of an organization becoming sustainable. Metrics, such as return on investment (ROI), net present value, and return on equity, are built upon beliefs and assumptions that overlook measures that include environmental and social concerns.</td>
</tr>
</tbody>
</table>
3 METHODOLOGY

In this section the working process and methods used during the thesis is described.

3.1 The research design

The study was conducted under an interpretivist paradigm, which implies that the findings have been derived using qualitative methods and analysis, based on the interpretation of qualitative research data, further interpretivism tends to produce ‘rich’, subjective and qualitative data (Collis & Hussey, 2014). The thesis is based on both primary and secondary data. Where the primary data was collected through a qualitative interview investigation of one company using deep semi structured interviews with eleven respondents, and the secondary data was collected through a review of literature.

The research was conducted using a qualitative research approach, the research followed a process of several steps presented in figure 5 below.

![Figure 2. The research process of the thesis.](image)

3.2 Literature study

Qualitative data needs to be understood within its context (Collis & Hussey, 2014), so background information was collected through reviewing of literature regarding CE, barriers to CE and topics related and connected to CE. The information was collected organically, based on the findings of the first articles reviewed the secondary data expanded into more areas. The study aim and purpose took form during the project, the project had an open approach from the beginning. When starting the study the research question was still not set, so the first weeks was used to get an overview of circular economy as a whole, what it implies, and where the literature is today, much time was spent on just understanding the phenomena CE. The parts considered most vital are introduced in the Theoretical Framework in sections 2.2 and 2.3. The review of literature started with the following areas:

- Understanding the phenomena circular economy
- Related CE areas with focus on PSS systems
- Circular business models
- Sustainable Business Models
- KTHs applications to research projects
- Organizing to deliver solutions

The first presented approach was then to have the purpose of finding barriers and enablers for a company to transition, with the final aim of creating a tool for companies to use to assess themselves on where they are in relation to CE. The first approach also had a focus on both the transitioning part, and how the CE would take shape within the company. During a progress seminar in the beginning it was mentioned that these two are rather different and unrealistic to have both. The study was then delimited to just focusing on the change and transition towards
CE, and the barriers and enablers towards that. It was also recommended to look into disruptive innovation. The following fields was then looked into:

- Disruptive innovation
- Transitioning to PSS
- Transitioning to CE
- Change & risk management

A seminar regarding eco systems and dominant design was attended, these areas are relatable to CE, and hence this area was investigated. The review of literature then grew from all of the earlier areas into more fields. The majority of the articles were found in *Journal of Cleaner Production*, other journals used was the *Journal of Service Management & Business Strategy and the Environment*. Since the field of circular economy is relatively new, most articles regarding CE is up to date, and several articles are from 2013 and onwards. Older articles are used for mainly related areas since these fields are more mature. Key words used for finding literature was:

- Circular Economy
- PSS - Product Service Systems
- Cleaner Production
- Business Model Innovation
- Disruptive, Radical and Incremental Innovation
- Service
- Circular Business Models
- Sustainable Innovation
- Transitioning to CE
- Barriers CE

The literature then took a focus more explicitly on barriers and enablers companies can face when moving towards circularity, and later the study was limited even further to focus only on the barriers. The aims of the literature was to find information regarding the following areas:

- The basic principles of circular economy
- Circular economy connected to the manufacturing industry
- Best practice studies on how a company can become circular
- What support is there today to transform into a circular economy
- Working ways and models existing today to help in the transformation of becoming circular
- The main factors in a company when becoming circular, design, organization, policies etc.
- Boundary conditions of circular economy, such as policies
- Barriers for applying CE
- Barriers to PSS
- Barriers related to transitioning in general (CE, CP, BMI, change, disruptive innovation etc.)

The literature was complemented towards the end with articles related to the results of the primary data. When the articles was reviewed the first time the thesis still didn’t have a set focus, and the author’s overall understanding of the field was weaker in the beginning of the work than
towards the end, therefore some of the original literature was reviewed a second time with a more clear focus on barriers.

3.2.1 Collection of qualitative data – Interviews

To gain company specific information to the case study interviews were conducted with a large mature industrial B2B company. The interviews were conducted with eleven respondents, and discussions were also held with the contact person at the Company, working with sustainability questions and eco design. The interviews took between 45-80 minutes, and consisted of between 5000-9500 words, when transcribed.

The respondents combined positions together covered a broad spectrum of the organization, whereof 7 of the respondents were in high managing positions. Their positions and experience within the Company made them suitable to participate, they were selected mainly by the contact person at the Company, but also in cooperation with the author and the supervisor. The interviews was performed with three marketing managers within the marketing segments General Industries (GI) and Motor Vehicle Industries (MVI), four Research and Development (R&D) employees, one operations manager, one strategic sourcing manager, one business control (service) manager and one within corporate responsibility. Discussions was also conducted with the contact person at the Company. The sampling of the participants was purposive, and selected carefully before the interviews started, the participants was selected based on their knowledge level, and to cover all areas identified as most important. An overview of the collected primary data is presented below in Table 6.

Table 6. Overview of collected primary data

<table>
<thead>
<tr>
<th>Number of interviews conducted</th>
<th>Type of interview</th>
<th>Type of company investigated</th>
<th>Length of interviews</th>
<th>Working areas of respondents</th>
<th>Positions of the respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 respondents</td>
<td>Explorative, semi-structured &amp; open ended</td>
<td>Large, mature, established, industrial, B2B company</td>
<td>45-80 minutes</td>
<td>R&amp;D</td>
<td>1 at group level</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Strategic Sourcing</td>
<td>10 at division level:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Operations</td>
<td>- 5 vice presidents</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Marketing segment GI</td>
<td>- 5 other</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Marketing segment MVI</td>
<td>7 of the respondents were</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Business Control (Service)</td>
<td>in managing positions</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Corporate Responsibility</td>
<td></td>
</tr>
</tbody>
</table>
Since the aim of the thesis is to identify possible barriers and enablers, the interviews were explorative, semi-structured and open ended. Rather than asking the same questions to all participants, the knowledge of the person as it came up during the interview was further explored to retrieve as much information as possible. The respondent’s personal role within the Company was of relevance, hence the questions were tailored to the different working areas.

DEVELOPMENT OF INTERVIEW GUIDE

The interviews were semi structured with open ended questions, which is recommended when the logic of a situation is not clear (Collis & Hussey, 2014, s. 134), such as in the case in this study. When designing questions for interviews under an interpretivist paradigm it’s necessary to have gained considerable knowledge about the topic before (Collis & Hussey, 2014, s. 135). The interview guide was hence developed after an intense analysis of the literature’. The interview consisted of open ended questions about how things work at the organization today and the respondents’ knowledge regarding CE. Hypothetical questions were used to explore how the respondents thought CE could be implemented and their attitude towards it. This was relevant to use since the knowledge about CE was varying but it was still the topic to be explored. Probing was used to gain further depth and clarity of the answers. The explorative nature of the questions had the aim of locating anything of relevance to CE that the person had knowledge about. The interview guide was conducted based on the literature findings, and a checklist of the expectations of findings from the interviews was drafted. The interview guide consisted of about approximately 3-4 A4s of questions, whereof several of the questions was made specifically for the respondents’ position within the Company, the interview guide functioned as a checklist to make sure the information sought was covered. Since the aim of the study was to explore all barriers a company might face, rather than just prove what’s already existing in literature, the study took literature findings of barriers to CE in mind, but focused on finding barriers beyond the literature, hence the literature’s main aim was to locate areas in which barriers could be found. The interview guide and the expected outcomes of the interviews can be found in appendix A, B and C.

INTERVIEW IMPLEMENTATION

Ten of the interviews was conducted face-to-face, which is the traditional approach, and one interview was conducted over telephone, which is also a widely used method (Collis & Hussey, 2014). The interviews were conducted by two people, the author and the supervisor, to make sure the interview was conducted efficiently to avoid missing important information and to ask relevant follow up questions. During the interviews notes were taken, that was conducted into summaries of the findings. The interview guide was iteratively altered with the findings, to see what other respondents said about similar topics. Specific questions to different positions was added along the way to retrieve the information specific to their knowledge.

3.3 Analysis of Qualitative Data

A general analytical procedure was performed with the data, which made it possible to conduct the analysis systematically. A qualitative data analysis involves three simultaneous flows of activity: reducing the data, displaying the data, drawing conclusions and verifying the validity of those conclusions (Collis & Hussey, 2014, s. 157). To be able to conduct the qualitative analysis the interviews were transcribed. The transcription was conducted with high accuracy, using limited sentence concentration to get rid of excessive spoken filling words. To avoid being biased, the interviews were transcribed and thoroughly analyzed, resulting in that the author knew almost all the data by heart, and could pinpoint which respondent said what.
The data was reduced through coding the transcripts. Coding is a method in which qualitative data can be controlled, and which makes it possible to group the data into different categories that share a similar characteristic (Collis & Hussey, 2014, s. 162). The transcripts were coded into different categories based on findings, aims and questions. These categories where identified iteratively to perform the coding, resulting in more categories evolving along the way. The words and phrases were inserted in an excel document overviewing all categories responding to each respondent. When inserting the content sentence concentration (Kvale, 1997) was used to fit the text, to make it easier to overview and get the core information. Two excel documents was used simultaneously, one for internal findings and one for external, this method was used for structuring and restructuring the data. During the first analysis of the data, categories emerged with connection through the literature, and the first notes after interviews. But many was added along the way. The matrixes with the information was restructured and based on the categories, the content was reviewed and organized. Some categories were merged together, at first a large number of categories were used, then the number of categories was reduced systematically.

The result of the data reduction was that the data was displayed in 2 large, over-viewable matrixes in excel, based on the topic categories connected to each respondent. This provided a summary of the data in a diagrammatic form possible to draw conclusions from.

3.3.1 Drawing conclusions
Conclusions were drawn parallel to writing up the case, where the findings became more apparent when writing and structuring the content. The content was compared to literature findings to make sure that the important findings got presented clearly. Discovering extra barriers and drawing conclusions was mainly based on reflections that appeared during the literature search, discussions with the supervisor and when analyzing the data. Before finishing the report the result part of the data was reviewed by the contact person at the Company, and no objections were raised of misinterpreting or showcasing the data in an incorrect way.

PRESENTING THE QUALITATIVE DATA

This section describes which methods were used when composing the primary data from the interviews into text.

Based on the collected and sorted data, explained in earlier chapters. The data was analysed and presented in the following way: First the different sections where filled in after memory, to get an overview. The case was written up based on the results, to present the content that the findings were then connected too. The outlay was based on the main findings mid through, and this was used as a base to fill in the different parts in the excel categories. After this the excel files with all the categories was methodically went through, to make sure the case contained all relevant information. Simultaneously searching out barriers the Company identified, and iteratively filling up the sections of the author’s reflections, to be discussed later, and again compared to existing literature. Every cell taken from the excel file and inserted in the case was color marked, to ensure nothing was forgotten. The description of the result was then large and fragmented, the categories were each summarized in a section. The first case description lacked in structure, a new approach was chosen of giving a brief description of the Company and what they are doing in regards to sustainability today, then the conceptual discussions were described in a separate section. Lastly all the barriers that were identified during the discussions with the respondents were described, and related content were discussed in regards to them. So the focus on the description of the case went from the Company and all its different part to focusing on the barriers and how a transition could take shape, which was also the purpose of the thesis.
The study was similar to a case regarding how the data was collected, therefore looking at how case studies are presented was applicable, the book ‘case study research’ was used as guidance to present the result (Yin, 1994). The composition is descriptive, and an unsequenced structure is used, (Yin, 1994, s. 138) i.e. the sections assumes no particular importance. The structure is sufficient for descriptive case studies of organizations, which often have the same characteristic, to cover employees, formal lines of the organization, etc. in separate sections, and where the particular order of the sections presented is not critical, it can therefore be regarded as an unsequenced approach (Yin, 1994, s. 140).

Since the transcripts were coded, and excel sheets were connected to the respondent, it was always possible to quickly find the original text when writing up the case. To ensure the sentences was not put out of their context. The interviews showed several different views and perspectives, only in some areas were the interviews corresponding. It took a lot of time to present the results in an objective way, including the different kinds of views at the different areas, and still present a conclusion.

### 3.4 Limitations

The study was conducted under limits of time constraint and limits connected to using primary data:

- The study was conducted within the business area of one company.
- 11 respondents represent a large business area in an even larger company.
- Respondents had a varying knowledge level about CE.
- The interviews was tailored to the respondent’s position and knowledge, and so the content of each interview was varying. Hence the respondents might not represent the general opinions of the whole company or business area.

### 3.5 Evaluation of analysis

If a descriptive case study fails, without excuse, to present a complete description, the researcher can be accused of being biased, to avoid this the researcher must know the topic well enough (Yin, 1994, s. 141). To avoid providing a faulty or confusing picture, considerable effort was put into describing the case and to focus the structure on the relevant findings, resulting in that the author became familiarized with the data. The results was also read through by the contact person at the Company before finishing it, and no complaints were raised on the content.

Problems and strengths of unstructured interviews: The process of open discovery is the strength of unstructured interviews, although it need to be recognized that that the emphasis and balance of the emerging issues may depend on the order in which the participants were interviewed (Collis & Hussey, 2014, s. 135). Another problem is the difficulty of analyzing the data since the matters explored might vary from one interview to another as different aspects of the topics are revealed (ibid). This is also something that occurred in this study, which proved to be more time consuming than expected, analyzing the data and presenting the results all took longer time than expected, but in the end resulted in a detailed description of the outcomes. The issue of the emphasis on emerging issues depending on the interview order is also recognized in this study, but since the study is explorative and the aim was to discover all barriers the Company might face, this should not affect the validity of this research.

The data was analyzed systematically and thoroughly following the recommendations from Collis and Hussey (2014), a potential problem with a general analytical procedure is that the
value of the analysis depends on the quality of the authors’ interpretation. The analysis is evaluated based on transferability, validity and reliability.

3.5.1 Transferability

Transferability relates to if the findings can be applied to another situation that’s similar to permit generalization (Collis & Hussey, 2014).

Interpretivism tends to allow the findings to be generalizable from one setting to another similar setting (Collis & Hussey, 2014). Therefore this study could be generalizable to other similar companies that are large, mature, B2B and industrial with similar structures.

3.5.2 Validity & Reliability

Weaknesses and strengths with qualitative data: Qualitative data are associated with an interpretivist methodology that usually results in findings with a high degree of validity, but low reliability, the challenge with constructing an interpretivist study is to retain the integrity of the data (Collis & Hussey, 2014, s. 130). Validity refers to if tests (here interviews) measured what the researcher wanted it to measure, and the results reflect the phenomena under study and reliability refers to the accuracy and precision of the measurement (Collis & Hussey, 2014, ss. 52-53).

The study identified key persons for the interviews and had a well worked through interview guide. The interviews were transcribed and the data handled systematically, with a result of the author becoming to know the data well. Due to a varying knowledge level of the respondents some discussions ended up being hypothetical. But whether a result is found through a hypothetical discussion or not is also presented in the results part. Since this study is based on qualitative data the validity of the findings should be high, but the reliability low (Collis & Hussey, 2014), although it should be emphasized that reliability is not the aim of qualitative studies.
4 RESULTS

In this chapter the results from the interview investigation will be presented. First the investigated company is described in 2 different sections, the first describing the Company in categories relatable to the findings, and the second being on a conceptual level describing the employees’ speculations and thoughts about CE. Lastly a summary of the barriers identified by the employees is presented.

4.1 Results from qualitative data collection

Abbreviations used to describe the respondents are presented below:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR</td>
<td>Corporate Responsibility</td>
</tr>
<tr>
<td>R&amp;D 1</td>
<td>First research and development interview</td>
</tr>
<tr>
<td>R&amp;D 2</td>
<td>Second research and development interview</td>
</tr>
<tr>
<td>R&amp;D 3</td>
<td>Third research and development interview</td>
</tr>
<tr>
<td>R&amp;D 4</td>
<td>Fourth research and development interview</td>
</tr>
<tr>
<td>Marketing 1</td>
<td>Marketing manager within the general industry segment</td>
</tr>
<tr>
<td>Marketing 2</td>
<td>Marketing manager within the general industry segment</td>
</tr>
<tr>
<td>Marketing 3</td>
<td>Marketing manager within the motor vehicle industry segment</td>
</tr>
<tr>
<td>Operations</td>
<td>Operations manager</td>
</tr>
<tr>
<td>Service</td>
<td>Business Control (Service) manager</td>
</tr>
<tr>
<td>Sourcing</td>
<td>Strategic Sourcing manager</td>
</tr>
</tbody>
</table>

4.1.1 Description of company

The Company is led by a board of directors, president and CEO at the top, it is then divided into 4 different business areas, which operates very independently of each other, this study was conducted within one of these business areas. The investigated company is large, global, well established and has been around for more than 100 years. It’s a B2B company with a very large and varying customer segment (Marketing 2). The Company is in the high end market and sells a premium brand with a high quality. The Company was said to be ‘wanting to be leading in all areas’ (Marketing 3), that they sell the best products on the market and they are number one (Sourcing).

“We are number one, largest on the market, most customer segments, and the best products, premium brand products. “

(Sourcing)

The product was described by all interviews to be high end, to have a very high quality, reliability functionality, performance and a long life length. The competitive edge of the Company was said to be quality and the lifespan of the products (R&D, Marketing 3). The product was also mentioned to be robust and ergonomic, and it was stated that the Company is strong in the high end segment, that they make the most productive tools (Marketing 3). The Company was also said to be a Solution Provider that sells total solutions (Marketing 2). They sell a high end product portfolio, selling solutions with high function quality to ensure quality, the product is partly built on good mechanics, but that it also includes good software to offer traceability (Marketing 3).
The Company culture is risk averse, and the Company has an incremental way of working. A core in the philosophy of the Company is Continuous Improvement (CI), (Marketing 2). The Company culture was said to be product oriented (Service), and the innovation was also said to be product oriented (Marketing 3). The profit level was said to be holy, and that the Company is willing to invest in top-line when it gives direct profit, but not in long term profit (Marketing 3).

The Company has a value based pricing model. The cost of the product doesn’t reflect the cost of creating it, instead reflects the value that’s sold to the customer; productivity and high uptime. They create a value and sell on other parameters than price, and they charge a lot for it (Sourcing).

The organization is extremely decentralized, and communication is mainly vertical within the organization, and not horizontal between the divisions. The Company is very agile, and it was said that they can be that by having a low inventory (Operations, CR). The divisions and units have a lot of influence and power of their own department, which mean they can make quick decisions and to be agile (Marketing 1, CR). Approximately 70% of the Company’s costs are external, and a lot is outsourced, which makes the Company very dependent on suppliers. All construction is made within the Company, it’s never outsourced, to not lose the know-how, and to have full control over the whole process, and then all stages in the factory are not done within the Company (R&D 2). It’s a well-established service division in place, and 45% of the Company’s revenues are from service (CR).

Sustainable Profitable Growth was mentioned as the core values of the Company, and to get Sustainable Profitable Growth through creating customer value and customer benefit, that the Company’s’ first mission is sustainable growth (Marketing, 1, 2). To create value for stakeholders and integrity was also mentioned as main Company values, to have a long term perspective, to walk the talk, regarding environmental commitments and the human right commitments, it was also said that it's a strong spirit within the Company of wanting to be proactive and of wanting to do business with a purpose (CR). They were also said to be profit driven (R&D 1), and that “we are here to create money for our stockholders.” (Operations).

The Company works with innovation incrementally. According to one interview the Company leads innovation, and that's how they can keep their margin and their customers (Sourcing). Innovation was said to be product oriented and connected to R&D. The R&D 3 respondent said that the Company don't work enough with innovation, that as the Company is built up today, almost no one works with innovation or technical development, and that it's a weakness. According to this respondent the projects don't have time to spare for innovation, because they're controlled by deadlines and 'slack’ is removed it’s no time to indulge in projects, which decreases the chances for technical leaps radically. The respondent also mentioned that it’s supposed to be 20% of the time available to work on own projects and ideas within the Company, but that it’s almost not possible to use it since the employees are under time pressure in the projects (R&D 3).

The Company view themselves as being solution oriented, and according to one respondent there’s always an advantage of being solution oriented (Marketing 2). Another respondent thinks they will be forced to go towards a Service Company from being a Product Company (Sourcing), and another said that the Company is slow in changing their view, and personally thinks that the product will become a commodity and that the differentiation will be in a total solution (Service). Yet another one emphasized that he was surprised how little process oriented the Company is, but also that it has improved the last 3 years (Marketing 1). One respondent thought that the Company have developed the hardware as much as they can, and that it will be
more software focused in the future (Marketing 3). On new markets the Company usually sells products, to initiate the selling/partnerships, but on more mature markets it’s possible to differentiate from the competitors by selling total solutions, and to go from hardware towards software, it’s also a trend among customers to purchase total solutions (Marketing 2).

The Company has an established service division in place. The products are not sold to the customer based on service, but it affects their decision that the Company has a strong Service division (Service). According to another respondent, customers with a service contract are more satisfied than customers without one (Marketing 2). The Company sells the tools as one product, and then service beyond that as another product, this is handled by different departments at the Company (Service). The Service division sells their contracts 1-3 years after the product is sold, when the guarantee time expires.

According to the Service respondent the interest for service at the Company was low from the product development parts of the Company, and in the respondent’s opinion the Service division should be more active there. There are internal conflicts between the Service department and the Product department, the tools/product department have a lingering mindset that Service should be free and that Service is only dependent on the product, and they regularly include 1-2 extra years beyond the guarantee-period of free Service to the customer, which makes it harder for the Service-department to sell the same contract later on. Due to the same lingering mindset, they also give away software for free, and the Service and tools/production departments also have different views on when to perform maintenance and when to give away a new product, the tools department avoid performing maintenance and instead they give away new tools for free (Service).

The Company has an exchange system for parts in place, it’s a limited system that is fairly unknown within the Company, today it makes no profit but it’s neither a cost for the Company. The purpose is to offer customer value through offering components cheaper than competitors and today a very low price is charged for the components, the price could be heightened significantly and the customer would still benefit from it (R&D 4). The exchange system is today in a small scale with flows systems that works well, the R&D 4 respondent considered it to be expandable.

4.1.2 How the Company works with sustainability today

This section presents how the Company and its different divisions work with sustainability today, providing a picture of where they are today regarding sustainability questions. This might provide an insight into the Company’s mindset towards sustainability and how far they have come in areas related to CE.

One respondent stated that the Company values sustainability very high, but also pointed out that sustainability can stand for many things (Marketing 2). Sustainability was said to be part of the Company’s culture and that a lot is common sense, it was mentioned that it's coming sustainability initiatives from the customers, especially the German customers (Marketing 3). There are also new KPIs at the Company, with sustainability in mind (CR), and one interview claimed that the Company is in the forefront regarding Corporate Responsibility compared to other industries, that they are setting the benchmark (Marketing 2).

Discussions regarding sustainability at the Company are focused on how to get the customer more sustainable, and compared it to Industry 4.0 that’s also about how the customer can connect their tools, but that the discussion internally is not at all the same (Marketing 3). Another respondent said that sustainability is mainly important for the Company at a group level, but not
further down (R&D 1), and one thought that the Company ignores these sustainable aspects and that surprisingly few people react on it (R&D 3).

According to one respondent the Company’s strategy towards sustainability is to produce tools with quality and a long life length, compared it to the Company’s competitors’ tools that need to be changed within weeks (Marketing 3), another said that the Company are working on IQ-design, designing for recycling etc. (Marketing 2), and a third said that the focus is to make tools that are as resource-economic as possible (Operations), to lower the impact energy consumption was also mentioned (Marketing 1). The main focus in the R&D projects is to deliver productivity to the customer, through high quality and performance on the product. Lowering the price for the customer was mentioned as another driver of the projects, this correlates with longer life on the products, which is also good for the environment, but the environment is not the reason it's done (R&D 1).

The suppliers are measured on quality, how they deliver, cost, and how well they perform on the Company’s audit, that has many parameters including health, environment and safety etc. (Sourcing). The Company has a goal that most suppliers should be within an environmentally certified system, they check that suppliers don’t use conflict materials, which is law, and don’t use materials on the black & grey list (Sourcing). The respondent within Sourcing said that the laws and regulations are too soft but also already very hard to navigate, and that even though the Company is a large it is hard, almost impossible, to look at all the parameters.

Environmental aspects beyond requirements was said to have a low priority in the projects, and to only performed in the end of a project ‘If there’s time’, which it was said to not be (R&D 1). The driving forces on the projects were said to be performance, time and cost, and that it’s a lot of demands that comes before the environment (R&D 1). Two interviews said that due to time pressure and priorities there is no time within the projects to consider environmental aspects (R&D 1, 3). According to one respondent the projects are under a lot of time pressure and are understaffed (R&D 3). According to another they are not time pressured, but that sustainability aspects beyond requirements are not considered anyway (R&D 2).

According to one respondent alternative materials that’s better from an environmental point of view are not tested, and it’s not time in the projects to bring in an untested material, the same one stated that it’s no time to take in recycling aspects in the developing projects, (R&D 1). According to another respondent the constructors can influence material selection and bring in new materials the Company hasn't used before, and that when developing a product cost of materials and components is not an issue (R&D 3).

What’s done today with regards to sustainability is mainly to review the materials to make sure they’re not on the grey or black list, and if they’re on the grey list to have a plan for getting rid of the material relatively soon (R&D 1, 2, 3). It was said that except for the grey and black list there are no rules for material selection or educations, and that the constructors choose as they want (R&D 3). The same respondent thought that the Company are behind on material selection and how to construct for environmental aspects, that today no review is carried out on what the Company could improve on, the respondent had also reacted to a superfluous and unnecessary use of Loctite (a very strong and toxic glue) and the lack of a standard department to have an overview of amount of used materials and parts that could simplify recycling, service and disassembling. (R&D 3) Today it’s not discussed within the Company if the products could be constructed for less machine time and to make them easier to disassemble (R&D 3).
4.2 Conceptual discussions regarding circular economy

This section describes the discussions about CE with the interviewees. Due to varying knowledge level, and the fact that CE is not yet implemented or discussed within the Company – much of this can be regarded as speculations.

4.2.1 Attitude & knowledge about circular economy

The knowledge about Circular Economy was varying, and the ones who were knowledgeable about CE was mainly due to personal interests, rather than due to company culture. One respondent had noted that CE seems to be emerging in the surrounding environment, but not within the Company, and said that CE is not talked about within the organization (Sourcing). The overall attitude towards circular economy was positive and the Sourcing respondent perceived it to be inevitable. Contradictory the Operations respondent remained skeptical, and said that probably no one in the Operations division cares about it, but also pointed out the need of education on the subject to talk further about it, and by the end of the interview said that it’s a bit exciting wanted to know more. The Company was perceived to be ready for CE (R&D 3), and the Sourcing respondent thought that the Company should have a part in the change towards CE, that they could have a leading role, and that otherwise someone else will.

“We're losing in new innovation, we should profile as a company that takes all circular responsibility, then do a business case for customer, and I think we have all possibilities with our muscles to carry through.”

(Sourcing)

Marketing 3 said that if the Company wants to do this, the economic keys are there, if they think the stockholders accept it, because it would affect the whole stock market, the respondent further sad it was only a speculation but that he thought the stockholders could be positive towards CE. The Sourcing respondent thought that they are on top of the pyramid and should be able to lead such a change, Marketing 3 also considered the Company ready to transform towards CE, as long as there is enough business advantage since it's always connected to the economical part. Although the Sourcing respondent argued that it would cost more not to change towards CE, that now the true cost of the current linear business models (LBM) are absorbed by the nature and not measured, thought that the costs should be compared to what the nature would charge us for doing what is done today.

“I think this will cost a lot more if we don’t do it. The true cost here isn’t measured, it’s absorbed by Mother Nature. Here we will start measuring it, but you have to measure it against the total cost there, which you don’t do. So you cannot measure it just like that. You have to do a: what would the nature bill us every year to do like this? I can imagine there are no such numbers. So maybe that’s the risk – are we prepared for that transition? Are we prepared to see that whole cost? Are our customers ready to take that? ”

(Sourcing)

4.2.2 Positive outcomes and risks with applying CE

The following presents what the respondents’ thought the Company could win with a transformation towards CE & what the respondents’ considered to be the biggest risks with applying CE within the Company
The following was mentioned as possible positive outcomes of a CE:

Table 7. What the respondents considered could be possible positive outcomes of a transition towards CE

<table>
<thead>
<tr>
<th>What to win by applying CE</th>
<th>Source and/or motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brand - Strengthen the brand</td>
<td>(Marketing 3, Sourcing)</td>
</tr>
<tr>
<td>Societal and environmental benefits</td>
<td>(Sourcing)</td>
</tr>
<tr>
<td>Resource efficiency</td>
<td>(Marketing GI)</td>
</tr>
<tr>
<td>Market shares</td>
<td>(Sourcing) and one also thought that stockholders could be positive to CE (Marketing 3).</td>
</tr>
<tr>
<td>Be first and to stay leader</td>
<td>The Company views itself as market leader and considers it very important to take responsibility as a market leader - to be benchmark (Marketing segment 1). One more said that it's important to be the first and to be a leader, in all areas, including this (Marketing 3).</td>
</tr>
<tr>
<td>Attract good people to the firm</td>
<td>By profiling as circular the Company could attract a new generation that regards this as important (Sourcing).</td>
</tr>
<tr>
<td>Be close to the customer</td>
<td>It was mentioned that a transition could change the sales product in a way that would give the Company a reason to be close to the customer, and that it would in some way increase the Company’s presence, which was regarded as often being a good reason (Marketing 3).</td>
</tr>
<tr>
<td>Competitive advantage</td>
<td>The competitors don’t have anything like this that the Company knows about. The Company are the largest in the market and their segment, so if they could develop economical offers that are expensive and requires capital, many of their competitors would struggle to offer the same. There is a possibility to offer unique solutions. (Marketing 3)</td>
</tr>
<tr>
<td></td>
<td>Sourcing thought that there could be new business opportunities, and that the companies that are best on CE will probably get incredible opportunities and competitive advantages. Was convinced that the companies that apply this will make the most money, mentioned an example of the coal industry, and that in the end these companies is driven out, but also thought that it will take time (Sourcing).</td>
</tr>
</tbody>
</table>
The following presented in table 8 was thought to be the largest risks with a transition to CE:

Table 8. What the respondents considered to be the largest risks with applying CE

<table>
<thead>
<tr>
<th>Risks with applying CE</th>
<th>Source and/or motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplier Quality</td>
<td>Once CE is looked at there will be a need to change a lot of what the Company procure. All the work executed on the suppliers’ quality would need to be redone. Uncertainties are how the product would be produced during a shift, since it might would require a break in production, also how to trust new suppliers’ that they haven’t done business with before, they might deliver products that breaks or don’t have the required quality. (CR)</td>
</tr>
<tr>
<td>Negative business advantage and profit</td>
<td>Marketing 2 mentioned to have negative business advantage and less sustainable growth as a risk, that regardless which area one is in there is a need for balance between corporate responsibility and business advantage. Another one questioned if they would make a profit (Service), and a third said that the customers might not think it's worth the trouble because it's just a very small percentage of everything (Marketing 3).</td>
</tr>
<tr>
<td>Expectations</td>
<td>That you open Pandora’s Box and can't keep what you promised (Marketing 3).</td>
</tr>
<tr>
<td>Will the Company get benefits from getting more effective?</td>
<td>A fear that if the Company gets more effective, will that benefit the Company or would the customers get all the benefits (Service).</td>
</tr>
<tr>
<td>See the true cost</td>
<td>The Sourcing respondent questioned if they are prepared to see the true cost that’s now absorbed by the nature, and if the customers prepared to pay for it.</td>
</tr>
</tbody>
</table>

4.2.3 How to implement circular economy

*How the respondents’ thought that CE could be implemented in the Company, and crucial factors needed to succeed. What follows is what came up in discussions during the interviews about how a transition to CE would take shape.*

One emphasized that CE is not talked about within the Company today, and that there would need to be more discussions and a place to discuss it (Sourcing). Respondents agreed that a change would be implemented incrementally, in small steps, since that is the way of the Company. That the only way for something radical to happen is if the Company would be forced by external forces (Marketing 2). One said that they would need a changed mindset within the Company that it’s not the amount of tools out on the market that determines if the Company is successful or not (Service). It was mentioned that a key in a transition would be to get the people responsible for production and logistics on board (Marketing 3), but according to the Operations respondent, since production is rigged for new production, a take-back system could possibly be incorporated into the service-flow, hence operations would never get in contact with it.

It was different views on how a change would be implemented in the Company, two respondents (CR, Marketing segment 1) said that a change needs to be implemented in the Company from bottom up with the divisions, they wanted to use the benefits of the Company being
decentralized, and to prove the concepts (leasing, new BMs etc.) through pilots before taking it to the upper management team. The respondent on group level stated that it would not be the CEO who said “do this”, instead they approve, review and challenge at group level, that they would not make decision for everyone, because that would become a one size that doesn’t fit anyone at all (CR). According to others a change has to come from the top management, one said:

“The base to succeed requires top management decides that this will happen, and push it through.”

(Marketing 3)

And another one:

“The ones on top must agree, and have a line of argument throughout the organization. People will act after directives and bonuses, is lower cost number one priority or is sustainability?”

(Sourcing).

That to apply circularity it would have to come from the management, that it has to be decided as something they do, partly because it's the right thing but also that there's value in it (Marketing 3). One said that it will of course be resistance if you would change in the system, and that if you do this kind of change it would have to be from the whole Company, the ones that own the Company, the leaders, and get everyone on board (Sourcing).

The CR respondent wanted initiatives towards CE to be taken by “entrepreneurs” within the Company, that there are councils that supports initiatives like this and that if someone has a good idea they should go for it and start building it. The respondent further argued that that’s usually how it’s done within the Company: that someone starts, do a proof of concept, and get a momentum. Then the higher level in the Company can build on the example (CR).

The Marketing 1 respondent said that to make general strategical decisions the highest chances of getting it done is by running in smaller size in form of pilots, before taking it further. That a transition to CE would be a strategical change, would have to be driven by the CEO and would need the management on board, that it would have to have a full support from the top management level, since it's a big structural change. This respondent was during the same time as the interview was held managing 2 pilots with different BMs and contracts, one pilot in Saudi Arabia, combined rental and service that provides the equipment for the period of shutdown and providing supervision of process, and one pilot in a shipyard in the Netherlands, a long term rental of equipment, with a 9 months contract, then the product was taken back, so far the pilots in Saudi Arabia and the Netherlands works properly with both refurbishing and service. Said that an advantage to being decentralized is that units can make decisions on their own, in the shape of submarines, and take risks in smaller scale (Marketing 1).

Another respondent said that they are very supportive to Marketing taking their own initiatives and try different BMs on their own. But that every sales division have a result responsibility, that the sales companies have the opportunity to develop a service and sell it, but that they still need to fulfill the ratios on the BMs, so they have to stand for it and support it on their own. The difference is that if the initiative comes from the division they have full support the whole way. (Marketing 3)
The section is regarding if the Company could carry through with big change, if the Company has any experience of change or restructuring since before

According to one respondent the Company has a history of doing good things without changing them (Marketing 1). At the same time some examples of how the Company has changed within just the last ten years was mentioned:

“When the leading management wanted to outsource to China we did that, it was the focus of every meeting for many years. Then it was a force that occurred to go for the lowest price, and so we did. This is old now, now you should produce at home. In the end of the 90s most production was at home, and now we have 70% externally. This is a major journey on just 15 years. Who knows what can happen in another 15 years with this mindset? CE could go as quickly.”

(Sourcing)

Marketing 2 said that the structure of the organization changes continuously, everything from changing structure of sales organizations to adopt to customer need, to how they work internally. The respondent also highlighted that it's not radical changes, they do a risk calculation and then take a decision to change, and then that can lead to a big change (Marketing 2). There is no experience of radical change, the Company would need help and intelligent people who can work with change management and change work, and it's a lot that would have to change culturally (Sourcing).

LEASING

To go towards leasing a more standardized product service system (PSS) is required, and developing processes with service are needed so the sellers can get a service thinking. The Company would also need to develop the finance product to the customer, a financial profile, in order to be able to argue to the customer why it would be better to lease the product than buying it. Should also develop how the data is used, to enable for selling data driven services with constant measuring on for example angles, to see when it differs. (Service)

CUSTOMER OFFER & BUSINESS MODELS

The Marketing divisions would change the customer offers and would enhance CE more, they would create sales tools and BMs, and try understand the customer from a CE perspective and generate customer value (Marketing 2, 3). The Company would also need to understand the customer needs and what gaps there are to the competitors (Marketing 3). Would also need to figure out how to charge for a circular system, and should not be afraid of that trend coming; more service contracts, leasing contracts etc. and to go from hardware to software (Sourcing), according to the respondent all of this is on its way already, without them calling it anything. The Company is also willing push new things on the market/customers after a concept is proven (Marketing 1).

SOURCING

Sourcing/purchasing would be valued higher, since a lot of value refining lies within this division. If you want a circular system 70% of the value can’t be excluded when you go to the customer. To be circular new contracts are needed, and the division on sourcing would have to
be measured differently, to find other forms to follow up and other kinds of suppliers with a more holistic view. To make sure when we sign a contract that they have good energy, a service division, reuse resources etc. Today they should just deliver something. (Sourcing)

Today it's no good method to overview what comes back from the field. Have end-of-process and dead-of-arrival, but need to sort this out, supply chain and value chain in an overview-able manner. It used to be a resource that worked with sustainable questions within sourcing, but not anymore. The resource helped with auditing, because the Sourcing Division is not experts at everything, and a purchaser can't look at everything, so they need help. When having the resource the division learnt a lot so they now have it in their formulary, but it was emphasized that it's not the same focus as when someone drives the activity. (Sourcing)

**PRODUCT / R&D**

It should be a separate group working with CE, and there results could be implemented in the projects (R&D 3). Another one asked for pre-work on alternative materials to easier change them in a project and know they are okay to use, and said that if it's done before it's much easier to include (R&D 1). Recycling should be considered earlier in the projects, today it’s done when everything is almost finished, this should be looked at within the same project, not a separate one. Also said that a perspective from the outside is needed, that someone should ask questions in a much earlier stage than today. (R&D 2)

One respondent sees no obstacles for constructing towards CE, but emphasized that educations are required and that it should be a part of the projects to look at it, and that the constructors should be informed how to choose materials. (R&D 3)

Reuse should be possible if the products were to be made more modular (R&D 4) and the modularity would be more important in CE (R&D 1, 2), to identify parts that could be reused, now modularity is done from a perspective of new production and supplier (R&D 1). To make them more modular it needs to come in early in the projects, it’s not hard to do it if you know it early, it’s when it’s coming in late in the projects it doesn’t work. (R&D 4)

One within R&D asked for a standard division, who could minimize screws, materials, liquids etc. To get fewer materials in the products etc. Today the managing regarding construction requirements is unclear, and the respondent didn’t know who’s in charge of what. Said that it’s no longer a standard department at the Company, which leads to many variations regarding materials, components, liquids etc., the respondent had the opinion that someone should hold back this variation. Said that today it’s some kind of informal review of what’s used and what’s done. (R&D 3) Another respondent also said that the construction can be partly not thought through which can lead to products being hard to disassemble when serving, for example different length of screws (R&D 1).

The new more modular tools, with their data, that’s getting developed at the Company would be easier to refurbish and serve than before (R&D). If a tool is more service-friendly, it's also easier to disassemble. So it could simplify for production if the tools are made with a thought on how to assemble and disassemble. (Operations) One mentioned Industry 4.0, which is driving cross boarder work and integrated solutions, are erasing the borders between product and data. (Marketing 3).
4.3 **Barriers identified by the Company**

In this chapter the barriers to CE that came up during the interviews are presented and motivated, a distinction has been made between main barriers and secondary barriers, hence they are presented in different sections. Table 9 below summarizes all of the barriers that was identified by the Company’s respondents that will be presented in the following sections.

Table 9. All barriers identified by the Company

<table>
<thead>
<tr>
<th>Financial</th>
<th>Cultural</th>
<th>Technological</th>
<th>Structural</th>
<th>Contextual</th>
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<tbody>
<tr>
<td>Initial Investments</td>
<td>Resistance for new BMs from inside the Company</td>
<td>Quality compromising when constructing for CE</td>
<td>Implementation of new strategy (CE) in a decentralized company</td>
<td>Material flows systems for take-back</td>
</tr>
<tr>
<td>Inventory</td>
<td>Capital cautious company culture</td>
<td>Hard/work-intense/expensive to disassemble the products</td>
<td>Environmental aspects have low priority in R&amp;D projects</td>
<td>Complexity in offering global solutions</td>
</tr>
<tr>
<td>Pricing models</td>
<td>Measuring success/company goals</td>
<td>Quality control of recycled/reused material</td>
<td>Involving suppliers in take-back</td>
<td>Complexity with large market presence</td>
</tr>
<tr>
<td>Quantify benefits</td>
<td>Resources and priorities</td>
<td>Uncertainties if remanufacture/reuse would save energy &amp; resources</td>
<td>Change long standing contracts</td>
<td>Customer maturity</td>
</tr>
<tr>
<td>Secure financial flow - related to refurbishing</td>
<td>Promise too much</td>
<td>Queries about remanufacture and reuse</td>
<td>Trusting new suppliers</td>
<td>Customer resistance towards leasing</td>
</tr>
<tr>
<td>Profit driven company with high profit goals</td>
<td>Attitude to selling second-hand</td>
<td></td>
<td>No volume benefit with suppliers</td>
<td>Environmental aspects have a low priority at the customer</td>
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<td>Attitude towards leasing</td>
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4.3.1 Main barriers perceived by the Company

This section highlights the barriers most ‘obvious’ to the respondents. Or that was lifted up as a main barrier by the respondent. A summary of the main barriers perceived by the Company is presented in Table 10 below.

Table 10. Main barriers identified by the Company

<table>
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<td>Secure financial flow - related to refurbishing</td>
<td></td>
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</tbody>
</table>

MAIN FINANCIAL BARRIERS

- Initial Investments

The investments to change the company for refurbishing, the logistics flow for take back and reuse. If it’s with a partner or without one, don't have that today. It takes much longer to disassemble a tool than to assemble it, the cost has to get back into the product cost, and that equation need to get accepted. The company don’t have that whole machinery, and it is large volumes. (Marketing 1, 2 & Marketing 3)

- Inventory

When business doesn’t work great, the investors look at working capital, they want their return. When business doesn’t go well, inventory doesn’t go off the shelf. They then put a lot of pressure through investor relation meetings and on the CEO, on the inventory numbers. Internally there is then questions why the inventory is high and people wants to reduce it. What CE does is that it needs more inventory, so it’s a conflict already, so that needs to be reconciled. (CR)

- Pricing models
To create pricing models for selling result based services. It was stated that there’s a lack of knowledge of how to build business systems for circular handling (Sourcing). It's a new value sale, have to sell on other parameters, sell what we ‘offer’ the customer (Service). The Company have looked at calculations for taking care of waste for example, but says that it's been difficult. It's expensive to disassemble electronics and recycle, and it's more expensive than what they do today. (Marketing 3) Also selling compressed air as a service have been explored, and it’s difficult to set a reasonable price on that (CR).

- Quantify benefits

To quantify the benefit (f. ex. Savings), for the Company and the customer (Sourcing, Marketing 2). The soft values are quite easy, but the quantification of the hard ones is very complicated (Marketing 2). The hard values are very important for the customer - payback and pure money, they can for example have requirements that payback of the investment has to happen within a year, the easiest way to argue with the customer is with return on investment (ROI), and most decisions are made are connected to ROI, sometimes decisions are made connected to prestige, but it’s rare (Marketing 2).

- Secure financial flow - related to refurbishing

It would be possible to secure financial flows and product flows in Europe, because it’s a free flow of goods and free flow finances, so it’s easier, but the respondent thought that the majority of the business won’t be in Europe in the future (Marketing 1).

**MAIN CULTURAL BARRIERS**

- Resistance for new BMs from inside the Company

The Market Divisions are responsible for the BMs, which have developed over time. It was said by one interviewee to be an internal resistance for new BMs from within the Company, but not from the customers, (Marketing 3). Marketing 1 pointed out internal politics and internal competition as a barrier, and that with changes to the BMs, revenue streams and profit streams, there’s a risk you’ll have people getting in a defensive mode when they see structures being at risk. Also said that this is the case with any change. One thought that the Company is stiff working with new Business Models (service, software), and two said that there’s resistance towards them from within the Company, (Marketing 3 and GI 1). The Company was also mentioned to be slow within software and to take bad decisions in these areas (Service).

According to one respondent the Company is in front of a shift and will need to change the course a bit, to go from hardware to software. That it's a change in the BM that’s delivered, that what creates value is less hardware and more software, that it's a different kind of selling, and that the customer must feel that they save more money and that things get better. The respondent said that Market at the Company are driving these initiatives, but with constant resistance. The Company are creating value in the portfolio on their software, and it's moving towards more software that they will live on in the future. (Marketing 3) Also another one said that the Company knows technique much better than the customer, so it would be better if the customer only paid for the results (Service).

- Capital cautious company culture

The Company is extremely capital cautious and is especially cautious of making investments and tying capital longer term without efficiency and flexibility (Marketing GI). There are some key
features in the Company that are holy, for example profit goals, this means that if someone wants to do something that’s not completely guaranteed to be earned back this will be met with resistance (Marketing 3).

“The biggest obstacle for CE would be the company culture, it’s extremely capital cautious. Especially cautious when it comes to making investments that requires tying capital, for longer term without having efficiency and flexibility.”

(Marketing GI)

The Company has been around for 130 years, and it was mentioned that then you don’t focus on survival and big leaps, but you focus on the long term (CR). The Company is risk-averse, and takes well considered and calculated risks (Marketing 2), the Company is careful and have a low acceptance to risks at a bigger scale (Marketing 1). The Company feel obliged towards stockholders to be risk averse and careful (Marketing 2). But there is a willingness to take risks at the Company, if it's clear it will have a positive outcome according to one respondent (Marketing 3), and another said that in general longer payback times are an obstacle, and that in general in most businesses longer payback doesn’t work in your favor. But that if you have a strong argument and it makes a lot of sense, there’s a lot of room at the Company to accommodate for that, and that no one wants to be short sighted. (CR)

- Measuring success/company goals

Largest barriers for a shift would be internally from the Company, there are goals to lower the costs every year, for example Operations should lower their production cost with 3%. So if you put in that they should also be responsible for taking back products, that's hard for them. They want to work with things that lower their production costs, not anything that increases it. (Marketing 3) There are very clear company goals regarding Return of Investment, and that a new product should replace another. Bonuses are based on lowering costs and the CEO gets his bonus from the board based on lowering the price of all products. (Sourcing) This correlates with another interview that stated that every sales division has a result responsibility, and that the goals today is to lower the production costs (Marketing 3). The sellers are steered by revenue and marginal, and the goals for sales and market is to create sustainable growth (Marketing 2).

According to one interview success is measured through Value Creation, if the Company is growing towards their commitments, if they’re keeping the right kind of people, if the employees are satisfied, also if they’re setting themselves up to be around for another 130 years. Said that it’s a lot of perspectives and that they have to take a very long term view. Further said that what they as a company measure themselves on is achievements; safety achievements, financial achievements, environmental achievements. According to the same interview a division can grow by creating value for the stakeholders, which goes beyond shareholders and customers (CR), according to another the Company divisions are considered better depending on how much profit they make and how much they grow, the ones that earn most and grows most are the best (Service).

It was said that internal revenue is valued below external revenue, that internal revenue is ‘less fresh money’ than external revenue, that this leads to internal politics with service since service creates internal revenues (Marketing 1), another respondent said that the Company has a view that’s based on that the amount of tools out on the market determines if the Company is successful or not (Service).
MAIN TECHNOLOGICAL BARRIERS

- Quality compromising when constructing for CE

To do a high performance construction with environmental aspects. (R&D 1) Performance would probably be compromised if material choosing would be based on environmental aspects instead of performance, ergonomic could also become a conflict, because of the weight. But if the products were to be leased instead of sold, it’s possible the requirements on some things could be lowered, could be less robust, since the ownership would stay within the Company, so the Company would not ‘lose face’ to the customer if something broke (R&D3).

- Expensive, time-consuming, hard and work-intensive to disassemble products

The products consists of many different materials that are glued together. It’s very hard and work-intensive to disassemble the products, that’s a reason for why it’s not economically defendable to keep the products alive (R&D 1). It takes more time to exchange components than to produce a new product (Operations). It would be a large cost to extract the components possible to reuse (R&D 3). And one respondent was convinced it's cheaper to take the metal, crush it, melt it and produce new product/metal, than to reuse the same metal (R&D 3).

- Quality control of material and components

A potential barrier for recycled material would be that it unknown what has happened to the material, so it would have to be quality controlled, or melted down and reused. It might cost too much. (Sourcing)

It would be large costs to ensure remanufactured/reused components reach performance requirements, would have to ensure the component has the same quality as first time and to control that is a lot of work, and energy (R&D 3).

“If components were to be reused you would have to measure/control all of them, to secure quality of them. When we produce new components we secure quality in the process, and perform some control measures. But to reuse a tool you would have to measure every component to see if they could be reused or worked up. We don't have that part, would have to look at how that would work, cost of it etc.”

(Operations)

- Uncertainties if remanufacture/reuse would save energy & resources

2 respondents (R&D 3, Operations) were uncertain if exchanging components, would save more energy than producing a new, or if it would even require more energy. That reusing might require more resources than to produce a new product, and that remanufacture might not be more resource efficient, that every component would need to be evaluated individually, to see how they could get more resource effective (Operations).

MAIN STRUCTURAL BARRIERS

- Implementation of new strategy (CE) in a decentralized company

The Company is extremely decentralized, if it was to be rebuilt there would be huge changes needed in each and every part of the Company, and the different divisions have different ways of working, (Marketing 1, CR), it’s uncertainty about how that could be aligned (CR). To coordinate the internal divisions would be complicated, because if the Company would invest in
CE loops, that might affect the long term growth in another division, because they might be dependent on a supplier etc. So step by step is important in this. (CR) According to one interview if you want to refurbish in a bigger scale all of these activities has to be performed within the Product Company (Marketing 1). It’s also unclear if the Company would sell whole solutions where in the Company those would end up. There are pros with working focused and divide things. But there are no natural driving forces when it comes to things that crosses these, like integrated solutions. A question with selling integrated solutions would be; who would get the income? And who would stand for the product developing cost. But we are product oriented and that's why we have a service organization that orients on the services. Because it's mostly traditional maintenance, calibration, education. (Marketing 3)

- Environmental aspects have low priority in R&D projects

There is no time in the projects to consider environmental aspects or look at ways towards CE, and they would get prioritized away (R&D 1, 3). Today environmental aspects are far down on the priority lists, and are only done in the end of a project if it’s time over for refinement (R&D 1). The project leaders are steered on time (R&D 4), and one respondent stated that the projects are both time and staff pressured, that you are under time pressure (R&D 3). Although according to another respondent within R&D since the projects are steered on mass of cost and if it’s a problem you can’t throw in 10 people to solve it, but instead you let the ones in the project work on until they have solved it (R&D 2). It was said that if the projects are steered badly, the projects get slowed down and get behind the time plan, and when there’s time pressure the environmental and service aspects get prioritized away (R&D 1).

**MAIN CONTEXTUAL BARRIERS**

- Material flow systems for take-back

To create flow systems, logistics, for take-back, (refurbishing or expanding of existing exchange system) of parts, tools and components was put out as a main barrier by several (4) interviewees. (Operations, R&D 2, R&D 4, Marketing GI)

“If you're going to remanufacture, that's a completely different operations, now we're rigged to produce from raw material Purchase of new components, final assembly, that's our flows. If you loop in return-flows into that, that's something completely new, different. You need to look at that whole flow.”

(Operations)
4.3.2 Secondary Barriers identified by the Company

Barriers beyond the main ones that came up during the interviews towards applying CE are presented below in Table 11:

Table 11. Secondary barriers identified by the Company

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<td>Profit driven company with high profit goals</td>
<td>Resources and priorities</td>
<td>Complications with remanufacture and reuse</td>
<td>Involving suppliers in take-back</td>
<td>Offer global solutions</td>
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<td>Promise too much</td>
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<td>Change long standing contracts</td>
<td>Complexity with large market presence</td>
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<td>Attitude to selling second-hand</td>
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SECONDARY FINANCIAL BARRIERS

- Profit driven company with high profit goals

Usually the Company have fast ROI and high profit goals, and an investment of CE wouldn't initially increase the sales, it’s more long-term. Would maybe have to go down 2 levels on the profit goals for 10 years to get this in place, possible to succeed but it's not easy to sell in. Because it would take large initial investments. (Marketing 3) The business cases today were said to be very strong. The Company invest maybe 5-10 million SEK on one product, and then earn it back on 5 sold systems, or a very short amount of time. And the Company sells several thousands of these. They can get the investments back quickly due to the high prices of the products. The respondent had a hard time to see that environmental business cases could be as strong, and the Company is profit driven. (R&D 1)

SECONDARY CULTURAL BARRIERS

- Resources and priorities

“Resource and priorities are always a parameter you have to look at. But if you set a certain priority you ensure certain resources.”

(Marketing 2)
It’s questionable if the Company wants to spend time and energy in constructing for recycling (R&D 3).

- Promise too much

Afraid to open Pandora’s Box and promise too much without understanding the consequences. Need to understand the consequences with saying that they’re this kind (CE) of company. Now don’t know what will happen. (Marketing 3)

- Attitude to selling reused/remanufactured

There can be internal resistance towards selling second-hand, because it doesn’t feel high-end (R&D 4) this goes in line with another respondent that said that he thinks that very few of the customers think that it's worth to pay a little less for a refurbished tool. If for example an important component has been through something bad he thought the customer might find that scary. That the Customer is fine with repairing their own tools, because then they know what it's been through. (R&D 2)

- Attitude towards Leasing

The leaders’ don’t view leasing of the products as a customer need, it would require an effort, also to go around Customer Finance. (Service) According to one respondent the Company is moving in a direction towards leasing contracts, that those cases appear more often and that leasing is talked about, although the respondent also pointed out that it’s hard to tell how far those cases can be driven. Said that to succeed with leasing contracts you need to combine the benefit of the customer to the benefit for the Company, and to evaluate each case individually. According to the respondent the Company has not been active in driving these kinds of initiatives, they have happened sporadically and in particular cases. (Marketing 2)

SECONDARY TECHNOLOGICAL BARRIERS

- Complications with remanufacture and reuse

Parts of the construction are not possible to reuse, glue and chemicals has reacted with each other (R&D 1). It would also be a lot that needs to be worked up, around 80% of a tool would need to be changed, the respondent thought it might cost more than its worth, and that you would have to look at each product separately. If the tool is too bad shape to be remanufactured, it would probably be sold as scrap metal/decay, then it might not be remanufacturing. (Operations)

SECONDARY STRUCTURAL BARRIERS

- Involving Suppliers in take-back

Recycling can be difficult if the Company would do it on their own, since a lot is performed externally, partnerships with suppliers who could melt down the materials would be necessary. If products were to be taken back suppliers would be required to be involved in that process since a lot is done by suppliers already (R&D 4). That things are purchased externally affects a possible circular flow in the way that the complexity would grow, would have to involve subcontractors (Operations).

- Change long standing contracts
The Company has very long standing contracts with business partners and suppliers, if a long standing contract is closed down, that will affect many other businesses/subcontractors too. (CR)

- Trusting new suppliers

The Company is dependent on suppliers, because the products have a high quality they are dependent on the material being of good quality too (Sourcing). It’s a risk to work with new suppliers, the Company delivers performance and high quality, which means their suppliers also need to deliver performance and high quality, all the work already done would have to be redone, and a lot of work is done with the suppliers to ensure high quality of the products (CR).

- Long life – no volume benefit with suppliers

According to the respondent it’s a problem with long life lengths on the products is the suppliers, because it’s hard to order small amounts later on. There is no volume benefit when ordering small amounts, and buying a few products it takes as much administrative resources as a new product. Can't get a better price so it can end up being more expensive than to produce a new product. But the products stay because they complement the Company s product portfolio. (Sourcing)

SECONDARY CONTEXTUAL BARRIERS

- Offer Global Solutions

If you want to change the BM, it has to be a global solution. Because if you want to offer solutions for bigger customers, they want it globally and you need to be able to provide it globally, which is more complex from your side as a supplier and from their side. (Marketing 1)

- Complexity with large market presence

Would need to change the whole system with processes, and would need support in this. The respondent said that the whole process would have to change, but that that's easy, but that then they burn on the tip, and there it's hard. The Company is present on 180 markets with thousands of customers, don’t know where to begin. (Sourcing)

- Find mature customers ready for total solutions

It’s hard to find mature customer companies that are ready to discuss total cost of ownership and total solutions and that has someone with the authority to discuss total solutions with. The Company has customers of varying customer maturity, but when it comes to buying total solutions most customers seem to be immature, and lacking a person to discuss total solutions with. As it works now it is one person responsible for purchasing the product/building the production line, and another one (local production manager) when the factory is running (service, spare parts). This is below different budgets within the customer company which makes it difficult to sell total solutions, which benefits both budgets. (Service, Marketing 3) The customer needs to get it in their calculation, and as a purchaser at a company you're educated to discuss initial costs, not the total cost of ownership, and it's a challenge to find customers who can (Marketing 3).
“There are mature companies who have solved the budget and purchasing problem with having a strategic purchaser at the top. That works with fewer partners, but closer. There you have someone to discuss total solutions with. “

(Marketing 3)

A note interesting for this barrier is that the Company already today works actively with influencing their customers to make them more mature: A core of the Company’s strategy is ‘Transformation’, to transform the customer from pneumatic to electric. It’s a part of the strategy to work close with customer, and take them from primitive to sophisticated, pneumatic to electric, through a set of stages. So the Company actively influences the customers’ choices and the contracts. It starts with reeling in the customer through just selling a product contract, and then start working more close to sell service, gain trust and then start taking them towards sophisticated solutions. (Marketing 2). One said that on the journey of making the customer more mature, you start creating value for them. That the customer dares to involve the Company in more processes, that they get a place at the customer dedicated to the Company. They become partners, which is beneficial for both the Customer and the Company, because the Company get a more sustainable income and can trust that the customer will buy more from them. This is a part of the strategy, and the Company do this all the time. The purpose of making the customer mature is to get partners, long standing contracts and a sustainable income. (Sourcing)

- Customer resistance towards leasing

So far the customers want to have ownership over the products, they have a model and that is how it’s always been done (Marketing 3). The customer also thinks it’s expensive to lease products instead of buying (Service). The customers have a resistance towards change, so far they haven’t went for solution contracts on production line, because it's easier to keep doing as they always have, they know how it works, the risks and who to blame, need someone who wants to do something differently (Marketing 3). According to the CR respondent the customers don’t care what kind of compressor they get as long as they get efficiency and quality and that the customers are not in the way for result based service contracts.

- Environmental aspects have a low priority at the customer

One R&D 1 respondent can't see that the customer will value environmental issues when they buy the product, and Voice of the Customer surveys that’s been done shows that environmental aspects has a very low value at customers. That sustainability is interesting for the customer at a group level, but it's the purchaser or production technician that makes the decision to buy the tool, and their priorities are performance and cost, therefore performance is valued higher than environmental requirements (R&D 1). German customers seem to be an exception, and they are driving sustainability. They want to know how the Company works with sustainability, how they recycle and how they save energy (Marketing 3).

- Raw Material

The Company is bad on the raw material side, it might still use too much raw material (Sourcing).

- Regulations regarding batteries
There are laws about batteries, some batteries can’t be transported if they’re damaged because of the explosion risk, this would block to have a central unit to take care of it, and there will be more batteries and energy packages in the future, (Marketing 3).

- Lack of regulations

The linear economic system today is regulated by laws, a circular one would also need to be that (Sourcing)
5 DISCUSSION AND CONCLUSIONS

In this section the empirical results from the primary data are discussed in relation to the secondary data, the main barriers identified by the author and suggestions on how to move forward are presented followed by the main conclusions of the thesis.

5.1 Discussion of empirical results in relation to literature

In this section first the barriers identified by the Company are compared to literature, then barriers perceived by the author beyond these are presented and discussed. After that a summary of all findings are presented, followed by suggestions of how the Company should move forward.

5.1.1 Barriers identified by the author

Beyond the barriers identified by Company the author of this paper also recognized the following, presented in Table 12 below:

<table>
<thead>
<tr>
<th>Cultural</th>
<th>Technological</th>
<th>Structural</th>
<th>Contextual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring success</td>
<td>Design to reuse/recycle</td>
<td>Being decentralized - related barriers:</td>
<td>Eco systems &amp; dominant design</td>
</tr>
<tr>
<td>Risk averse</td>
<td></td>
<td>• Communication gap</td>
<td></td>
</tr>
<tr>
<td>Product oriented</td>
<td></td>
<td>• Hard to align</td>
<td></td>
</tr>
<tr>
<td>Holy profit level within company</td>
<td></td>
<td>• Tension between divisions</td>
<td></td>
</tr>
<tr>
<td>Discussions are if the customer can be more sustainable – not the company</td>
<td></td>
<td>Lack of knowledge and organizing skills</td>
<td></td>
</tr>
<tr>
<td>To be based on outsourcing</td>
<td></td>
<td>Lack of knowledge regarding how to organize for sustainability/CE</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Changing mature/established firms</td>
<td></td>
</tr>
</tbody>
</table>

CULTURAL

- Measuring success

Sustainability is not reflected in direct rewards and status at the Company. Bonuses are based on lowering costs and divisions grow by generating money.

- Risk averse

Being risk averse relates to being capital cautious, and CBMs have a higher risk than LBMs. This relates to Liu & Bai, who mention risk aversion from managers as a barrier to CE (Liu &
The culture of an organization can either encourage or discourage risk taking, and no matter the views of a powerful CEO, that person will need support and an appropriate culture can help (White, 2004). In this case the organization discourage risk taking, so this could be a barrier for CE. To continue both internal and external change can be upsetting for organizations, especially when the outcome of a change cannot be predicted, fear of the unknown can result in organizational inertia (Hoffman & Bazerman, 2007).

- Product oriented

Even if the Company is moving towards software, has a service division and aims of being a solution provider, it is still product oriented in many ways. This is reflected in for instance that some divisions (product divisions) have a lingering mindset that service should be free, and one respondent was surprised how little process oriented the Company is. The Company also values revenue from Service (internal revenue) lower than external revenue, selling products (Marketing 1). And the firm has a view that amount of tools out on market defines success. PSS literature emphasize that one of the hardest things for product oriented companies is the cultural change of becoming service oriented (Olivia & Kallenberg, 2003). The Company are on their way already in this change, but they still have a long way to go and are not excluded from this barrier.

- Holy profit level within company & low acceptance of longer ROI

The profit level was said to be holy, and CE will likely need another driving force. It’s a very low acceptance of long ROI within the Company, and CE in general has longer ROI. CE has a need for new economic models, which for manufacturers implies a shift from quick returns on investment towards a constant stream of money, with a need for major upfront financing (Schulte, 2013).

- Discussions regarding sustainability is mainly how to make the customer more sustainable

The Company mainly discusses sustainability from a point of view of improving the customer, to make them more sustainable. But apparently the discussions internally about how the Company themselves can be sustainable is not at all the same thing. This points to a lack of acknowledging ones one responsibility and impact, and can be in the way for taking full responsibility of the products and what happens to them after they’re sold and discarded.

- To have a company based on outsourcing

The respondents mentioned several barriers to CE related to the Company being based on outsourcing, which makes a possible transition more complex:

  - Involving suppliers in take-back
  - Change long standing contracts
  - Trusting new suppliers
  - No volume benefit with suppliers
TECHNOLOGICAL

- Design to reuse/recycle

The products are upgraded and used for a very long time, so remanufacture and longevity of products is already happening. The products are designed to be robust and durable, and it leads to them being hard to disassemble, reuse and recycle. Designing for high quality seems to be one cause for the products to be hard to recycle, the products consist of a wide mix of materials, toxic glues etc., which some are impossible to reuse and very hard to recycle. Although some respondents were sure that the products could be constructed to make these aspects better.

STRUCTURAL

- Barriers related to being decentralized

The respondents mentioned being decentralized as a main barrier to CE. And some barriers identified by the author related to this are a communication gap within the Company, that it’s difficult to align and existing tensions between divisions.

  o Communication gap & aligning within a decentralized company

It appears to be a knowledge and communication gap within the Company regarding how it’s run. There were different views on how to implement change, and who should take the first initiatives in a change. Where it appears that the group want the divisions, and individual entrepreneurs to make their own decisions to start CE pilots and initiatives to prove concepts and then bring it further, because that’s how the organization works according to the Corporate Responsibility respondent, that a change would never be started at the top, but it would have to come from the divisions. The problem was that when talking to most of the other interviews they all agree that this kind of decision needs to be taken from the top management group, and have the full support of the CEO, to go in that direction. The views are similar in that way that all of these people want the top management to be on board to do this throughout the whole company. But most people want it to start there, and the respondent on group level made it clear that the group wants the initiatives to come from the bottom to prove it, and then involve top management.

During a presentation meeting of the interview results at the Company it was strong reactions from the Corporate Responsibility respondent, it became clear that the respondent thought that the group had communicated sustainability questions more than they had. The respondent had expected more from the interviews and was very disappointed that the market interviews viewed CE as branding opportunities and not more. Showing the results led to intense discussions of the members of the meeting talking about how they could move forward. The CR respondent appeared disappointed that employees did not ‘use’ that the Company is decentralized and took more opportunities to use this. It also appeared to be different views regarding Company goals, if the main mission is to generate growth and profit or to generate value for the stakeholders, and that sustainability is valued higher further up at the group level, but hasn’t succeeded to be communicated as a core value further down in the divisions, there the main focus is profit. What the group think is communicated, has not reached all the way throughout the Company. The consequence of this is that it shows the organization is already unaligned, and that it might be very difficult to align it.

A consequence of being decentralized appear to be that the communication throughout the Company is rather poor, and results and experiences within the Company are not shared and
made use of in other parts. Communication is vertical, not horizontal between divisions. There are things happening in the Company, but these results are not shared and built further upon, so it seems like knowledge that’s within the Company is lost to other parts of the Company to make use of. Related to this is that the lack of an information exchange system is also an identified barrier for CE (Amsterdam, 2013).

  - Tensions between divisions

Conflicts between service and products division. Product Division have a lingering mindset that service should be free of charge, and gives away extra years of service for free. Further the Product Division are opposed to repairing, and gives away new products instead. This is comparable to that ‘Silos exist between planning and production’, which is identified as a barrier to CE by Liu & Bai (Liu & Bai, 2013). The influence from the service division on other parts of the company came out as low, it’s weak cooperation between service and other divisions, and it appears to be a lack of respect of the service division, even if other employees considers it very important and vital. This could be a consequence of that revenue is valued lower and the lingering mindset that service should be free, so it’s hard for the division to grow within the current premises of the firm. But since PSS is an essential part of CE, service is very important for CE. Hence the Service division would require more space and influence than it got today.

  - Organizing for sustainability

The sustainability practice today at the Company pointed towards some barriers and challenges present today, it appears as a lot is an organizational matter and a question of not giving sustainability space within the Company. That it’s a lack of resources within the Company that has the expertise of environmental questions, and it’s too much and too complicated to put extra on the current employees. It was asked specifically for separate teams, projects departments to deal with sustainability, some of the respondents also seemed afraid (R&D) of getting extra workloads in the projects when discussing CE. Today it seems like these questions are ‘weakly’ incorporated in the regular activities, performed by people who are not educated within it, that have other goals that comes before on their agenda, and sustainability is in general pushed down. What’s communicated further down in the Company is not sustainability, its deadlines and making profit, then performance and quality. People act on these directives, and what they will be questioned on if they’re late.

  - Changing mature/established firms

Part of being a mature and established firm is that one automatically has long running structures that can be hard to change, with many people being dependent on the Company looking as it does today. Any attempts to restructure a system will likely undermine the existing power structures and will hence be met with resistance from the people whom it currently benefits (Hoffman & Bazerman, 2007). According to White smaller and younger organizations are more flexible (White, 2004).

  - Managerial challenge of applying CE

Large scale implementation of CE requires radical change in the way business operate and requires commitment from higher management in industry (Lieder & Rashid, 2015). According to one respondent the Company has no experience of radical change and would need help and intelligent people who can work with change management and change work, since it’s a lot that would have to change culturally (Sourcing) and according to another the Company has a history of doing good things without changing them (Marketing 1). Also Shi et al identifies
‘Management resistance to change’ and to have an ‘inadequate management capacity’ as a barrier towards CP (Shi, Peng, Liu, & Zhong, 2008), which indirectly becomes a barrier towards CE.

**CONTEXTUAL**

- Eco systems and dominant design

Being a leading company that competes on other things than price the Company seems to be standing outside of this and could drive a change. Technically. The Company is not trapped technologically, but the contracts with other suppliers generally look the same, one budget for purchasing and one for service, this could be called to be a dominant design in the BM. Seems to be some eco-systems/dominant design around the contracts, that it was questioned if the customers are interested of doing something differently on just a small part. If they’re doing the same on all other contracts they might not want to do something different on one. This goes with making the customer companies more mature. When being stuck in an ecosystem – one can create markets for the innovation. This is the case with disruptive innovations.
### 5.1.2 Summary of identified barriers

Including the barriers identified by the author beyond the ones identified by the Company leads to a summary of the barriers identified in this study presented below in Table 12:

<table>
<thead>
<tr>
<th>Financial</th>
<th>Cultural</th>
<th>Technological</th>
<th>Structural</th>
<th>Contextual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Being based on low inventory</td>
<td>Risk averse &amp; Capital cautious</td>
<td>Design to reuse/recycle</td>
<td>Implementation of new strategy (CE) in a decentralized company, barriers related to being decentralized:</td>
<td>Material flow systems for take-back</td>
</tr>
<tr>
<td>Initial Investments</td>
<td>Holy profit level within company</td>
<td>Quality compromising when constructing for CE</td>
<td>• Communication gap</td>
<td>Complexity in offering global solutions</td>
</tr>
<tr>
<td>Pricing models</td>
<td>Product oriented:</td>
<td>Hard/work-intense/expensive to disassemble the products</td>
<td>• Hard to align</td>
<td>Complexity with large market presence</td>
</tr>
<tr>
<td>Secure financial flow - related to refurbishing</td>
<td>Mindset that service should be free</td>
<td>Quality control of recycled/reused material</td>
<td>• Tension between divisions</td>
<td>Customers:</td>
</tr>
<tr>
<td>Profit driven company with high profit goals</td>
<td>Values external revenue above internal revenue</td>
<td>Complications with remanufacture and reuse</td>
<td>Being based on outsourcing, barriers related to outsourcing:</td>
<td>• Customer maturity</td>
</tr>
<tr>
<td></td>
<td>Mindset that the more products on the market the better</td>
<td>Uncertainties if remanufacture/reuse would save energy &amp; resources</td>
<td>• Involving suppliers in take-back</td>
<td>• Customer resistance towards leasing</td>
</tr>
<tr>
<td></td>
<td>Discussions are if the customer can be more sustainable – not the Company</td>
<td>Lack of knowledge regarding how to organize for sustainability/CE:</td>
<td>• Changing suppliers</td>
<td>• Environmental aspects have a low priority at the customer</td>
</tr>
<tr>
<td></td>
<td>Resistance for new BMs from inside the company</td>
<td>Barriers to current sustainability practice</td>
<td>• Changing long standing contracts</td>
<td>Eco systems &amp; dominant design</td>
</tr>
<tr>
<td></td>
<td>Measuring success/company goals</td>
<td>Managerial challenge</td>
<td>• Trusting new suppliers (quality)</td>
<td>Being dependent on raw material</td>
</tr>
<tr>
<td></td>
<td>Resources and priorities</td>
<td>Changing mature/established firms</td>
<td>• No volume benefit with suppliers</td>
<td>Regulations:</td>
</tr>
<tr>
<td></td>
<td>Afraid of promising too much</td>
<td>Environmental aspects have low priority in R&amp;D projects</td>
<td>• Environment al aspects have a low priority at the customer</td>
<td>• Regulations regarding batteries</td>
</tr>
<tr>
<td></td>
<td>Negative attitude to selling second-hand &amp; leasing</td>
<td></td>
<td></td>
<td>• Lack of regulations</td>
</tr>
</tbody>
</table>
5.1.3 Most vital barriers for applying CE

In this section the barriers and enablers considered to be most crucial are discussed in relation to literature.

An interesting outcome in this study is that the internal barriers appeared significantly more important than external ones. Before conducting the interviews the author expected to find more barriers correlating to legislation, regulations, taxes and market forces such as a lack of interest from customers. What instead appeared to be a larger barrier than regulations in place was the ‘lack of regulations’, since a linear economy is already regulated, a circular would also need to be. This is also correlating to literature stating that there are institutional obstacles to CE are an unleveled playing field created by current institutions, financial governmental initiatives support the linear economy & that circularity is not effectively integrated in innovation policies (Amsterdam, 2013). In relation to barriers an interesting note is that Liu and Bai argues that institutional and cultural barriers play a more important role than skills, and that psychological factors, such as perceived adaptive capacity, and the normative or motivational context of responses are more important than resource constraints when approaching CE (Liu & Bai, 2013). The barriers considered most essential by the author for applying CE are found in the 5 categories presented in in Figure 3 below.

![Figure 3. Main areas in which barriers for applying CE can be found in identified by the author](image)

**COMMUNICATION GAP**

In the case of the Company a communication gap was identified regarding how the Company is run and how the first steps towards a change should be initiated and implemented (see section 5.1.1, structural barriers). A positive attitude towards CE was present, but almost no one felt like they should be the one responsible to initiate a way towards this, instead most people felt that
this should come from the leading managers, and the group level was clear on that they wanted to encourage initiatives from the divisions. In the case of the Company the will of wanting divisions take own initiatives was not communicated all the way down, which pointed towards a severe communication gap, this gap is the real barrier for starting a change. The way the Company wants their employees to take initiatives need to be clearly communicated, so that people encouraged to take action. The employees all the way down need to feel the support from the ones above them, and know what the Company is supportive of. As long as they’re steered on time, deadlines and generating growth, that’s also what they will deliver.

MANAGING DECENTRALIZATION

Implementation of new strategy (CE) in a decentralized company came out as a main barrier perceived by the Company, how to implement changes and how a change in one part will affect another. In the case of the Company it’s also a question of aligning what’s already in place in the Company and how to move forward in these areas. For example in the case of the Company they already have many features in place, but for different reasons than CE. To bring them to CE, the parts would need to be looked over through a CE-lens. The Company investigated already had several features that could be viewed as enablers for CE in place at the Company, such as: value based pricing models, pilot projects with new BMs in place, a working exchange system, developing of digitalization and a positive attitude towards CE. It’s likely that other mature companies interested in CE already has features in place related to CE as well, these features should first of all be identified and then reviewed from a new perspective of how it could be beneficial for CE.

LACK OF KNOWLEDGE

A lack of knowledge related to areas related to CE was identified both from primary and secondary data, such as quantifying benefits, making pricing models and consequences of what would happen if CE was applied. For example how to make pricing models has been put forward as one of the most important barriers for PSS, according to Galbraith pricing is a major policy issue for solutions providers (Galbraith, 2002), and that it’s a lack of methods for the companies to use to handle life-cycle-related data, and that traditional methods used today are not adapted for the challenges that comes with a circular business model thinking (Produktion2030, 2014). It’s a lack of knowledge in how to review the situation in relation to all the found barriers presented earlier, estimation what they would imply and how to approach them and how to actually conduct the activities and perform the changes. Other barriers the author considers significant from the outcome of this study is the customer maturity, that there is a lack of a responsible person to discuss whole solutions, and consequences of outsourcing such as changing long standing contracts and trusting new suppliers. The development of take-back systems and the complexity of involving suppliers in them, development of take-back systems was also identified as a barrier by Ghisellini et al (Ghisellini, Cialani, & Ulgiati, 2015). The main technological barriers appear to be that there are uncertainties if remanufacture and reuse would save energy and resources due to quality controls of recycled/reused material, this barriers related to barriers identified by Ghisselini et al, that are to ensure repair and secondary use of products after their original use and to design for disassembly, reuse, recycling (Ghisellini, Cialani, & Ulgiati, 2015).

IMPLEMENT CHANGE

It is argued that threatening an established structure of power will likely be met with resistance from those who benefits from the existing system (Hoffman & Bazerman, 2007), and a company
that’s mature and established and been around for many years will certainly have these kinds of structures in place. Management resistance to change was also identified as a main barrier to implementing CP (Shi, Peng, Liu, & Zhong, 2008). In the case of the investigated company resistance for new BMs from inside the Company was identified as a main barrier, also Amsterdam I.M.S.A. identifies a limited application of new BMs as a barrier towards CE (Amsterdam, 2013). In relation to this is also that disruptive innovations are usually not compatible with the existing preferences in an organization, and may be met with resistance, BMI is also difficult to manage because it transcends an organization’s boundaries (Sandström, Berglund, & Magnusson, 2014).

**NOT GIVING SUSTAINABILITY SPACE**

This aspect is a major barrier which affects both structural, cultural and financial aspects. Sustainability is a core value of the Company, yet this is failed to be reflected all the way. Sustainability is so far not a value on its own but is evaluated in relationship to profit and time. This is reflected in for instance R&D projects where the highest priorities of meeting deadlines and deliver quality in made the environmental aspects get prioritized away. This is a barrier that’s also confirmed by Amsterdam I.M.S.A., who identified that a barrier towards CE is limited attention for end-of-life phase in current product design’ (Amsterdam, 2013), also Liu & Bai identified that a barrier for CE is that there are no incentives built into the budgetary system that stimulates CE innovation and that competing priorities suppress commitments to CE (Liu & Bai, 2013). This is also reflected on how rewards are handed out in the Company, where bonuses are given based on generating profit and growth, this correlates to Hoffman & Bazerman’s finding that an organization might claim to hold sustainability as important in its mission statements, but that misaligned reward systems can lead individual managers to fulfilling immediate personal goals that aren’t correlating to long-range goals of an organization striving for sustainability (Hoffman & Bazerman, 2007).

Another identified barrier was that the Company has a risk averse company culture, this correlates to Liu and Bai’s findings that a barrier to CE is a ‘strong risk aversion of managers’ (Liu & Bai, 2013). This is an obstacle since there are risks involved with applying CE, according to Moors et al one of the most important barriers for radical innovations is the high risk involved in committing capital to unproven technology (Moors, Mulder, & Vergragt, 2005), and according to Linder & Willander (2015) a CBM always has a higher business risk than a corresponding LBM. The Company also showed resistance to making investments with a long pay-back time, and CE has a need for new economic models, which for manufacturers implies a shift from quick returns on investment towards a constant stream of money, with a need for major upfront financing (Schulte, 2013). Large initial investments is put forward as a main barrier towards CE (Amsterdam, 2013), in the case of a mature and established company my interpretation is that this comes down to a question of priorities. In the case of the Company the resources are there if the priority is set. So here it comes down to set a priority of sustainability as its own value and steer the Company in a way where the profit level is not the main core value.
5.1.4 Moving forward  
*Suggestions by the author for how to approach the main barriers identified in the earlier section.*

Below in Figure 4 suggestions are presented for how a company could meet the most crucial barriers identified and how they could start their journey towards CE. Below a suggestion is put forward of how one should start a change, each identified barrier is met in a correlating way of how to meet it. The most natural way to start is likely to creating a communication base, and then move round clockwise, but it should be taken into account that all parts are vital and connected to each other, and could be considered simultaneously.

![Figure 4. Suggestions for approaching the main barriers, identified by the author.](image)

**MANAGE KNOWLEDGE**

*This section aims to provide suggestions on how to meet barriers connected to ‘communication gap’ within a company.*

If the top management want change to be implemented through initiatives from the divisions, this needs to be communicated. For people to feel safe to conduct these kind of initiatives they need to know it’s encouraged. The organization needs to actively communicate how the organization is run, how change is implemented, and how they wish their employees to take initiatives, not only in relation to CE but in general. Although if CE is something desirable for an organization, they should express their support for initiatives in relation to this, and through a knowledge base express what kind of initiatives are desirable. The author suggests to create a base for discussion, such as forums or communication platforms, where CE has the main focus. When creating a knowledge base and initiating discussions regarding CE, these kind of knowledge gaps might be revealed. According to Adner (2006) the value in frameworks lies in
clarifying issues that arise when managers with different instincts try to debate the right course of action. A framework presents elements and relationships that provide a grammar for the debate, and can transform the debate from a battle of guts into a comparison of the assumptions being made about a given situation’s fundamental structure (ibid). It would therefore be of value to create formal discussions related to CE, to focus the agenda on how to move forward. During interviews with the investigated company it was clear that the majority had not reflected upon CE in general or how CE would take shape in the Company, but during the discussions they came up with many ideas about how it could work. It also seemed like several changed their attitude during the conversation, mostly towards becoming positive. This implies that formal workshops and discussions about CE, combined with walkthroughs to heighten the knowledge about the topic, could initiate initiatives towards CE, and the positive interest could be retrieved.

**EVALUATE & REVIEW**

*This section aims to give directions in how to meet barriers related to ‘managing decentralization’.*

First an organization should find out what features they already have in place that are related to CE, such as exchange systems, digitalization, service units etc., an organization should also be found out what is lacking for a CE. These features already in place should then be evaluated through a sustainability lens, for example at the Company initiatives of collecting data has been started, but the final purpose of it is yet to be decided. Things like these should be evaluated with an aim of reaching circularity, and hence developed in a direction towards this. Features already in place should also be used as basis for calculations when estimating how CE could work. The situation should be reviewed and decisions made on how to move forward. Presented below are suggestions of more explicit activities to conduct when reviewing CE application:

- Calculate on alternative BMs and if CE could be profitable
- Review what activities that would be of necessary for applying CE
- Evaluate how take-back systems could be implemented in the organization
- Review how the activities related to closing loops, such as reuse, remanufacture and recycling could be performed.
- Review how CE would affect the organization, and which consequences that would occur
- Evaluate what kind of pilots would be relevant for CE
- Evaluate how CE would affect partnerships and suppliers

A priority needs to be set to look at this specifically and in the case of the Company they should review what’s already in place at the company and how it could be brought together, and they should take in help from the outside to bring in expertise to perform calculations.

**CAPACITATE**

*This section aims to give directions in how to meet barriers related to ‘lack of knowledge’.*

To meet the barriers of pricing models, how to develop take-back systems and other barriers and activities related to applying CE, organizations need to capacitate in related areas. They should develop knowledge within the areas that CE would affect, such as economics, technique, take-back systems, logistics and production. There is a need for knowledgeable employees working explicitly with environmental questions, to give support to other parts of the organization, such as R&D and Sourcing in the case of the investigated company. To meet these kinds of obstacles the author suggest to capacitate within the different areas regarding CE, to bring in external help to review the situation and how to move forward. Since this is complicated it is likely unwise to
only rely on the current capacities at place, expertise is required to review the organization from CE perspectives. A company approaching CE should invest in more competence and knowledgeable people to work with sustainability, put away resources for specific projects.

**ORGANIZE & ALIGN**

*This section aims to give suggestions on how to meet barriers related to ‘implementing change’.*

At an industrial level implementation of CE should begin with organizational development with emphasis on change management and managerial mindset (Lieder & Rashid, 2015). There is a need to advance in how to organize for sustainability and CE related areas, and to manage change actively and strategically. Especially in a decentralized organization emphasis need to be on aligning when conducting a new strategy. To meet organizing challenges existing field knowledge of change and risk management should be used, also best practice examples of how organizations have organized for disruptive innovations, new business models and becoming solution provided and implemented PSS should be considered and included.

Decentralization has mainly so far in this thesis been put forward as something negative, which makes it complex and hard to apply CE, but it can also have some positive outcomes in relation to CE. For example it is argued that a new BM it might imply extended co-existence between the current and the new model, and that it’s a fragile balancing act to know when to shift the resources to the new one (Chesbrough, 2010). In the case of being very decentralized an organization has the opportunity to use this by doing a lot of pilots where the new BMs can be tested, the new BM won’t need to be incorporated all at once, but can instead be shifted to incrementally division to division.

**GIVE SUSTAINABILITY SPACE**

*This section aims to give suggestions how to meet barriers related to ‘not giving sustainability space’.*

Sustainability needs to be raised up to become a value that can stand alone, i.e. to reach sustainability in a matter should be enough of an argument to conduct a change, and it should not always be put into relation to monetary values such as generating profit. In order to apply CE the status of sustainability within an organization needs to be raised, it needs to become a core value. If sustainability were to become a priority on its own, initial investments, risks and economic models with longer payback-times related to CE implementation could be accepted. It was suggested from one respondent (Sourcing) and it’s also recommended from by Amsterdam I.M.S.A. that financially CE should be compared to true value (Amsterdam, 2013), hence the concept ‘True Value’ should be developed and looked into. Sustainability needs to be incorporated more directly in the strategy, and clear directives and steering on sustainability aims need to be done. More concrete actions suggested by the author to approach CE are the following:

- Conduct sustainability projects & provide sustainability guidance

R&D divisions at the Company explicitly asked for help regarding environmental aspects, which implies that the will is there to work more with sustainability, but that time constraints and priorities was a barrier for it today. Projects should be conducted with explicit focus one environmental aspects, such as reuse, remanufacture and recycling, and the results could be implemented in other projects. Also guidance in how to take a sustainability approach in the regular R&D projects should be provided, in order to reach a sustainability mindset. The priority
of sustainability should be set early in projects, so it could be incorporated from the start and not treated as an add-on towards the end.

- Innovate for CE

Since CE can be compared to a disruptive innovation, and disruptive innovations can be viewed as BM problems, organizations that want to move towards CE should capacitate within BMI, and work actively with innovating BMs for sustainability and CE. Hence best practice examples and expertise within BMI and innovating for new business models should be applied to this area. Also in the case of the Company they already had an innovation strategy of giving employees 20% time to work on own innovations, unfortunately this was in general not taken advantage of, but nevertheless I think that there is an opportunity to use this kinds of innovation strategies to develop CE. An organization could combine such innovation strategies with incentives to steer innovation towards CE goals.

- Conduct pilots relevant for CE

Pilots should be used to test the activities considered crucial for CE found when conducting the review of the organization, to test queries, uncertainties, and to help make cases, calculations and evaluations of how it would work in a larger scale, to try out new types of contracts and BMs. The pilots should be aiming to create a base for making a case to bring to the leading management, to tackle the aspects that would stand in the way. This could then be used as an argumentation base for stakeholders. In a case of the Company or an organization steered on a similar way where the leading management want entrepreneurs within the company to take action and create projects, in order to these kind of pilots happen and to make sure relevant pilots are conducted, these need to either be implemented on clear directives and orders, or they could be encouraged through incentives. But some kind of clear communication where the pilots are explicitly asked, and the organization expresses its support for them are of need to make employees taking these initiatives.

- Actively influence the customer

The main barriers were in the case of the Company considered to be internal and not external from the customers, but the lack of interest for sustainability aspects from the customer was still emphasized, and the Nordic Council highlighted the need to create markets where products designed for long life and service- and function based BMs are desirable (Kiørboe, Sramkova, & Krarup, 2015), also Liu & Bai found that a significant contextual barrier was uncertainty about the market place, that consumers can be resistant to changes in their behaviour, and thus not provide the required incentive for firms to take substantial action on developing a CE (Liu & Bai, 2013). However I want to argue that a mature B2B company’s influence on their customers should not be neglected. In this case the Company already works with transforming the customer, and other mature established B2B firms are likely working closely to their customers in other ways. Therefor there should be potential for influencing them actively and to incorporate CE in customer relations & strategies. An enabler to go towards CE would be established and good customer relations, since a certain level of trust can be good if one is to sell longer contracts, and extend the relationship with the customer. In the case of the Company they could include CE in the current customer strategy of making the customer sophisticated, they could include circular flows and CE solutions in the existing strategy.
5.3 Conclusions
This thesis was carried out using primary and secondary data, whereof the primary data was collected through an interview investigation with eleven respondents at one large, mature, industrial, B2B Company and the secondary data was collected mainly from published articles in scientific journals. The interviews were explorative, semi-structured and open ended, when conducted they were transcribed and thoroughly analyzed with a general analytical procedure. The aim with the study was to explore barriers that large, mature, industrial, B2B organizations might face when applying CE, hence the aim with the interview investigation was to explore internal barriers the investigated company would face if applying CE. The study managed to identify a broad range of barriers whereof the main findings can be found primarily within the following themes;

- The company; culture, driving forces, internal structures, conflicts, priorities etc.
- The customers; maturity level, customer values, customer relationships etc.
- Logistics and manufacturing; material flows, technical aspects, sourcing etc.

Conclusively the study presents five areas in which barriers lie that the author considers most important, and provides suggestions for how to meet them. The five main areas are the following:

- Communication gap
- Managing decentralization
- Lack of knowledge
- Implement change
- Not giving sustainability space

Suggestions for how to meet these barriers and move forwards are the following:

- Communication gap → Manage knowledge
- Managing decentralization → Evaluate & review
- Lack of knowledge → Capacitate
- Implement change → Organize & align
- Not giving sustainability space → Give sustainability space

Considering the field of CE is relatively new and the literature being fragmented, the study is forefront research with potential to contribute to the literature on CE. The study contributes with a detailed, broad and honest picture of barriers a mature established B2B company might face if applying CE and provides a detailed overview of the company’s attitude towards CE. It provides a good overview of the Company’s current situation and the employees’ thoughts and speculations regarding a move in this direction. The study both presents barriers identified by the Company and barriers identified by the author beyond these. The barriers cover a wide range of barriers from the core of CE issues such as technical aspects to more fuzzy barriers related to internal resistance and not being aligned. This thesis has managed to confirm barriers related explicitly to CE, confirmed barriers to areas related to CE, and discovered barriers that was not confirmed by the author in the reviewed literature. The barriers might not be directly applicable to other large, mature, and industrial, B2B companies approaching CE, but instead it can provide an idea of the spectra the barriers might be within, and give hints of where to search for them and how to start.
6 RECOMMENDATIONS AND FUTURE WORK

6.1 Recommendations

One of the hardest things for mature companies appears to be internal resistance from the company and how to carry through with a change, hence one should review how the company implements change usually and put emphasis into how the organizational challenge should be approached in that organization specifically. Barriers for applying CE should be identified in order to meet them and move forward. Further considering that the literature and best practice examples of implementing CE is lacking it’s here recommended to look into areas connected to CE when approaching CE, such as change management, managing for business model innovation, becoming sustainable, cleaner production, disruptive innovation and PSS.

6.2 Future work

The findings of this study can be used as a reflection base for companies interested in transitioning. To trigger discussions regarding the area and what barriers affect them and not. In order to generalize and compare the findings similar companies should be investigated. More studies like this could create the base for an analytical tool for companies to use for evaluation of their position in relation to CE and what barriers they could face, with the aim to give directions in how to start an implementation.


APPENDIX A. GOALS WITH THE INTERVIEW GUIDE

Goals with the interview: What rives CE in the investigated company and what they could win on a transition? The interview has as ambition to identify what barriers that stands in the way for a transition towards CE, the interview has its main focus on a micro level, within the organization, but also wants to retrieve external barriers on the market level, other actors and ecosystems within the industry, also barriers on macro level (laws, regulations & taxes. It strives to identify partly absolute barriers that’s not possible to affect, but also barriers the companies can affect & influence now. These barriers can then be used as a base in future research when one can proceed with how to overcome these barriers.

Control questions, list on what the author thinks are the barriers today, what the author thinks will be the outcome from the interviews:

- Economy – expensive to transition, to change the machines, large one-time expense when reorganizing
- Economy – worries about future incomes and business models with higher risk than the current ones
- Complicated/expensive to change the product manufacturing, CP can demand new techniques and materials
- Unwillingness to conduct a large reorganization, due to leading management/company culture
- Unwillingness to conduct reorganization and economical investment on something with a potentially high risk
- The concept CE feels to strange/unknown, to indistinct to work towards it
- One feels locked in by other actors on the market
- Have a since long established and complicated company structure that can be difficult to change
- One is unwilling to push/influence the customers in a new direction, instead one is steered by the customers
- One identifies as a product company and not a service company
- It can be hard to compete about prices when other actors and other countries goes on the cheapest possible
- Taxes, regulations and laws today don’t support working force, an instead it’s cheaper to buy new and throw away
- One as a company don’t think that one need to take responsibility for ones effect on the environment, but instead puts it on the customers to ask for environmentally friendly products, and that the company’s foremost mission is to make profit
- One is unwilling to be the first to change, want the rest of the eco system one’s competing in to change at the same time
- Lack of knowledge and lack of interest regarding sustainability, solutions, CE, CP etc.
- Worry of losing customers with a transition to CE
- Lack of driving, high positioned leader to carry through a transition
APPENDIX B. INTERVIEW GUIDE (ENGLISH)

Interview person, and his/hers relation to and view of the company

1) Could you describe your role within the company?
   a. Which department?
   b. Which cooperation areas?
   c. Which responsibility areas?

2) How do you work with sustainability today?
   a. How do you work with business models connected to sustainability?
   b. How do you work with service connected to sustainability?
   c. What sustainability goals do you have in the company?

CE is a concept for combining business models with sustainability

3) What is CE to you? Do you view it as for example a:
   a. Business model
   b. Environmental/sustainable strategy

4) What would a transition to CE mean to the Company?

5) How do you see that the Company could become circular?

6) What could the Company win on a transition to CE?
   a. Benefits (profits/gains) would for instance more service be a gain, to get more return/money of the products during a longer time etc.
   b. Obstacles for CE, and to reach profits/gains
   c. Disadvantages (what would you lose)
   d. What risks are there?

Risks

1) What are the largest/main risks with a reorganization to CE?
   a. Would The Company withstand a complex/major reorganization, on organization level?
   b. Could the Company manage a (temporary) unsteady economy?
   c. Where would the main costs end up? (exchange of machines with CP for example)
   d. How would it affect the present infrastructure if new CP-technology would be incorporated? Would it demand a complete adaptation/change? (Alliances, suppliers etc.)

7) What do you see as obstacles and enablers with The Company doing a transition towards CE? (Example: More service systems, cleaner production, less waste etc.)
   a. How would a transition take form?
   b. What are the external obstacles? (Policies, taxes, external actors, alliances, cooperation’s etc.)
   c. What are the internal obstacles? (reorganization, economy/finances, company culture)
   d. What absolute obstacles are there?
   e. What manageable/relative obstacles are there? (For instance dominant designs, lock ins)
   f. What could simplify? (common game field in the industry, support from government)

8) How would your business role take form in a transition to CE?
   a. What would be required of that role to manage a transition to CE?

Ask everyone to see how they think
9) What business model does the Company have today?
10) Can you see a connection to business models and a sustainability perspective?
11) About business models: to whom do they create value, (service)
   a. Value creating for customers
   b. Value creating for The Company

**Work for change in the company**

1) Where is Copco today? What is happening within the organization?
2) Who is pursuing/driving/pushing, who would be leading in a transition towards CE? Is there any forces within the company towards CE?
3) Would you say the Company is mature for a transition towards CE?
   a. Financial (Are there resources for a reorganization and an unpredictable/insecure future in a transitioning phase)
   b. Company culture (Would the culture within the company be supportive of a reorganization to CE, is the culture supportive of change? Would there be understanding for an unsecure future?)
   c. Is the lead management ready for a transition to CE? Would it get support?
   d. How is the structure within the company? Is it flexible and possible to change? Or is it since long defined and hard to make changes too? (un-shapeable)
   e. How does one stand towards risk taking within the company? Is there a culture/management that encourages/discourages risk taking?
   f. How would the company meet a decision with a high risk?

4) What would it take for the organization to become mature and ready for this kind of work?
5) Have the company ever in history performed a complex/larger reorganization of the firm?

*Ask in general:*

6) How does the company work to reach a high/competitive news value? Is AC willing to take large risks within business development?
7) How does one work with change and innovation within the company?
   a. Incremental innovation, small steps
   b. Radical innovation
   c. Does the Company today have a strategy/preparedness to work with radical innovation? Business Model Innovation etc.

**Customer relationship**

1) Are you as a company controlled and driven by your customers’ needs and wishes?
2) Do you have a possibility/will to influence your customer’s choices? To be a part of creating a market not explicitly asked for? (For instance sell more service systems than products)
3) How would your customers respond to result oriented and environmental friendly products?
   What is your competitive edge now? Quality? Price?
4) How would CE affect your relationship to your customers?

**Service: A transition to CE often implies that more Service systems are sold than products**

1) Do you see a possibility to become more result oriented, to transform even more products to service systems, and sell results rather than products?
   a. Obstacles
   b. Enablers/possibilities
c. What is the self-image of the Company today? Does one view itself as a product (manufacturing) company or service company? How would it be received if the company became more Service oriented?

2) Can you see a connection between circularity/sustainability and service? For example a way to retrieve magnets, extend product life etc.

Relations

1) How dependent are you today of external suppliers, middle hands? How would a transformation affect your relation with them?
   a. Would it be an obstacle?
2) How are you affected by competitive companies? (your competition)
3) How would it affect that collaboration throughout the value chain? What does it mean in internal and external relations:
4) What does it mean for the internal collaboration? Organizations. Which collaborations, structures and departments are affected?
6) How are ecosystems and networks externally affected? Standards, components. Is the Company dependent on other actors to develop their technique too? Are you locked in a system? Does the rest of the market need to be on the same level with their products and processes? Does one need to wait, or are you in a position where you could lead this change?

R&D (to inventors)

7) How would CE affect how you produce your products and services?
   a. What does every turn imply: Manufacture for recycling
   b. For remanufacturing
   c. For reuse
   d. Repair – longer life
   e. Choice of material (replace poisonous etc)
   f. Cleaner Production

8) Would a transition to CE affect the systems at large, would for instance a now working manufacturing system need to be replaced?
9) Would it affect pricing? (competitiveness)
10) Who collaborates today, how would it be affected by CE? (collaborations on internal level, external)

Economy (For economic staff)

1) How is the economy/finances in the company connected to sustainability?
2) What financial changes would be required to implement CE?
3) How would a transition affect the business models as of their state today?
4) Can the company finance a reorganization? (repeated question but might be of relevance)
5) How does the financial systems work within the Company?
APPENDIX C. INTERVIEW GUIDE (SWEDISH)

Main part is the same as English version, but the Swedish version contains more questions.

Intervjupersonen, samt dennes relation till och syn på företaget
12) Kan du beskriva din roll inom företaget?
   d. Vilken avdelning?
   e. Vilka samarbetområden?
   f. Vilka ansvarsområden?
13) Hur jobbar ni med hållbar utveckling idag?
   d. Hur jobbar ni med affärsmodeller kopplat till hållbar utveckling?
   e. Hur jobbar ni med service kopplat till hållbar utveckling?
   f. Vad har man för hållbarhetsmål? (sustainability)

CE är ett koncept för att kombinera affärsmodeller med hållbar utveckling
14) Vad är Cirkulär Ekonomi för dig? Hur ser du på CE, tex som en:
   c. Affärsmodell
   d. Miljöstrategi
15) Vad skulle en omställning till CE innebära för The Company?
16) Hur ser du att The Company skulle kunna bli cirkulär?
17) Vad skulle The Company kunna vinna på en övergång till CE?
   e. Fördelar (vinster) Skulle tex mer service kunna vara en vinst, få ut mer pengar av
      produkterna under längre tid etc
   f. Hinder för CE, och för att nå vinster
   g. Nackdelar (vad skulle man förlora)
   h. Vad finns det för Risker
18) Vad ser du som hinder och möjliggörare med att The Company skulle göra en övergång mot CE?
   (Exempel: Mer service system, cleaner production, mindre waste etc)
   g. Hur skulle en övergång se ut?
   h. Vilka externa hinder finns? (Policys, skatter, externa aktörer, samarbeten mm)
   i. Vilka interna hinder finns? (Omgöring, ekonomi, företagskultur)
   j. Vilka absoluta hinder finns det?
   k. Vilka hanterbara/relativa hinder finns det? (Tex dominanta designer, Lock in effekter)
   l. Vad skulle kunna förenkla? (gemensam spelplan i industrin, stöd från regering)
19) Hur skulle din roll se ut i en övergång mot CE?
   b. Vad skulle krävas av den rollen för att få till en övergång mot CE?

Risker
2) Vilka är dom största riskerna med en omorganisering till CE?
   e. Skulle man klara av en stor oorganisering, på organisationsnivå?
   f. Kan man hantera en (temporär) osäker ekonomi?
   g. Vart skulle de största kostnaderna hamna? (byte av maskiner vid Cleaner Production
      tex)
   h. Hur skulle det påverka den nuvarande infrastrukturen om ny CP-teknologi skulle
      inkorporeras? Skulle det kräva en total omställning? (allianser, suppliers)

Fråga alla, se hur dom tänker.
20) Vad har företaget för affärsmodell idag?
21) Kan du se en koppling mellan affärsmodeller och ett hållbarhetsperspektiv?
22) Om affärsmodeller: för vem skapar det värde, (service)
Förändringsarbete i företaget
8) Var befinner sig företagetidag? Vad händer inom organisationen?
9) Vem driver/ vem skulle vara drivande i en omställning mot CE? Finns det några drivkrafter inom företaget mot detta?
10) Skulle du säga att företaget är moget för en omställning till CE?
g. Finansiellt (Finns det resurser för en omorganisering och osäker framtid i en övergångsfas)
h. Företagskultur (Skulle kulturen i företaget stödja en organisering mot CE, är den med på förändringar? Skulle man ha förståelse för en osäker framtid)
i. År ledningen redo för en förändring mot CE? Skulle det få stöd?
k. Hur ställer man sig till risktagande inom företaget? Finns det en kultur/ledning som uppmuntrar/avråder risktagande?
l. Hur skulle företaget bemöta beslut med högre risk?

11) Vad skulle göra att organisationen blev mogen för ett sånt här arbete?
12) Har man någon gång tidigare i företaget genomfört en omfattande/större omorganisering?

Fråga generellt:
13) Hur jobbar AC med att nå högt nyhetsvärde. Är företaget benägna att ta stora risker inom affärsutveckling?
14) Hur jobbar man med förändringar och innovation inom företaget?
   d. Inkrementell innovation, små steg
e. Radikal innovation
   f. Har man idag en strategi/beredskap för att arbeta med radikal innovation? Business Model Innovation etc.

Kundrelation
5) Styrs ni som företag främst av era kunders behov och önskningar?
6) Har ni möjlighet/vilja att påverka era kunders val? Att vara med och skapa en marknad som inte är explicit efterfrågad. (Tex att sälja mer service system än produkter)
7) Hur skulle era kunder ta emot mer resultatbaserade produkter och miljövänliga? Vad är er konkurrenskraft nu? Kvalitet, pris?
8) Hur skulle CE påverka era kundrelationer?

Service: En omställning till CE innebär ofta att fler Service system säljs än tjänster.
3) Ser du en möjlighet att bli mer resultat inriktat, att omvandla ännu fler produkter till service system. Och sälja resultat snarare än produkter?
   a. Hinder
   b. Möjligheter
   c. Vad har företaget för självbild idag? Ser man sig som ett produktföretag eller Serviceföretag? Hur skulle det bemötas om företaget blev mer ett Serviceföretag?
4) Kan du se en koppling mellan cirkularitet/hållbarhet och service? Tex ett sätt att få tillbaka magneter, utöka produktlivslängd etc.

Relationer
2) Hur beroende är ni i dagsläget av externa leverantörer, mellanhänder? Hur skulle en omställning påverka er relation med dom?
a. Skulle det vara ett hinder?
11) Hur påverkas ni av konkurrensföretag?
12) Hur skulle det påverka det samarbetet längs värdekedjan. Vad innebär det i interna och externa relationer:
13) Vad betyder det för samarbetet internt. Organisationer. Vilka samarbeten, strukturer och avdelningar berörs?

R&D (främst till uppfinnare)
16) Hur skulle CE påverka hur ni tillverkar era produkter och tjänster?
   a. Vad innebär varje varv: Tillverkning för återvinning
   b. För återproducering
   c. För återanvändning
   d. Reparering – längre liv
   e. Val av Material (ersätta giftiga etc)
   f. Cleaner Production
17) Skulle en omställning till CE påverka systemen i stort, skulle t ex ett nu fungerande tillverkningssystem behöva bytas ut?
18) Skulle det påverka priser? (konkurrenskraft)
19) Vilka samarbetar idag, hur skulle det påverkas av CE? (samarbetar på internnivå, externnivå?)

Ekonomi (Till ekonomipersoner)
6) Hur är ekonomin i företaget kopplat till hållbarhet?
7) Vilka ekonomiska förändringar skulle krävas för CE?
8) Hur skulle en omställning påverka affärsmodellerna som dom ser ut idag?
9) Kan företaget ekonomiskt hantera en omorganisering? (frågat förut men om ekonomipersonal ståll ev. igen)
10) Hur funkar ekonomisystemen inom företaget?

Service
1) Hur stort inflytande har ni idag på tillverkningen av produkter?
2) Vilka kommunicerar/samarbetar ni med inom företaget?
3) Skulle man kunna reparera mer än man gör idag?
   a. Vad är de vanligaste hindren för att kunna reppra som gör att ni byter ut?
   b. Är produkterna servicevänliga idag?
   c. Skulle ni kunna vara en del i att få produkterna att bli servicevänliga?
4) Vad är dom vanligaste orsakerna till att produkterna slits ut i förtid? Är det något man skulle kunna åtgärda enkelt, eller något som sker oavsett?
5) Ser du att företaget skulle kunna vara en större del serviceföretag än det är idag?
   a. Hur skulle den övergången se ut?
   b. Vad skulle krävas av din roll för det?
6) Hur skulle affärsmodeller kunna se ut där service hade större uttrymme? Vad skulle skilja från idag?
Marknad

Sälj

1. Vilka produkter säljer ni?
2. Vilken marknad har ni?
3. Hur ser kundbasen ut? (Europa, industri, många små kunder, färre stora kunder)
   a. Hur spelar det roll för hur man säljer?
4. Hur säljer ni på er enhet och hur skiljer det sig från de andra marknadsenheterna?
5. Hur ser kontrakten ut till kund?
6. Vad säljer ni specifikt? (värden, helhetslösningar, produkt, service)
7. Hur utvecklar ni det ni säljer? Nya BMs? (service, helhetslösningar, mjukvara istället för hårdvara)
8. Hur ser en säljprocess ut?
9. Har man olika säljprocesser för olika produkter?
10. Vem är motparten? Hur ser mognadsgraden ut hos kund för helhetslösningar?
11. Hur är mognadsgraden hos företaget för helhetslösningar?

Prissättning

1. Vad har säljarna för styrparametrar?
2. Hur säljer dom produkter vs service? Hur mycket frihet har dom att lägga till extra service, extra produkter?
3. Är det samma säljare för produkt och service?

Marknad

1. Vad gör man idag för att förstå marknaden?
2. Hur tar man in marknadskrav?
3. Hur tar man in kundens intressen och krav?

Radikal/inkrementell

1. Hur radikala krav kan man ställa på produktutveckling?
2. Hur tar man in kundkrav, hur påverkar det produktutvecklingen? Vad leder det till för innovation?
3. Hur radikala är man (företaget och kund) när man ska förstå och utveckla en ny produkt?

Organisation och mätning

1. Hur mäter man och styr i organisationen? Vad mäter man?
   a. Vinst? Produkter på marknad? Långa kontrakt?
2. Hur mäter man framgång på företaget och på olika avdelningar?
3. Skulle företaget s vinstsyn kunna stå ivägen för en övergång mot CE? (som skulle innebära långsiktig vinst snarare än kortsiktig)

Logistik

1. Hur skulle logistiken påverkas av att man införde take-back system?
2. Har ni ändrat logistikflödena tidigare?
3. Skulle det krävas omfattande omorganisering?
5. Möjliggörare för en omställning?
6. Hur skulle logistiken påverkas av följande respektive:
   o Återvinning
   o Remanufacturing / Återproducering
   o Reusing / Återanvändning