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Towards a circular business model in the plastic packaging sector

- a case study of Trioplast Industries AB

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Abstract

Plastic packaging, a commonly used material across several industries and consumers. It is characterized for being affordable, versatile, durable and its high strength to weight ratio makes it a perfect fit for packaging material. However, this useful material also causes negative impacts on the environment, society and economy. For example, greenhouse gas emissions from its production, composition of various chemical properties and its non-degradable nature leading to increased waste. Moreover, the use of non-renewable fossil feedstocks in its production is also another major concern. Therefore, to minimize these impacts, the concept of Circular Economy (CE) is seen as a viable measure for the plastic industry to move towards sustainability. Through circular principles of prolonging useful life and reuse of materials, CE helps to shift from the cradle to grave concept. It also encourages production processes to be designed in a way that would encourage more use of renewable resources and eliminate toxic chemicals. Therefore, this study aims to investigate implementation of CE in the plastic packaging industry. CE implementation within an industry is a broad vision that requires collaboration from all actors involved. Therefore, to gain deeper insight, this study focuses on a single plastic packaging producer using the qualitative research method. Following the case study approach, the producer and two other actors from the same industry were interviewed using a semi-structured interview method. To understand this phenomenon, the business model (BM) concept was used as an analytical framework. BM is visualized using its value categories which focus on how value is created, delivered and captured by businesses. Therefore, the findings reveal that although the producer will continue to do business as usual, partial changes are expected across their offerings and production process. To adapt circular principles, the findings show that the case company is working with strategies such as altering their offerings and selling services in addition to their products. They are also designing products that can be produced with greater fraction of recycled materials in order to achieve the vision of closed-loop material flow. For future studies, it would be interesting to see similar sustainable journey of other actors. Such practices would benefit plastic packaging sector to continue business with minimal negative externalities and provide further reflection on challenges to enable more collaboration among the actors of the plastics value chain.

Sammanfattning

Plastförpackningar, ett vanligt använt material i flera industrier och konsumenter. Den kännetecknas av att den är överkomlig, mångsidig, hållbar och dess höga styrka till viktförhållande gör det perfekt för ett förpackningsmaterial. Detta användbara material ger dock också negativa effekter på miljön, samhället och ekonomin. Till exempel utsläpp av växthusgaser från dess produktion, sammansättning av olika kemiska egenskaper och dess icke-nedbrytbara natur som leder till ökat avfall. Dessutom är användningen av icke-förnybara fossila råvaror i dess produktion också ett annat stort problem. För att minimera dessa effekter ses konceptet med cirkulär ekonomi (CE) som ett genomförbart mått för plastindustrin att gå mot hållbarhet. Genom cirkulära principer för att förlänga livslängd och återanvändning av material, hjälper CE att växla från vaggan till graven. Det uppmuntrar också produktionsprocesser att utformas på ett sätt som skulle uppmuntra mer användning av förnybara resurser och eliminera giftiga kemikalier. Därför syftar denna studie till att undersöka implementeringen av CE i plastförpackningsindustrin. CE-implementering inom en bransch är en bred vision som kräver samarbete från alla aktörer. För att få djupare inblick fokuserar denna studie på en enda plastförpackningstillverkare som använder den kvalitativa forskningsmetoden. Efter fallstudieinriktningen intervjuades producenten och två andra aktörer från samma bransch med hjälp av en semistrukturerad intervjumetod. För att förstå detta fenomen användes affärsmodellkonceptet som ett analytiskt ramverk. BM visualiseras med hjälp av sina analytiska värdekategorier som fokuserar på hur värde skapas, levereras och fångas av företag. Därför avslöjar resultaten att även om producenten kommer att fortsätta göra affärer som vanligt, men delvisa förändringar förväntas över sina erbjudanden och produktionsprocess. För att anpassa cirkulära principer visar resultaten att fallföretaget arbetar med strategier som att ändra sina erbjudanden och sälja tjänster utöver sina produkter. De utformar också produkter som kan produceras med större andel återvunna material för att uppnå syn på materialflöde med sluten slinga. För framtida studier skulle det vara intressant att se en liknande hållbar resa från andra aktörer. Sådana metoder skulle gynna plastförpackningssektorn för att fortsätta verksamheten med minimala negativa externa effekter och ge ytterligare reflektion över utmaningar för att möjliggöra mer samarbete mellan aktörerna i plastvärdekedjan.

Abbreviations

BM - Business Models
It is a simplified representation of the elements of a complex organisational system and the interrelation between these elements (Geissdoerfer et al. 2018).

BMI - Business Model Innovation
It can be referred to as a form of organizational innovation or a fundamental change in the relationship between elements of the business model (Guldmann, Bocken & Brezet 2019; Hackin, Björkdahl & Wallin 2018). It is mainly used to develop novel configurations of a business model within matured or start-up types of businesses (ibid.).

CBM – Circular Business Model
It can be identified as a business model in which the conceptual logic for value creation is based on utilizing economic value retained in products after use in the production of new offerings. Thus, a circular business model implies a return flow to the producer from users, though there can be intermediaries between the two parties(Linder & Williander 2017).

CE – Circular economy
An industrial economy that is restorative by intention; aims to rely on renewable energy; minimizes, tracks, and eliminates the use of toxic chemicals; and eradicates waste through careful design (EMF 2012).

PCR- Post-Consumer Recycled
This term is often used by actors involved in the plastic packaging industry instead of recycled materials/contents. Some actors perceive this term to be more appropriate when addressing issues related to plastics.

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1 Introduction

This chapter introduces the topic and the relevant theories in the problem background and the problem statement. From the understandings of the gap in knowledge in the problem statement, the aim and research questions are formed. This is followed by the delimitations and structure of the study at the end of the chapter.

1.1 Problem Background

Imaging a world without plastic is quite impossible. Plastics are used as a source of diverse packaging material in areas like food, healthcare, shelter, electronics, aerospace, construction, and transportation (Obrecht *et al.* 2019). Resulting in increasing economic benefits in these areas. This is because plastics are characterized as affordable, versatile, durable and its high strength to weight ratio makes it a perfect fit as a packaging material (EMF 2017b). These favourable features of plastics have also indicated that there has been a surge increase in the production of plastic worldwide. Like for example, statistics show that production between 1950 and 2017 has increased from 1.7 million metric tons (Mt) to 348 Mt respectively (Foschi & Bonoli 2019). Moreover, within the European Union (EU) and Sweden percentage of plastic use for producing long-lasting applications is seen in industries like construction (20%), automobile (9%) and electronics (6%) (Palm & Myrin 2018). However, considering all these uses, plastics for packaging accounts for the highest utilization category of 40% (ibid.). Although, according to the EU Commission (2018), plastic production within the EU has remained stable while it has grown in other parts of the world. On the other hand, EMF and WEF (2016) mention that plastic packaging can also benefit the environment. Like its low weight helps to reduce fuel consumption during transportation and its barrier properties can help to minimize food waste by keeping them fresh in the containers (EMF & WEF 2016). Examples like these make plastic packaging increasingly replace other materials like wood, leather, ceramic, metal and glass (Obrecht *et al.* 2019).

It is quite apparent that plastic packaging is capable to replace other types of material, but the main concern rises from its negative externalities. For example, greenhouse gas emissions during production and post-use littering leading to waste (EMF & WEF 2016). Another problem is that these materials after a short-shelf life loses about 95% of their value to the economy which makes them equivalent to single-use plastics like cigarette butts, plastic drinking bottles & caps, food wrappers, grocery bags and straws (ibid.; Tudor *et al.* 2018). Therefore, due to its abundance, non-degradable and persistent nature, huge concerns about plastics are raised on its impact on biodiversity and the environment (Lam *et al.* 2018). Plastic packaging waste in the form of littering is also another concern due to its increasing demand over the years (ibid.). As such plastics vary in properties, so not all are collected in the waste management system, leaving a lot of it in nature (Palm & Myrin 2018). Unfortunately, these do not only create pollution on the land but also in the oceans, causing damage to the marine species (Lam *et al.* 2018). Also, plastic waste often has impact on soil, waterways, marine environment and fauna (Tudor *et al.* 2018). According to Tudor *et al.* (2018), economic damages are also incurring due to this leakage. Like for example; plastic litter in the Asia-Pacific region cost it's fishing and shipping industry about $1.3 billion/year and in Europe cost of about euro 630 million/year for cleaning beaches and coasts.

Effects of plastic packaging hindering environment and economy have raised awareness among policymakers to increase its circularity and foster resource efficiency (Van Eygen, Laner & Fellner 2018). As such the EU has proposed to increase the recycling targets to reduce concerns of plastic packaging waste management (ibid.). Also, studies have suggested that exposure to

the complex blend of chemical substances in plastic material may cause potential effect on human health and the environment (EMF & WEF 2016). To combat these challenges, many scholars, policymakers and business entities suggest the concept of Circular Economy (CE). Hence, during the last few decades CE has gained increased attention for its attractiveness for proposing a system that can overcome the linear pattern of production and consumption (Merli, Preziosi & Acampora 2018). Implementing CE may also show benefits at economic, environmental and social levels. Some of these are; economic growth, net material cost savings, job creation, more innovation and reduced emissions (EMF 2013). By moving towards CE, the goal is to sustain the value of the materials and products for as long as possible in the value chain (ibid.).

According to Kalmykovaa, Sadagopanb and Rosadoc (2018), currently, there are two directions of CE implementation. One which focuses on a systematic economy-wide implementation (at all levels of the society) and the other which focuses on a group of sectors, products or materials (such as plastic) (Kalmykovaa, Sadagopanb & Rosadoc 2018). Considering the latter for this study, Planing (2015) pointed out that there are four important building blocks that enable companies to move towards CE. They are, materials and product design, new business models (BM), global reverse networks, and enabling conditions (EMF 2012; Planing 2015). However, to gain a deeper insight, this paper will only focus on business models to understand how companies move towards CE. Therefore, Lüdeke-Freund, Gold and Bocken (2019) suggest that when companies plan to integrate CE, the fundamental challenge is the adaption and implementation of CE principles in the company's supply chain. CE principles have been reflected by Bocken *et al*. (2016) as strategies to prolong useful life of products and reuse of materials to foster circularity in the value chain. Lewandowski (2016), emphasized that for businesses to operate in a CE economy, it is necessary to introduce circularity in their BMs. This is because BMs are firm-centric and explains how businesses create and capture value (Pels & Kidd 2015). BM also helps to break down complex strategies of companies into managerial tasks (Roos 2014). According to Stål and Corvellec (2018) BM's are considered as a template for businesses to organize their activities which innovators can use to reflect implementation of their strategies. Fjeldstad and Snow (2018) and Antikainen and Valkokari (2016) refer this kind of innovation in BMs as business model innovation (BMI) in which companies either improve their existing business model or develop a new one. BMI plays an important role to incorporate circularity and fundamentally changes how is business conducted by focusing on efficiency, productivity and greening the supply chain (Bocken, Schuitc & Kraaijenhagen 2018). BMI can also be reflected as a tool for its usefulness to resolve complexity in organizational configuration and activities (Geissdoerfer *et al.* 2018). According to Ritzén and Sandström (2017), innovation is important because it is a collective process that involves all actors in a value chain. Hence implementing CE oriented BMs does not only require businesses to change the way they do business but also reflects their capabilities to manage innovation and understand the challenges and barriers that come along with the change (Ritzén & Sandström 2017).

1.2 Problem Statement

The aim of CE is mainly to transform the open-ended use of resources with closed production systems (Urbinati, Chiaroni & Chiesa 2017). This aim is further elaborated by Planing (2018) as the recovery of material and energy flow for a longer product life cycle within an increasingly international supply chain. However, despite the increased attention towards this concept, there are still many conceptual barriers. According to Korhonen, Honkasalo and Seppälä (2018), the scientific and research content about CE remains largely an unexplored area. Also, the concept of CE is portrayed to be a collection of vague and separate ideas from several fields and schools

of thought. According to Tura *et al.* (2019), the implementation of CE principles in businesses has been gradual as most of the business processes are structured linear from the beginning. Other reasons may include that the research conducted around CE is focused on single category as such financial or economic indicators or either on whole industry or segment but not on a single firm (Tura et al. 2019; Urbinati, Chiaroni & Chiesa 2017). Further to implementation of CE, the transition is likely to lead businesses towards new value chains and BMs. This is because CE principles affect areas of product design, production, use, disposal and waste management (De Mattos & de Albuquerque 2018). Although according to de Mattos and de Albuquerque (2018) and Lewandowski (2016), the design and management of CE oriented BMs have not been studied sufficiently till date which has impact on theory development and application towards a CE transition (de Mattos & de Albuquerque 2018; Fjeldstad & Snow 2018). Moreover, using BM to implement CE may also have some theoretical barriers as the BM concept reflects few critical issues. Like as stated by Writz *et al.* (2016), that concept of BM is very poorly understood especially within the research area and that there is still no clear literature on how BMs work, their categories and features of a successful BM. Achtenhagen, Melin and Naldi (2013) also added that the theoretical foundations of BMs illustrate inconsistency with underlying assumptions and propositions. Hence, this hinders its application as the concept can be viewed in varied ways (Achtenhagen, Melin & Naldi 2013).

According to Urbinati, Chiaroni, and Chiesa (2017) for companies that plan to implement CE principles in their business activities, there is a struggle concerning how the adaptation will take place. As such the current representations of CE do not indicate the different types of BMs but rather focuses on macro loops such as product-life extensions (slowing the loop) or recycle and remanufacturing (closing the loop) (Urbinati, Chiaroni & Chiesa 2017). Hence, according to Bocken, Schuitc and Kraaijenhagen (2018) traditional BMs and Sustainability oriented BMs differ as they incorporate a triple bottom line approach which includes environment and societal factors as well as stakeholder interests. In relation to these differences, companies often struggle between the option of developing their existing BM with CE principles or creating new BMs discarding their previous strategies (Urbinati, Chiaroni & Chiesa 2017).

Although there is a lack in the categorization of sustainable BM. In a few cases, industrial implementation has been ahead of developing a business model with sustainability orientation (Bocken et al. 2014). Similarly, companies within the plastic packaging industry of Sweden are involved in various engagements with the Swedish Environmental Protection Agency and other actors to foster sustainability and circularity in their production process (Naturvårdsverket 2019b). According to Urbinati, Chiaroni and Chiesa (2017), companies often begin moving towards CE by adopting circular practices such as recycle or remanufacture in their internal activities before implementing other CE principles at a firm level. Eventually leading to the creation of a BM that is fully CE oriented. However, to design and manage a CE oriented BM, comprehensive knowledge is required and often the available frameworks have limited transferability (Lewandowski 2015).

The focus of this study is to create a deeper understanding of circular business models (CBM)s which is also a subcategory of sustainable BM (Antikainen & Valkokari 2016). The purpose of CBM is to help businesses to redefine and create value while adhering to the CE principles like reducing waste, reuse, recycling, and retention of materials (Lüdeke-Freund, Gold and Bocken, 2019; Oghazi & Mostaghel 2018). However, there are few uncertainties and gaps in knowledge about CBMs. According to Vermunt *et al*. (2019) the key challenge in designing a CBM is related to its value creation and capture. This is because CBM requires companies to design BMs in a way that would bring economic value, environmental and social benefits (Vermunt *et al.* 2019). Hence, there is still gap in knowledge about how the innovation process needs to be

facilitated to make this transition from a traditional BM to CBM (Guldmann, Bocken & Brezet 2019). According to Oghazi and Mostaghel (2018) there is a limited number of empirical studies that incorporate views of CBMs from suppliers to customers. Bocken *et al.* (2014) also highlighted that CBMs are required to be designed in way that would produce economic value from the offerings and at the same time delivering environmental and social benefits. However, it is still not clear as to how social and environmental benefits can be translated into profits and competitive advantage for the company (Bocken *et al.* 2014). For these reasons, more case study-based research is required to fill in the gaps on the discussed issues (Oghazi & Mostaghel 2018).

According to Merli, Preziosi, and Acampora (2018), to enjoy the benefits of CE, it is important that there will change at all levels of the society (macro, meso and micro). However, research at such broad perspectives requires time and other resources. Therefore, for the purpose of this study, CE implementation will be investigated only at the micro-level by focusing on a case company operating in the plastic packaging sector. Hence if companies want to adapt circular strategies such as closed material loop, it will have to make changes in several areas like relationships with other actors, production processes and revenue models (Antikainen & Valkokari 2016). In this regard, Hofman (2019) pointed out the usefulness of BM and its ability to connect multiple actors, link between production and consumption and help to market new ideas or technologies. However, in transitioning to CE, companies often struggle between the development of their existing BM and creation of new ones (Hofman 2019). Based on this phenomenon, the study will use the case company as a unit of analysis and BM as an analytical framework, to understand implementation of CE. As CE implementation cannot happen in a short time, it is important for companies to adapt to CE strategies and vision. Therefore, the strategies and visions are what the study will focus on and are reflected in the next section.

1.3 Aim and Research Question

The aim of this study is to investigate and critically reflect on the implementation of CE in the plastic packaging sector. Therefore, the aim is addressed in the following research questions.

1. What is the vision and strategy for adopting a circular economy in the company's BM?
2. What are the challenges for adapting to a circular economy in BMs in the plastic packaging industry?

1.4 Delimitations

In deciding the delimitations of the study, many theoretical and empirical aspects were looked upon. For example, moving towards CE requires changes at all levels of society (Ritzén & Sandström 2017). However, the focus of the study was not to look at CE implementation on a broad range but rather focus at a particular level. Hence, the micro-level which focuses on a single firm or consumers was chosen. Trioplast Industries AB was considered for their initiatives to incorporate circular principles of slow, close and narrow loops in their production process. Therefore, to draw a clear understanding of their measures in implementation of CE, the BM of Trioplast was considered a good starting point. According to Antikainen and Valkokari (2016), the BM reflects the rationale about how value is created, delivered and captured by a company. Hence, by investigating their current BM and future strategies, it could reflect their market position and stance towards CE. There are also very few literatures focusing on CE implementation using BM and especially within the plastic packaging sector, which makes BM and ideal choice as analytical framework.The plastic industry is subject to many

criticisms due to its dependence on fossil fuel, energy and inefficient waste management (Leal Filho *et al.* 2019). Therefore, Trioplast has been taking small steps for many years within their organization towards sustainability and reflecting on their organization could help to build a different perspective about plastic packaging producers.

Although Trioplast has offices in other European countries, its head quarter is located in Sweden and so is the representative who shared information for the study. Therefore, the scope of the study is only within Sweden and discusses regulations such as Extended Producer Responsibility (EPR) scheme that is directed for producers within Sweden only.' Furthermore, in chapter 4, 5 and 6, the role (title) of the interviewees have been shortened for convenience in writing such as the 'Group Innovation, Sustainability & CSR Director of Trioplast' is simply mentioned as 'sustainability Director' and 'Lead Product Developer (Packaging R&D) of Essity' is mentioned as 'Lead Product Developer, Essity. The term recycled material is often preferred in many sections as PCR (Post Consumer Recycled) to enhance realistic understanding and the term is also widely used in relation to plastic packaging within the industry as per empirical sources.

1.5 Structure of the study

To develop a clear view on the structure of the study, the figure below (Figure 1) illustrates the necessary information. Therefore, Figure 1 includes chapter numbers with their names to familiarize the readers with the chapters. Chapter 1 is addressed as 'Introduction'. This chapter elaborates the background of the study and why the relevant theories were chosen to address the problem. The background is followed by the problem statement which specifies the gaps in knowledge of the chosen theories. This is followed by the aim and research question of the study. Chapter 2 is addressed as 'Literature review and conceptual framework'. This chapter addresses details of the theories introduced in chapter 1. The chapter focuses on circular business models and other theories relevant to the study such as business model, business model innovation and circular economy. Chapter 3 elaborates on the method used to conduct the study hence it is addressed as 'Methods'. It focuses on the research design, sources of literature review, description of the case study and further data collection and analysis procedures used for the study. The chapter also elaborates on the criteria for quality assurance and ethical consideration issues. Chapter 4 highlights details of the empirical findings of the study. The findings are collected through interviews with the chosen research participants who agreed to share information for the study. Additionally, references are also made from journals and other publications to foster deeper insight. Chapter 5 is called 'Analysis' which details the empirical findings in relation to the research question addressed in chapter 1. Chapter 6 referred to as 'Discussion' relates the findings with the theories explained in chapter 2. Chapter 7 draws a conclusion of the study by returning back to the aim and gap in knowledge and focuses on the contributions of the results from the study to the plastic packaging industry and business research.

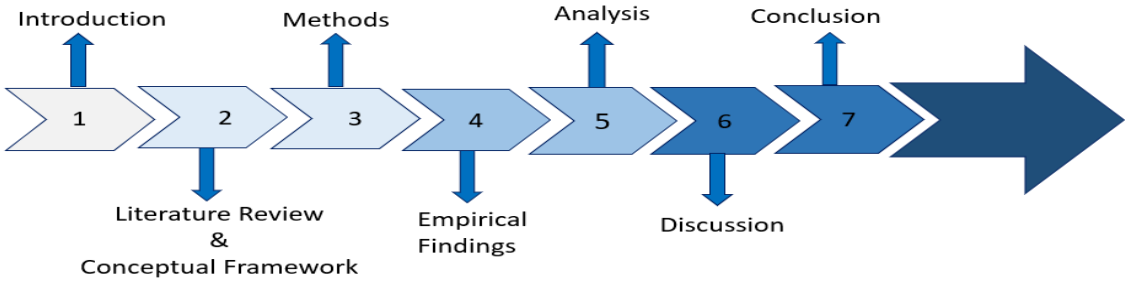

Figure 1: Structure of the study (own processing)

2.Literature Review and Conceptual Framework

This chapter explains the theoretical perspective of the study through the literature review. The sections highlight the theories that were introduced in the previous chapter. The chapter is concluded with a summary of the conceptual framework that illustrates and explains how these theories will be applied considering their gap in knowledge. The purpose of this chapter is to support the empirical study, analysis and discussions in the later part of the study.

2.1 Circular Economy and Sustainability

From the beginning of the Industrial Revolution, most production and consumption economies are depicted as the linear economy (extract, produce, and discard) (De Mattos & de Albuquerque 2018). This economy depends heavily on the extraction of raw materials to produce products. After use, most products become waste. Hence this economy has been leading towards scarcer raw materials and creating large waste problems (Guldmann, Bocken & Brezet 2019). The negative effects of the linear economy are threatening the stability and integrity of the natural ecosystems that are required for humanity's survival. (Ghisellini, Cialani & Ulgiati 2016). Additionally, Prieto-Sandoval *et al.* (2018) explain that the introduction of this model was inspired by the exploitative scientific and technological innovations during the 17th century which did not consider the environmental limitations and long-term damages to the society. Currently, it has become quite apparent that this economic model of take-make-dispose is being challenged not only due its dependence on natural resources but also for using virgin materials for production of products (Ranta, Stenroos & Mäkinen 2018). Hence, a transition to a sustainable future has a clear driver as the linear economy is close to reaching its limits (Tura *et al.* 2019).

Ranta, Stenroos, and Mäkinen (2018) identifies CE as an alternative economic model for understanding and analyzing consumption and production. Unlike other economic concepts, the deep-rooted origins of CE cannot be traced back to a single date or author (EMF 2012). Rather this concept has been the result of the efforts made by a small number of academics, thought leaders and businesses. Thus, its practical application into the economic systems and industries have gained momentum since the late 1970s (ibid.). The general concept of CE was refined and developed from the following school of thoughts and theoretical roots such as cradle-to-cradle, industrial ecology, industrial metabolism, biomimicry, blue economy, natural capitalism, regenerative design and performance economy (EMF 2012; Hofmann 2019). CE has gained attraction from policymakers, academia, and businesses in recent times. This is because it can be considered as one of the latest approaches to respond to sustainability, climate change, and address resource scarcity challenges (Tura *et al.* 2019).

Among the various definitions of CE, one of the most quoted definition was developed and conceptualized by EMF (2012, p.22). The definition linked elements from different schools of thought that were part of its origin (Lewandowski 2016). EMF (2012) in their definition of CE highlights several areas as such; a shift from an end-of-life concept to a cradle-to-cradle concept, using renewable energy, eliminating toxic chemicals and reducing waste through reuse. The definition also indicates the creation of superior product designs, changing processes and business models (Lewandowski 2016). In order to achieve the vision of CE certain measures like implementation of long-lasting product design, maintenance, reuse, and recycling of products needs to be taken in account (Lüdeke-Freund, Gold & Bocken, 2019)

Moreover, the term CE aims towards redesigning the current linear processes and flow of materials and energy to more circular ones thereby rebuilding natural and social capital

(Bechtel, Bojko, & Völkel, 2013). CE is also attractive for one of its important features of closing the material and energy loops. Bechtel, Bojko, and Völkel, (2013) illustrated materials loops can be divided into two cycles of biodegradable nutrients where the non-toxic chemicals can safely re-enter the biosphere and the technical nutrients can be reused again. CE and its features can be a good fit for the plastic packaging industry as well because it can be used to restructure the current material and energy loops in plastic production. Like for example, currently huge amount of plastics wastes is found in the oceans and landfills but in a CE system it is expected that there shall be no plastic waste, rather they will re-enter the economy as valuable biodegradable and technical nutrients (EMF 2017b). On the other hand, plastic packaging production is also expected to be carried out by utilizing renewable energy instead of the current use of fossil feedstocks (ibid.). According to Freitas (2018), plastic waste recycles leads to a complex value chain with many processes but starts from the consumers. Therefore, the idea is to process the waste and turn it into a resource that can re-enter the value chain and foster circularity (Freitas 2018). However, attaining CE may not be a final goal, rather it could be assumed to be a part of an ongoing process. This in return could help to achieve greater resource efficiency, effectiveness and contribute businesses to incorporate sustainability in the systems (Lüdeke-Freund *et al.* 2019).

2.1.1 Sustainability and circular economy

Sustainable development is frequently defined as the 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'(WCED 1987).

According to Suárez-Eiroa *et al.* (2019), there are two ways of addressing sustainability; strong or weak sustainability. Strong sustainability indicates that natural capital cannot be replaced by human capital whereas the latter claims the possibility of substituting it by human capital. Hence both of these approaches indicate the existence of ecological limits and as well as the relevance of CE to address sustainable development (Geissdoerfer *et al.* 2018; Suárez-Eiroa *et al.* 2019). Geissdoerfer *et al.* (2018) explained that CE could help to reduce environmental impact without hindering growth and prosperity. Suárez-Eiroa *et al.* (2019), also agreed that CE could meet environmental and economic targets but not the social target. Murry *et al.* (2017), suggests that meeting the social target within the framework of CE was important to build the pillars of sustainability. The relevance of both of these concepts has been summarized by Suárez-Eiroa et al. (2019) as sustainable development is responsible to establish goals to solve problems while CE is a tool to address some of the causes of these problems.

Sustainable development is also considered an important goal from a business perspective. According to França *et al.* (2017), the continuous degradation of environmental and social systems is directing businesses to incorporate sustainability in the twenty-first century. This view is further explained by Bini, Bellucci and Giunta (2018), that the three categories of sustainability (economic, environmental and social), have become an important strategic priority for businesses across various sectors and geographical regions. This is because factors like resource limitations, lack of stakeholder engagement and social responsibility of firms are moving businesses to integrate sustainability in their activities. Thus, some businesses have already realized this and started various initiatives like adopted sustainability values, published sustainability reports, included new management systems and created specific sustainability departments within their organization (França *et al.* 2017). However, these implementation programs differ among businesses and are often too timid (Bini *et al.* 2018). As such many companies view CSR as a separate business operation and have not taken any measures to supervise their CSR undertakings (ibid.). Additionally, reluctance of senior management is also

one of the reasons for lacking embeddedness of sustainability throughout their organizational values (França *et al.* 2017). Although companies are taking steps to incorporate sustainability in their systems, there are still many challenges that need to be looked upon to achieve CE visions.

2.1.2 Critical reflections of circular economy

The concept of CE has attracted many practitioners and scholarly writings as well as gained support for implementation among businesses and policymakers. However, according to Kirchherr *et al.* (2018), its implementation appears to be still at early stages. There have been few works of literature where scholars have pointed out implementation of CE in connection to a variety of CE barriers (Kirchherr et al. 2018). According to de Jesus and Mendonça (2018), barriers to CE indicates the factors that obstruct the transition towards CE. Agyemang *et al.* (2018), identified a number of CE barriers and divided them into internal and external barriers while de Jesus and Mendonça, (2018) identified them as soft and hard barriers. However, for this study the barriers are discussed as organizational, economic and technical barriers. They are illustrated in Table 1 Barriers to CE and explained below:

Table 1 : Barriers to CE (own processing)

Organizational	Awareness among consumers Educating customers Change of interest towards products Resistance from managers Lack of collaboration in the value chain Lack of support within the industry
Economic	High investments Lower prices of virgin materials Uncertain profit forecast Quality of products Previous locked-in commitments
Technological	Circular product design Technological gaps Unavailability of technological capabilities

Organizational barriers: As the name suggests, these barriers focus mainly on the company and its customers. For example, Kirchherr *et al.* (2018) mentioned that the customers too often change their mind which can hinder the company's BM that aims to produce durable products. Hence, this may be a problem not easy to solve since it is not possible to control or change consumers' interest and awareness (Kirchherr *et al.* 2018). In relation to awareness, de Jesus and Mendonça, (2018), added that customers' awareness is changing slowly and one of the reasons is their lack of education about CE and the choices available to them. Consumers are still not well aware of the various CE models such as product-service systems, performance-based services or servitization which are resulting in slower diffusion of CE models in the society (De Jesus and Mendonça, 2018). On the other hand, there are also internal barriers within companies. Like Agyemang *et al.* (2019), pointed out resistance from top managers to implement CE initiatives like changing company strategy has been a common barrier in many companies. Thus, to broaden their views and perspectives about CE implementation more workshops and training of employees might reflect change in perception. The implementation of CE requires collaboration among all the actors of the supply chain and often this a barrier. As put forward by Kirchherr et al. (2018) a company often finds itself alone in a supply chain when trying to implement CE due to lack of industry support. Again, this is an indication that the concept of CE has not yet become mainstream for which many companies. Moreover,

Ritzén and Sandström (2017) also identified few challenges for companies after implementing CE. For example when a company is operating in a product-service system, sometimes there is tension between the service department and product units (Ritzén & Sandström 2017). Although, reasons for tension may vary often due to lack of integration between the units and departments which fosters such situation (ibid.).

Economic barriers: Agyemang et al. (2019) identified high investments as a barrier to CE implementation. This is because often companies need to restructure or redevelop their infrastructure that was built decades ago to make it compatible with the CE approach. Moreover, there is also uncertainty in the forecasts of future profits. This is because according to Kirchherr et al. (2018), the cost of virgin materials is often cheaper in comparison to the recycled materials. Agyemang et al. (2019) also included that due to mixed material composition of recycled and virgin materials, for some products the quality of the final output is low which does not meet consumers' standards. Thus, consumers insist to buy them at lower prices, and this may indicate lower profits. Hence, due to uncertain profit forecast many actors in the market are often waiting to see economic gains of others before making any investments (Kirchherr *et al.* 2018). This has been further elaborated in the EU Commission's Plastic Strategy Report (2018), that the industry suffers from low commodity prices and uncertainties held back investments in the plastic sector. Kalmykovaa, Sadagopanb, and Rosadoc, (2018) also added that since there is an absence of sufficient analysis of CE implementation strategies as well as development of CE implementation experience, it has put planned CE investments at risk. De Jesus and Mendonça, (2018) also mentioned that companies often find it difficult to overcome previous linear economy locked-in commitments which make them further resistant towards any changes.

Technological barriers: It is to some extent not possible to perceive changes without technological innovations. Similarly, as argued by Agyemang *et al.* (2019) that CE is a technologically centered system and cannot be implemented without the right technology. Kirchherr *et al.* (2018) also added that having the relevant technology for product development is a prerequisite for CE. Therefore, circular product design is one of the concerned areas as technical solutions are needed to ensure that the product sustains good quality throughout its life cycle (de Jesus and Mendonça, 2018). This includes features like durability, efficiency and optimal usage of the product. Technological options play a vital role especially in the recycling and waste management practices of CE (ibid.). Moreover, it is not only about the unavailability of technological capabilities but also the technology gaps as such between process and product development or between invention and production that becomes a barrier in moving towards CE (ibid. p.22).

According to Ritzén and Sandström (2017), transitioning to a sustainable alternative such as CE has become important due to reasons such as the depletion of natural resources followed by social impacts. However, according to EMF (2012), by reducing use of resources and finite stocks of energy, it will not alter the resources but rather delay the effects. Therefore, mainstream changes are required across all levels of society (EMF 2012). According to Ghisellini, Cialani and Ulgiati (2016), CE implementation can be conducted in two different categories as such horizontal and vertical dimensions. The vertical dimension focuses on different levels of the society for example macro, meso and micro while the horizontal links between industries, urban infrastructures, cultural and social systems (Ghisellini, Cialani & Ulgiati 2016). In reference to the above, CE implementation as discussed in chapter 1 will focus on the vertical dimension in which BM will play an important role from a business perspective.

2.2 Business model and its value categories

The substantial negative externalities of plastic packaging which include degradation of natural resources like the leakage of wastes into the oceans and emissions of greenhouse gases do not always pose a direct cost to businesses (EMF 2017b). However, they do expose businesses to regulatory risks such as banning specific types of plastic packaging or imposing a tax on plastic packaging products (example carbon tax to reduce GHG emissions). Such circumstances encourage businesses to explore and review their existing BM for improvement and minimization of said risks (EMF 2013). According to Chesbrough (2010), BMs are used by companies to launch new ideas and technology commercially.

The concept of BM has been widely studied and defined by several authors. For example, Geissdoerfer *et al.* (2018) defined a business model (BM) as a representation of the elements in an organizational structure and the relationships between those elements. While Oghazi and Mostaghel (2018) view BM as the foundation of business process which can be used as an architectural structure to implement business strategy. On the other hand, Bocken *et al.* (2014), describes BM as a tool that illustrates how a company conducts its business and defines its strategy for competing with rivals. The competitive strategy is usually present in the company's offerings like; product design, cost of production and uniqueness of the products (Bocken *et al.* 2014). Hofman (2019) gives a different view of BM and that it joins different values to meet the needs of the customers. Additionally, Gorissen, Vrancken and Manshoven (2016) elaborate further to this perspective by viewing BM within the value framework and defines it, as means by which a company creates, delivers and captures its values. Moreover, Ranta, Stenroos and Mäkinen (2018) explain value framework in a BM as a bridge that links two concepts and states that companies need to create value for their customers (value creation) while at the same time generate profit for themselves (value capture).

Alternatively, Osterwalder and Pigneur (2010) also suggest that the BM framework may be conceptualized based on its practical relevance as the 'business model canvas'. The framework consists of nine business model elements. They are; key resources, key partners, customer segments, customer relationships, channels, value proposition, revenue streams, cost structure, and key activities (Osterwalder and Pigneur 2010). However, Richardson (2008) proposed an integrative framework of BM using the value categories of value proposition, value creation and delivery and value capture. This framework has been widely used by researchers and is a useful tool for strategists and understanding BMs for strategy implementation (Richardson 2008; Oghazi & Mostaghel 2018). Hence, the aim of this study is to understand CE implementation from a strategic point of view. Thus, considering the aim, according to the author of the study the BM framework proposed by Richardson (2008) is more appropriate than Osterwalder and Pigneur (2010) business model canvas. Hence, the rest of the study will refer BM as the one proposed by Richardson (2008). Figure 2 illustrates the three value categories (value proposition, value creation and delivery and value capture) and they are explained below.

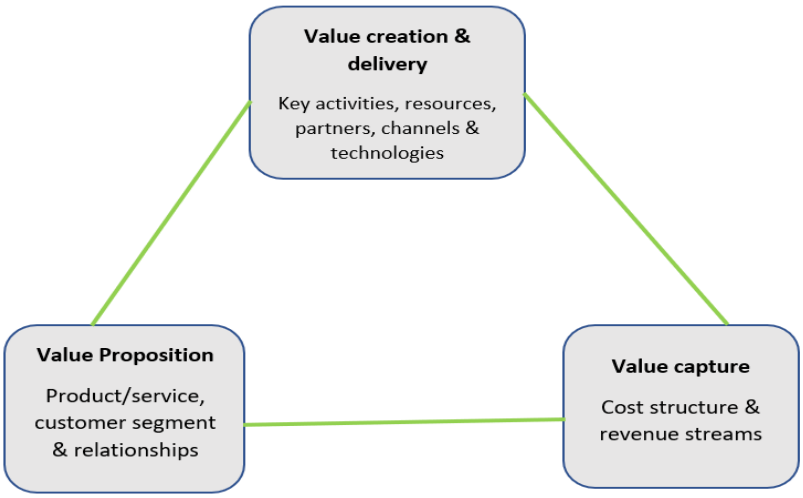

Figure 2: Value categories of a BM framework (own processing)

Value proposition: Oghazi and Mostaghel (2018) and Richardson (2008) describe value proposition consisting of the company's offerings, customer segmentation and its competitive strategy. Richardson (2008) further emphasizes that by customer segmentation it indicates target customers and their interest in the company's products in comparison to other competitors.

Value creation and delivery: According to Bocken *et al.* (2014), value creation and delivery is considered as the heart of a BM since it helps to focus on new business opportunities, markets and revenue streams. On the other hand, Richardson (2008) describes this dimension as a snapshot of the organizational architecture, processes that help to create and deliver value and gain competitive advantage. Ranta, Stenroos and Mäkinen (2018) elaborate this dimension with subcategories of resource and capabilities and position in the value network as important components of value creation and delivery. However, in comparison to the traditional value creation and delivery, this dimension in a circular BM needs to have systematic view in connection to its value proposition (offerings) (Bocken, Schuitc & Kraaijenhagen 2018). Like for example to ensure reverse logistics for the products, companies may need to ensure more collaboration with other actors to maximize value of their offerings (ibid. p. 82).

Value capture: According to Richardson (2008), every BM must contain a revenue model that focuses on the revenue streams and an economic model that focuses on the cost margins and other financial aspects. The traditional concept is to ensure that the revenue model provides enough profit margins over its cost (ibid. p. 140). Bocken, Schuitc and Kraaijenhagen (2018) explain that in a CE oriented BM, in which offerings are extended from products to services investments will take longer time to return as revenue. This is because services by nature do not generate revenue as in direct sales, for example a pay per use service will only generate small revenue every time the customer uses the service. On the other hand, Ranta, Stenroos and Mäkinen (2018) argue that irrespective of CE additions in value proposition, the company will capture value from its offerings through added revenue or other benefits from investments made by the company.

Although BMs differ between business to business (B2B) and business to customer (B2C) markets, hence the main types of BM are products and services (Planing 2018). This means that product-focused BMs generate innovative products while the latter focuses on services that are immaterial but require direct contact with customers (ibid, p. 75). This also indicates that the

study of BM is reflected more within the level of the company they operate. As pointed out by Pels and Kidd (2015) there are three different company levels; economic, operational and strategic. Economic focus on profit, while operational reflects on the internal processes which determine how value is created and the strategic level responds to the market positioning and overall direction of the company (Pels & Kidd 2015). Moreover, it is within this strategic level where the value structure of the company is determined (ibid. p. 202). Chesbrough (2010) adds that it is important for companies to develop capabilities to innovate their BMs that can lead to more economic gains. Additionally, with rising effects of the linear economy and efforts to tackle those challenges, business model innovation may be used to create, deliver or capture value as such environmental and societal benefits (Antikainen & Valkokari 2016). According to Antikainen and Valkokari (2016), these benefits may be achieved through changes of elements in the BM. Hence, Bocken *et al.* (2014), suggests that BMI is considered as a key success factor in the process of moving towards CE.

2.3. Business Model Innovation

Pieroni, McAloone and Pigosso (2019) explained that in order to enhance circularity and sustainability within the business processes, it is necessary for companies to make changes in ways they generate value and do business. It has become important that companies move from being firm centric to a network-centric system as well as rethink their incumbent BM to decouple value creation and resource consumption (Pieroni, McAloone & Pigosso, 2019). Moreover, according to Ritzén and Sandström (2017), innovation can be referred to as a collective process because when companies recognize new opportunities collaborations can help to develop and implement strategies to achieve them. Hence a similar approach is found in case of CE innovations in which companies are required to collaborate within inter-organizational networks (example actors outside the firm) as well as wider societal systems to achieve CE vision (Gorissen, Vrancken & Manshoven 2016).

BMI can be referred to as a form of organizational innovation or a fundamental change in the relationship between BM elements (Guldmann, Bocken & Brezet 2019; Hackin, Björkdahl & Wallin 2018). It is mainly used to develop configurations of a BM within matured or start-up types of businesses (ibid.). BMIs can also be identified as value appropriating innovations which can either be an independent innovation or complement to value-creating innovations (Roos 2014). There is number of factors that encourage businesses to focus on BMIs. For instance; emergence of new technologies, needing to manage matured business, obtaining better leverage on underutilized resources, responding to stakeholders (example customers) and legal or regulatory changes (ibid. p. 3). This, in turn, helps firms to compete through strong BMs which eventually becomes a part of their competitive advantage (ibid.). Such innovative approaches are also acknowledged as a means of transforming businesses towards sustainable development (Guldmann, Bocken & Brezet, 2019). However, according to Bocken et al. (2014), BMI towards sustainability may not result in economic benefits at the beginning but it is expected to do so in future due to changes in regulations or other surrounding factors. Although Gorissen, Vrancken and Manshoven (2016) explain that there is a lack of established research literature on how BMI can use sustainability as a guideline, yet current innovations mostly focus on eco-efficiency discourses. Bocken et al. (2014), explained eco-efficiency as reduction of energy, resources, emissions and waste in each unit of production. However, in order to tackle the challenges of unsustainability, it is necessary to conduct system innovation, change logic of value creation and design new transactions (Gorissen, Vrancken & Manshoven 2016).

The importance of BMI is observed with the recent trend of moving to a CE by businesses that need innovation to adapt CE visions. Additionally, Pieroni, McAloone and Pigosso (2019) suggest, BMIs that are CE oriented tend to implement the principles of CE to the BM design. This is done with the aim to foster resource efficiency and effectiveness through slowing, closing and narrowing energy and material flows (ibid.). Moreover, Bocken *et al*. (2016) emphasize that CE oriented BM is required to enable economically viable ways to continually reuse products and materials with the increased use of renewable energy. Thus, this new paradigm of CE now requires newer concepts and tools to describe its functions within businesses. Therefore, Bocken *et al.* (2016) suggest that facilitation of product design and strategic level of BMIs can help businesses move to a circular model. It would also provide clarity and give direction to designers and strategic decision-makers to work on newer BMs. Hence, the principles of CE (slow, close and narrow loops) as suggested by Bocken et al. (2016) are described below:

Slowing resource loops: According to Bocken et al. (2016), slowing the loop implies that products need to be designed for longer life which would extend their utilization period. This can be done by the introduction of service loops to extend the product's life by repairing, reconditioning or reselling (Nußholz 2018; ibid.). All these can result in slowing down the flow of resources from manufacturing to recycling (Hofmann 2019). The aim behind these services is to inherit the value of the products and their components by maximizing the number of times of use as well as lengthening them in each period (ibid.). Moreover, Merli, Preziosi and Acampora (2018) emphasizes the scope of access and performance model within this principle as it could help to satisfy needs without physical ownership of the products. For example, the product-service system (PSS) in which companies sell products in addition to services, has the scope to prolong the life span of their products and ensure increased use, reduced cost and material effective during production (Michelini *et al.* 2017). Although according to Merli, Preziosi and Acampora (2018), slowing the loop is not very commonly studied by scholars as it requires changes in consumption and production patterns and is marginally included within CE implementation strategies.

Closing resource loops: This loop is mainly concerned with the post-use waste and production phase which defines the circular flow of resources within the system (Bocken *et al.* 2016). The process begins with collecting and processing of post-use components from discarded products which may include product wastes (Hofmann 2019). These, in turn, can be converted into new or used materials, as the repurposing of by-products for other production systems (ibid.). However, such recycling also helps to enhance circular flow of materials or products in the economy (Bocken *et al.* 2016). Moreover, Merli, Preziosi and Acampora (2018) explained that CE is often summarized as extending the resource value of materials through recycling and industrial symbiosis which links its connection with closing the loop strategy. Bocken et al. (2016) also emphasize that by designing products towards circularity, a deeper understanding of the concept of recycling have emerged among product designers. Therefore, Figure 3 illustrates a plastic recycling value chain adapted from Freitas (2018). The figure shows the post-use phase of the wastes until they are recycled and reused for producing new products. Afterwards, they are again circulated in the supply chain.

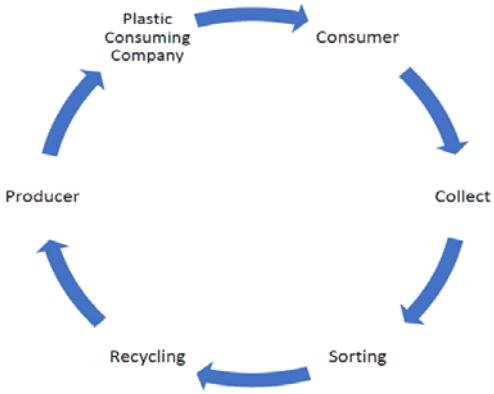

Figure 3 : Plastic waste recycling value chain (Freitas 2018)

Narrowing resource loops: According to Bocken *et al.* 2016, this strategy is quite different from the previous ones as it does not involve services, nor does it focus on the post-use phase. What it intends to do is use fewer resources, therefore, creating options for resource efficiency (ibid.). However, there are already successful strategies in the linear business model which is similar to this strategy. Bocken et al. (2016) propose that perhaps the existing strategies can be used in conjunction with other strategies of slow and close material loops to foster circularity in the value chain.

The concept of BMI has gained attention as a way to efficiently implement circular strategies within BMs (Nußholz 2018). Also, Roos (2014), suggests that since BMs are structured in a combination of different value categories, using BMI would mean innovation in at least one them. A CE oriented BM is important for the plastic industry because it could help to close material loops using various strategies and enhance circularity of plastic in the value chain (Vermunt et al. 2019; Ghisellini, Cialani & Ulgiati 2016).

2.4 Business models and circular economy

CE has been an important discussion topic within the European Union for quite some time now (Manninen *et al.* 2018). Given the benefits of CE like decoupling economic growth, new employment, business growth and most importantly reaching for the Sustainable Development Goals of the future (example SDG 2030) makes it an attractive business opportunity for economies to move to CE (ibid.). Thus, a transition to the CE as a whole would require changes of elements at different levels of society (Guldmann, Bocken, and Brezet, 2019). For example, at the macro-level includes the cities, provinces, regions, and nations; the meso level involves networks, eco-industrial parks; and the micro-level focuses on individual companies and consumers (Lüdeke-Freund, Gold and Bocken, 2019). Hence, for this study considering the individual businesses at the micro-level with a simple structure, a transition would need fundamental changes in BM and actions of actors within the value chain of the businesses (Manninen *et al.* 2018). However, as Schulte (2013), points out that this transition may not be an easy one as many actors within the value chain may not see beneficial opportunities in CE, so a step by step change within the existing BM can create a new BM in the long run.

According to Oghazi & Mostaghel (2018), innovating BMs are a key strategy for businesses to move towards CE as the current linear BMs represent a cradle to grave structure. Thus, BMIs incorporating CE include circular BMs, sustainable BMs, and closed-loop BMs. Though all of them have the same aim of achieving environmental sustainability and preserve finite resource, circular BMs and closed-loop BMs might be considered as subcategories of sustainable BMs. This is because according to Oghazi & Mostaghel (2018) sustainable BMs focuses to bring

businesses, actors and environmental entities together in one place whereas circular BMs and closed-loop BMs focus on specific business operations for achieving CE.

Nußholz (2017) states that to aid businesses to adapt to CE principles like reuse, repair and remanufacturing, the idea of circular business models (CBM) has emerged. The idea is to incorporate a design or redesign of business activities that would create a cost-saving structure which can be considered as both profitable and sustainable (Zucchella & Previtali 2019). According to Nußholz (2017), a good starting point in a literature review is to define the concept's objective but as it seems that so far it has no clear definition. However, some authors during the past few years have aimed to define CBM in reference to BM and resource efficiency strategies. For example, Linder and Williander (2017) imply that CBM focuses on a return flow of products to the producer from users, though there can be intermediaries between the two parties. The term CBM also overlaps with the concept of closed-loop supply chains, and always involves concepts like recycling, remanufacturing, reuse or one of their sibling activities (Linder & Williander 2017). According to Linder and Williander (2017), CBM indicates the importance of value creation and retaining value in products with links towards BM. It also identifies how the post-use return flow can be established using strategies like recycling, and remanufacturing. On the other hand, Nußholz (2017) explains that businesses operating in a CE system requires BMs to be designed in such a way that it prevents, postpones, minimizes leakage and favours the use of 'presources' over the use of resources in the process of creating, delivering and capturing value. This explanation too gives reference of BM when it states about business rationale and how value needs to be captured. At the same time, it states the strategies of resource flow like prevent or reverse obsolescence or minimise leakages. However, these existing definitions and explanations of CBM does not suggest clarity in when it is sufficient to operate using one of the resource efficiency strategies. It is also unclear whether recycling of products, parts or materials may help to close the loop at the value chain level which is also a part of CBM (Nußholz 2017)

The concept of CBM helps to promote the net value of products within the value chain by utilizing the already used products and their components (Linder & Williander 2017). Therefore, by reusing these used products as inputs in the remanufacturing process, a significant value from the original manufacturing process is saved or preserved in the remanufacturing process (ibid.). Hence, a further understanding of CBM could be identified that it aims to generate more economic gains in businesses by ensuring that the operations are conducted in a sustainable manner that could provide environmental and social value (Oghazi & Mostaghel 2018). Hence, Nußholz (2018) summarized the concept of CBM as adapting to circular strategies such as prolonged useful life and closed material loop in addition to the economic value of the products.

2.4.1 Developing a circular business model

Application of CE principles within BMs has been discussed and illustrated by several authors such as Oghazi & Mostaghel (2018), Ranta, Stenroos and Mäkinen (2018) and Bocken *et al.* (2014). Using different value categories of BM, Oghazi & Mostaghel (2018) used BMI strategies to create a CBM framework that was relevant to this study than the other proposed frameworks. The framework is shown in Figure 4: Characteristics of CBM in a BM framework (Oghazi & Mostaghel, 2018).

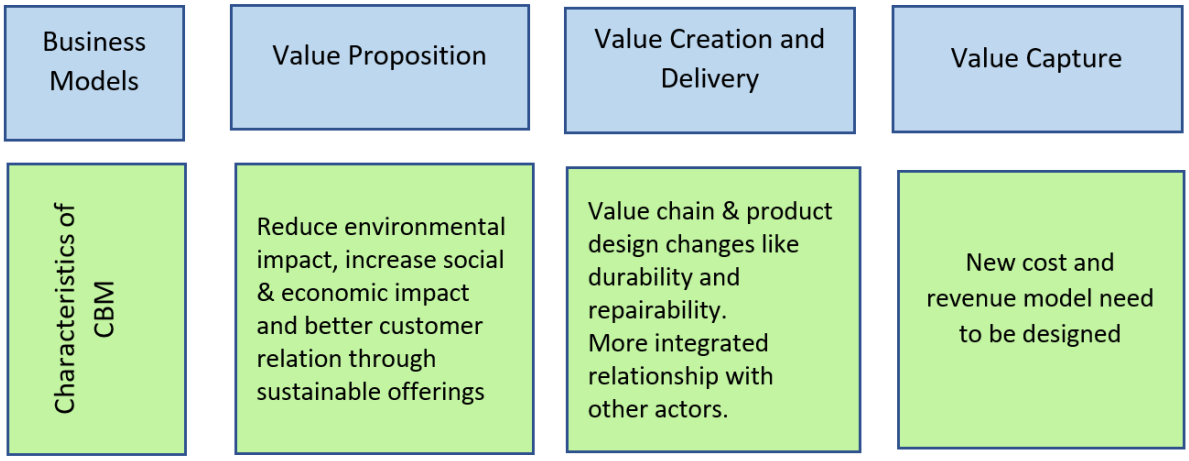

Figure 4: Characteristics of CBM in a BM framework (Oghazi & Mostaghel, 2018)

As explained in section 2.2, value categories within a BM consist of value proposition, value creation and delivery and value capture. According to Bocken *et al.* (2014), among all the value categories, value creation and delivery is the center of any BM. This is because this value segment is used to capture new markets or opportunities that would also lead to new revenue streams (value capture) (Bocken et al. 2014). Similarly, in order to move towards CE, companies may need to redesign their products for more durability and repairability. Like for example as per EMF (2017), without redesigning and innovation about 30% of the plastic packaging cannot be reused and recycled. By doing so, the companies are upgrading their value proposition (creating sustainable offerings) and also value creation and delivery (by producing sustainable offerings). Additionally, Oghazi & Mostaghel (2018) explained that a new design might decrease the cost if the residues or wastes from the new products can be reused as a future resource. This also links the other two value categories of BM with the third value category i.e value capture. According to Ranta, Stenroos and Mäkinen (2018) companies can capture value through additional revenue or when there are benefits in the production process. The idea is not only to focus on the lowest possible cost for a specific type of feature or quality (Laubscher & Marinelli 2014). Rather the products are needed to be designed and engineered in a way that would maximize high-quality reuse for manufacturing of different products, components and materials (ibid.). This idea of redesigning may also be seen as a beneficial factor for plastic packaging as it suggests that it is not a solution to completely remove them from the market (EMF 2017). Rather considering their important functional benefits a focus towards redesigning and innovation is required (ibid.).

Another important area of CBM is the relationship and close collaboration between the producers and its stakeholders in relation to retaining the product. As can be seen in Figure 4 more integrated relationship is a common feature among both value proposition and value creation and delivery. Bocken *et al.* (2014), explains that companies do not any longer create value individually rather by acting together with external actors through informal arrangements or formal collaborations. This is also an important feature considering the global sustainability pressure and the need to act together with other actors of the value chain. Further to the relationship between producers and customers, as stated by Linder and Williander (2015), the retained ownership usually facilitates products as a returned flow back to the producers. This results in a more product-service offering which is an offering that consists of use of or the result from the product (Linder & Williander 2015). Therefore, it requires a clear understanding and mutual trust between the producers and customers. Thus, companies are required to educate their customers more thoroughly about the originality of the product and their value after use

(Oghazi & Mostaghel 2018). This makes the revenue structure in a CBM quite unique as the offering becomes more of a service-based (ibid.).

2.4.2 Critical reflections of CBM

As interesting as the incorporation of CE principles in BM may sound, there are also few constraints of CBM. These are categorized and illustrated in Table 2 aligning with value categories discussed in section 2.2. The challenges within the value proposition are further broken down into product-oriented barriers as offerings are one of the features of value proposition. While challenges within value creation and delivery will focus on areas like organizational and external barriers. Value creation is not possible without collaboration of inter and internal actors of the value chain, hence organizational and external barriers focus on issues internal and external to the company (Manninen *et al.* 2018). These constraints are viewed from a micro-level perspective that focuses on individual companies and customers (Lüdeke-Freund, Gold and Bocken, 2019).

Table 2: Constraints of CBM (own processing)

BM dimensions	Challenges
Value Proposition	
Product oriented constraints	Product catagory restrictions
	Risk of cannibalization
	Fashion vulnerability
	Return flow challenges
Value creation & delivery	
Organizational Constraints	Internal Barriers
	Cultural Barriers
	Financial & Economic Barriers
	Misaligned profit sharing within the supply chain
	Conflict of interest among partners
	Technological barriers
	Conflict with customers
External Constraints	Geographical dispersion
	Lack of regulations

Product-related constraints: According to Linder and Williander (2015), not all products are suitable for remanufacturing. Therefore, certain attributes of a product are responsible for such. Like as pointed out by the authors that when the product has a core it can be used to restore the product or if it fails functionally than by dissipation. The value-added to the returned component may be high in relation to its market value and original cost or perhaps the product technology is stable (Linder & Williander 2015). An important attribute is also a case where the product technology developed is used for price discrimination thus selling offers with older technology to more price-sensitive customers (ibid.). Another product-related constraint is fashion vulnerability. As one of the main circular strategies for CBM is slowing and closing the loop, it can often become a barrier for high-quality products (Oghazi & Mostaghel 2018). Moreover, CBM promotes the idea of producing longer-lasting products which can result in a reduction in

sales of previous product versions. This may put companies at risk of cannibalization (Linder & Williander 2017). Lastly, the return flow of products can also be a barrier for companies using CBM. This is because there lies a particular challenge with the reliability and predictability of the return of products (ibid.). It can create difficulties with capacity planning as the flow is likely to vary from time to time and businesses may not always have the resources available to process the reused products (ibid.). However, some authors suggest that this can be avoided by having close relations with the customers and retain ownership of the products.

Organizational constraints: A transition to a new BM brings certain uncertainty and constraints within the company. Various studies have shown that changes within business activities are often difficult for the organization as well as the individuals involved (Oghazi & Mostaghel 2018). One of the crucial reasons is because restructuring is expensive and risky. Also, the managers who are benefiting from the current system may need to rule out expected benefits for the firm and the environment (ibid.). It is quite noticeable that restructuring may also give rise to fear of cultural changes within the organization (ibid.). CBMs are a big leap from the linear BMs as they require the involvement of further costs after the product is recycled back to the producer. This requires more cash and capital investments as often recycled materials are more expensive in a CBM design than a linear model (ibid.). Usage of different resources and skills can also be costly. Along with the expenses, the profits are also often misaligned within the value chain and cause of imperfect product design. As explained by Planing (2018), when a product is returned for remanufacturing or recycling, this then leads to a situation where the optimization of product design is mostly based on cost and production efficiency. This means that the profits from a better design could also occur at the end-of-use phase within the value chain (Planing 2018). Other challenges are also associated with the understanding of the key partners of the business. As discussed by Linder and Williander (2017), when producers move to a CBM influence, it is important that their BMs are compatible with that of the initiating firms e.g. retailers or service partners. Generally, lack of a channel control is also a critical barrier to increased service contents of a product offering. As mentioned earlier that a CBM strategy tends to move more towards service-based initiatives like leasing or renting by which producers can retain ownership of their products. This strategy can also create conflicts as customers in a B2C transaction prefer ownership over leasing (Oghazi & Mostaghel 2018). This would further require producers to educate their customers more on the origins of the product and its use (ibid.). Lastly, one of the important barriers to CBM is the lack of technological expertise (Linder & Williander 2017). These include; lack of method for handling life cycle of product data or technological limitations for recycling product design or lack of considerable expertise and knowledge (ibid.).

External constraints: Apart from the product and organizational factors, there are also external factors that affect when adopting to CBM. Planing (2018), explained that geographical dispersion is often a challenge as value chains of products in recent times spread over multiple countries hence national initiatives often lose their potential impact. On the other hand, rules and regulations may unintentionally have an impact on CBM. For example tax on price of new materials is often cheaper in comparison to reused or repaired materials (Oghazi & Mostaghel 2018). This may, as a result, may make new products cheaper compared to remanufactured products and decreases the demand for CBM based products by customers.

2.5 Conceptual framework of the study

The lack of research on CE from a business perspective has led to slow implementation and theory development of the concept (Korhonen, Honkasalo & Seppälä 2018; Tura et al. 2019). Also, the incorporation of CE principles leading to newer BMs and value chains have posed a threat for companies whose systems follow linear structure (De Mattos & de Albuquerque 2018). Moreover, companies who are interested to adopt CE in their business often struggle to implement strategies in their BM. This is because most of the previous research focuses towards single category in businesses or industry segments (Tura et al. 2019; Urbinati, Chiaroni & Chiesa 2017). Therefore, focusing on a single company as a unit of analysis and using BM as the analytical framework, CE implementation will be studied. Considering the critical reflections of BM literature for lacking in its understanding and framework, the study will focus on the one proposed by Richardson (2008) due to its relevance to the aim of the study.

Therefore, the conceptual framework is designed in a way that would at first focus on the existing business model of the case company and then towards the incorporation of CE principles. Richardson (2008) has broken down BM into three value categories of value proposition, value creation and delivery and value capture. The study will use these value categories to understand implementation of strategies by the company to achieve CE vision. The CE principles suggested by Bocken et al. (2016) of slow, close and narrow loops will be considered as CE visions to understand how the company is adapting CE.

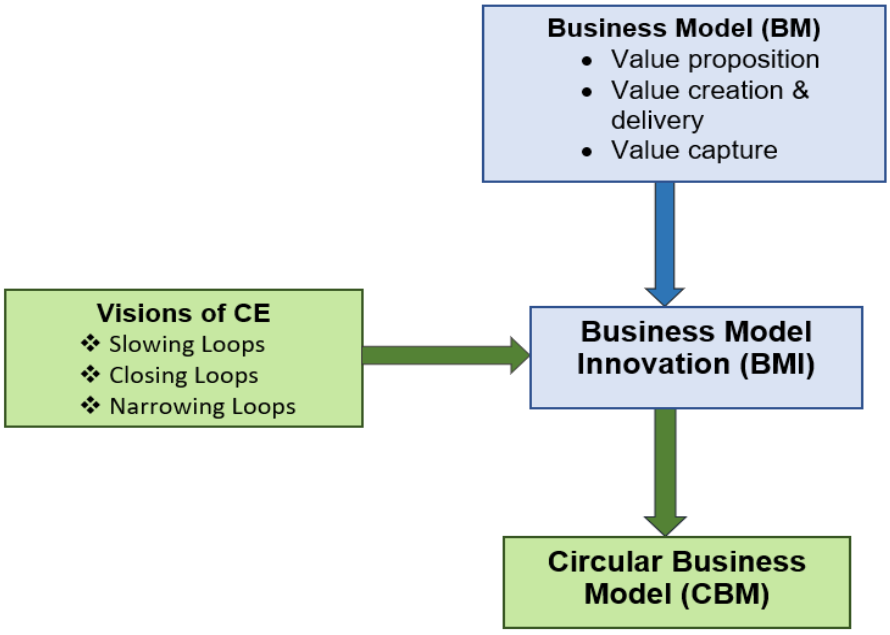

Figure 5 : Conceptual framework of the study (own processing)

In order to apply CE principles, the use of BMI takes place. The concept of BMI has gained attention in a way to efficiently implement these principles without completely changing the way companies do business (Nußholz 2018). It is important for BMs to change over time if firms intend to sustain their value categories and continue to be successful (Hackin *et al.* 2018). Therefore, what is necessary is to innovate BMs by adapting external business environments (ibid. p.84). Innovation is central to companies when transitioning their activities from linear to circular economy. The conceptual framework for this study is visualized in Figure 5 (above).

3.Methods

This chapter is an elaboration of the methodological structure of the study. It begins with the research design, followed by a literature review and case study. It also describes how data is collected and analysed for the study while ensuring quality assurance and ethical consideration. Based on the previous chapter this chapter compliments how the chosen method is a good fit for the study.

3.1 Research Design

According to Tura et al. (2019), CE implementation has been gradual since most business processes are structured as linear models. Moreover, management and design of CE oriented BMs have also not been sufficiently studied to date for which there are barriers in theory development and successful implementation of CE in businesses (de Mattos and de Albuquerque 2018; Lewandowski 2016). It is therefore quite clear that areas surrounding BMs and CE implementation require more research and exploration. Therefore, as this study will focus on CE implementation using BM, this explorative aim would require a qualitative research method (Suter 2019). According to Bryman and Bell (2015), qualitative research is a distinctive research strategy which emphasizes on words rather than quantity. Bryman and Bell (2015) also mentioned that qualitative research focuses on an inductive approach to the relationship between theory and research where the emphasis is mainly on generation of the theories. So, having considered relevance with qualitative strategy, this research aims to build up theories that can be linked to show relationship with its empirical study. Qualitative research has significant difference in comparison to other forms of business research strategies. Like when a report is built following this strategy, the theoretical issues drive the formation of the research question which in turn guides the collection and analysis of data (Bryman & Bell 2015). After analysis, the findings are seen as feedback to the relevant theory. Theory plays an important role in this research method because they are outcomes of the investigation rather than a tool that precedes it (ibid.). Another difference may account the depiction of the research strategy in terms of a set of stages which helps to exhibit less codification of the research process. According to the authors, delineating the sequence becomes a critical issue in comparison to quantitative research. Bryman and Bell (2015) have visualized a typical qualitative research process that consists of six steps. They are; (i) general research questions, (ii) selection of relevant sites and subjects, (iii) collection of relevant data, (iv) interpretation of data, (v) conceptual and theoretical framework and (vi) writing up findings and conclusion. The current report follows similar set of stages where the research questions are used as a base (Robson & McCartan 2016). The research questions do not only help to frame the purpose of the study but guide towards other important stages. For example, it guides the theoretical framework followed by the method to be used for sampling and analysing of data (ibid.). A well-formulated research question also prevents the report from unnecessary information and gives the readers a clear sense of the research topic (Bryman & Bell 2015). This nature of the qualitative method makes it an ideal research method for this report

3.2 Literature Review

The purpose of the literature review as described by Bryman and Bell (2015) is a means of gaining an initial impression of the topic area. Among the two types of review namely systematic and narrative review, this report is more of the latter. The reason being that narrative review is aimed to identify and summarize previous publications to avoid duplications in the current study (Ferrari 2015). As a result, helping to seek new areas that have yet not been

addressed (ibid.). However, as further explained by Bryman and Bell (2015), narrative reviews are more wide-ranging and less focused making them less explicit to the exclusion and inclusion of study materials. Hence to avoid irrelevant data, the researcher uses relevant keywords and other parameters (ibid.). Hence, a narrative review can also be assumed to be more suitable for qualitative researchers whose research strategy is based on an interpretative epistemology (ibid.).

The literature review in this study consists of publications like books, reports and academic journals that were gathered from different electronic databases. Some of these include; Primo (SLU's library database), Google Scholar, Web of Science, Sage Journals and others. However, to strengthen critical reflections, some facts and figures were also gathered from governmental and non-governmental institutions such as the EU Commission and Ellen MacArthur Foundation. To find relevant and appropriate information keywords such as 'circular economy'. 'business models', business model innovation', 'circular business model' and 'plastic packaging' were used. These keywords helped to filter and save time while collecting information. After relevant literature was found, its year of publication, citations followed by peer review were considered to assess the quality and authentication of the sources. The literature review sources are referenced following the Harvard style for referencing and in-text citations. Detailed references of all the in-text citations is presented at the end of the study under the heading of 'Bibliography'.

3.3 Case study

Case study, common research approach in qualitative research design. There have been several elaborate definitions by many scholars of this approach. For example, Yin (2009), defined a case study as a strategy in which the research involves an empirical investigation of a contemporary phenomenon within its real-life context which uses multiple sources of evidence or theories. This definition gives a glimpse of some of the important contents within a case study. Like it highlights a case study as a strategy that is concerned about research of an empirical case of an explored phenomenon using multiple sources of data collection for investigation (Yin 2009). Additionally, Creswell (2013), added that case study as a design of inquiry that is found in areas where the researcher develops an in-depth analysis. The analysis is often about a case that focuses on an event, program, activity, process or one or more individuals (Creswell 2013). This means that case study tends to investigate a specific event or situation within a case and not the case as a whole. Like for example in this study the aim is to investigate how the case company implements CE in their BM. Hence the focus is only on the implementation of CE and not how the company operates overall. On the other hand, Bryman and Bell (2015), took the discussion further by mentioning that researchers tend to generate intensive investigation out of a single case through theoretical analysis. However, issues like whether the data is sufficiently supporting the theoretical arguments or is the theoretical analysis inclusive needs to be taken into consideration (Bryman & Bell 2015). Therefore, the crucial question is not if the findings can be generalized but rather how efficiently the researcher generates the theory out of the findings. Hence, such views put case study research within an inductive tradition to the relationship between theory and research (ibid.). In relation to this report, case study was chosen to investigate the case company in reference to the theory developed in the study. Although, cases in real-time and theoretical applications vary, hence the motive was to understand how the practical implementation of CE can be linked to the theoretical perspective of the study. The case study was completed under a specific time frame during which the author was able to conclude the findings in relation to the theories.

3.3.1 Time Frame

In relation to time Creswell (2013) also mentioned that case studies are bound by time and activity during which the researcher uses various data collection techniques to collect information over a given period. Bryman and Bell (2015) also highlighted that apart from data collection the author needs to ensure that there is enough time for various stages of the research process. Also, often it takes must longer than expected to have data approved by research participants before the author can present them in the study (ibid.).

In relation to this thesis study, the paper was prepared between September – January according to the course schedule set by the university. During this period the author was required to perform all the necessary activities that would contribute towards the completion of the paper. The introduction, literature review and methodological chapters were structured and partially completed between September and October. For data collection, most of the interviews were conducted, approved and analysed during the month of November. However, due to unavailability of one the participants, a short interview was conducted in the middle of December. Although, it had no impact on the completion of the study. The final steps of writing discussion and conclusion were done during December and there was also enough time to revise the study prior to the defence seminar in January and before final submission.

3.3.2 Sampling

An important factor that needs to be determined before data collection is the sampling method. Bryman and Bell (2015) state that data sampling within qualitative research usually revolves around the notion of purposive sampling. It is a non-probability form of sampling (ibid.). This type of sampling requires the selection of units based on the research question (Bryman & Bell 2015). Therefore, the aim is to sample units in a strategic way so that their information is relevant to the research questions. Samples can be considered among people, organizations, documents, and departments are often referred to as units in a qualitative approach (ibid.). For instance, the unit of analysis for this research project is a company who produces plastic packaging (Trioplast). The idea is to understand in detail how the company adopts CE in their BM. As discussed previously that case studies tend to investigate deeply within one or more cases but here the research question was prepared in a way that would lead to an investigation of a single company. This approach is a clear indication that multiple units were ruled out and the research would focus only on a single unit i.e one case company.

For this study, both criterion sampling and snowball sampling were used. According to Bryman and Bell (2015), criterion sampling means to sample all the units that meet a particular criterion. Hence, the idea to write the thesis on plastic packaging came to the author as a personal interest. Therefore, using Google search, the author searched for plastic packaging companies in Sweden with ambition towards *sustainable innovation*. This was mainly the core focus of the search. Hence, after writing to a very limited number of chosen companies, the case company Trioplast responded with their interest to share their journey for the thesis. The other partial contributors to the thesis were sampled using snowball sampling. Bryman and Bell (2015) explain snowball sampling as a technique in which the researcher samples small group of people who are relevant to the research question and can who then propose others who have relevance to the research topic. Similarly, the author requested the case company to refer another participant such as their customer/supplier who could share some insights about their sustainable journey with them (Trioplast). Hence, Essity was referred and their Lead Product Developer agreed to be a part of the study. Moreover, a suggestion was also given by the thesis supervisor to investigate environmental policies for understanding the regulations on plastic packaging. Hence, the

Swedish Environmental Protection Agency (EPA) was contacted through e-mail. The e-mail was sent to the relevant units working with climate policies. Thus, two participants from two different units (Recycling unit & Development Unit) responded to the e-mail and were interested to answer questions and offered support for further information on regulations. Once the sampling was completed, the next step was to determine how data could be collected from the participants through a convenient procedure.

3.4 Data Collection

In a research project, data collection is usually carried out on an instrument or a test or gathered information on a behavioural checklist (Creswell 2013). This view was further elaborated by Bryman and Bell (2015) as there are diverse research methods that can be used for collection of data in a qualitative study. They are ethnography/participant observation, qualitative interviewing, focus groups, language-based approaches and lastly collection and analysis of texts and documents. However, this study is conducted using a case study approach that does not intend to study on an entire organization but rather focuses on a particular issue, feature or unit of analysis (Noor 2008). For example; the BM of Trioplast is examined here rather than the operations of the entire company. This also indicates that data needs be collected from the person(s) who has knowledge about the specific event and not all the employees of Trioplast. Hence, this eliminates data collection methods like participant observations or utilizing focus groups or even language – based approaches due to their non-relevance to the study approach. The remaining method that is left is qualitative interviewing according to ones mentioned by Bryman and Bell (2015).

Interviewing is perhaps one of the most widely used methods for data collection in a qualitative study. It is because it also comes with several advantages for the interviewee. During the interview, the interviewee is given more priority to share their views that could enable formulation of initial theory, it is acceptable to ramble as it gives more insight as to what the interviewee sees as relevant and important and lastly it is also acceptable to depart from any previously prepared interview guide as the interviewer has the liberty to ask new questions as a follow-up to the replies from the interviewee (Bryman & Bell, 2015). The important factor here is the flexibility during the interviews that can direct towards findings of the research which makes most researchers prefer interviewing over other methods (ibid. p. 470). Therefore, interviews are categorized in two categories of unstructured and semi-structured interviews. As will be explained below, for conducting primary data collection for this study, semi-structured interviews will be used.

3.4.1 Semi-structured interview

Semi-structured interview (SSI), comes with a number of advantages including flexibility and versatility (Noor 2008; Bryman & Bell 2015; Kallio *et al.* 2016). Moreover, it can avoid poor response that is usually observed in a questionnaire survey through direct communication and the interviewer too has more control over sequence/line of questions during the interview (Barriball & While 1994; Creswell 2013). Other merits as pointed out by Barriball and While (1994) and Kallio *et al.* (2016) include; the interviewee answers the questions directly without any assistance from anyone which satisfies criteria of trustworthiness, can be carried out both individual and in groups, rigidity of its structure is variable which depends on the purpose of the study and is suited for the exploration of different attitudes, values and motives. Moreover, Newcomer, Hatry and Wholey (2015) also added that SSI is very compatible where the interview guide consists of one or more open ended questions that require follow up queries. However, like other methods SSI too has disadvantages. For instance, it is time-consuming,

labour intensive, and require interviewer sophistication (Newcomer, Hatry & Wholey, 2015). This can be further elaborated that the interviewer needs to be smart and knowledgeable about the topic of the interview. At the same time manage the entire process of setting up the interview, preparing the interview guide, conducting and analysing the interview data (ibid. p. 493).

Bryman and Bell (2015), describes SSI to a context in which the interviewer has a series of questions that can be used as an interview guide. The sequence of questions can vary. These questions are somewhat more general as they form a guide of reference that is typically found in a structured interview (Bryman & Bell 2015). It is not important for the questions to be a part of the interview guide as they can be picked up by the interviewer during the dialogue with the interviewee. In preparation of the interview guide, Kallio *et al.* (2016), also adds that a certain level of the previous study of the research topic is required to formulate the questions. This is because most of the questions within the guide are prepared prior to the interview based on the previous study (Kallio *et al.* 2016). Therefore, the interview guide covers the main topics of the study and the interviewer uses similar wordings and structures during the interview (ibid.). Moreover, Noor (2008) also emphasizes the use of recording and taking notes of the information discussed between the interviewer and the interviewee. This can contribute towards securing accurate account of the conversation avoiding losing data, thus ensuring that the criteria of trustworthiness are met.

Primary data collection for this study was done through SSI of the following participants mentioned in Table 3 (interview details). The interviews were conducted using different communication devices as such telephone, skype and e-mail correspondence, whichever was preferred by the interviewees. The interview guide was prepared carefully prior to each interview based on the topic that was to be discussed during the interview. This is because it is a single case study that focuses on a case company while other sources were used to strengthen issues that were already discussed with the case company. Each participant was sent a basic interview guide and a proposal of the thesis so that they could have a deeper understanding of the thesis and prepare before the interview. The interview guides can be found in Appendix 1 & 2 which illustrates the participants and the type of questions that were used during the interviews. A broader structure of the guide was prioritized to the case company as the interview was broken down into themes relevant to the research question. During the interview, notes and recordings were taken to ensure the accuracy of the data collected. After the interview, the raw data was compiled in a word file and sent to the participants for approval for use in the thesis and make any corrections (if required).

Table 3: Interview details for empirical findings (own processing)

Name	Organization	Role	Duration	Date	Validation
Lena Stig	Swedish Environmental Protection Agency	Expert/Advisor in Sustainable use of plastic	60min	1.11.2019	Transcript
Kristin Geidenmark Olofsson	Trioplast Industries AB	Group Innovation, Sustainability & CSR Director	1 hr 15min	13.11.2019	Transcript
Emma Nord-Norén	Swedish Environmental Protection Agency	Advisor at the Recycling Unit	60min	13.11.2019	Transcript
Anders Andreasson	Essity	Lead Product Developer (Packaging R&D)	35min	16.12.2019	Transcript

Table 3 illustrates the research participants/interviewee(s) who have contributed in the data collection for the study. The case company is represented by Group Innovation, Sustainability

& CSR Director, who have gathered all the necessary information from various departments that were needed to answer the interview questions. Therefore, to avoid confusion and ensure clarity, she has been the sole contact person on behalf of Trioplast Ind. AB. She has thoroughly co-operated during the whole process and consulted with her colleagues to ensure that the answers to the interview questions remain fair and neutral. The interviews with the Trioplast and Essity were conducted over the phone while with Swedish EPA Skype was used for both the interviews. During the whole process of the study, communication with all the research participants was made through e-mail which has enabled prompt replies and convenience for everyone. After each interview, the next step was to analyze the data collected. This was important because without data analysis it would not be feasible to process data for use in the study.

3.5 Data analysis

Data analysis is an important part of qualitative research design and every study requires decision on how to analyze the data, considering its influence on the rest of the study. According to Maxwell (2009), strategies to perform data analysis can be done in three different ways. They are; categorizing strategies (such as coding and thematic analysis), connecting strategies (such as narrative analysis and individual case studies), and memos and displays (for a more detailed discussion). On the other hand, Berg and Lune (2017) defined data analysis as consisting of three concurrent flows of action: data reduction, data display, and conclusions and verification. The authors stated the importance of data reduction and coding in qualitative research so that it can be accessible, understandable and possible to be divided into different themes and patterns.

Bryman and Bell (2015) break down all these similar strategies into two approaches and suggests what is most commonly used in qualitative research. They are analytic induction and grounded theory. According to Bryman and Bell (2015), analytic induction begins with a rough description of the research question which is followed by hypothetical explanation of that problem and continued by data collection. However, if the case is inconsistent then hypothesis is encountered for which either the hypothesis is redefined or reformulated. To conclude it is a very rigorous method of analysis (ibid.). On the other hand, Gentles *et al.* (2015) define grounded theory as a flexible method for developing theory and understands the reliance on interview for data collection. Bryman and Bell (2015) also emphasize that in this approach data collection, analysis, and eventual theory stand in close relationship with one another. Thus, grounded theory uses various reliable tools for data analysis. Therefore, to analyze data using the tools of grounded theory were chosen for the study as they were familiar to the author as well as relevant to the study. Hence, among the different tools used in grounded theory, the author prefers to use coding as a strategy for data analysis. Coding in qualitative research is not the same as in quantitative research. In contrast to the latter, as explained by Maxwell (2009), the goal of coding is not to produce counts of things but rather arrange the data in way that would bring similarities between things within the same or other categories. The formation of the categories will depend on the study, like it may comprise of categories of people studied for the research or derived from existing theory (ibid. p 237). However, when using coding as a strategy, it is important for the researcher to follow certain steps before making categories of the data for analysis. According to Bengtsson (2016), these steps are decontextualization (where the researcher reads through the transcripts to break the data into meaning units) and recontextualization (where the data is reduced based on the aim of the study). Thus, after following these steps and creating categories with data relevant for the study, the next step is to head for compilation of the data.

Similarly, in this study, once data collection was completed after the interview with the research participants, the author transcribed the data in a word document from the notes and other sources used during the interview. These data were then carefully highlighted based on their relevance to the aim and research question. The data that were not highlighted were copied and saved in a different file for later use (if needed). Afterward, these data were put under two different headings, *existing business model* and *business model innovation*. Based on their relevance to the concept of value categories, the data within the two headings were further broken down into *value proposition, value creation and delivery* and *value capture*. A similar structure is followed in chapters 4, 5 and 6. Moreover, data received from other participants that correspond to issues discussed with the case company were given a common heading and saved. For example, the issue of *traceability* was initially discussed with the case company. Later on, to gain a deeper insight the same issue was raised during the interviews with Essity and the Swedish EPA. Thus, the data collected on traceability from both the research participants had a common heading. Using the headings as codes, it was easy during data compilation to address issues that had more than one perspective. Once this process was completed, they were compiled and ready for use in the study. Although, after data analysis, the compiled data was sent back to the participants for quality assurance before they were presented in the later chapters.

3.6 Quality Assurance

According to Bengtsson (2016), it is important that all research is open to evaluation and criticism. This is because it would give the readers an opportunity to discuss the results linked to the concepts based on the trustworthiness of the study (Bengtsson 2016). Thus trustworthiness, as explained by Gill, Gill and Roulet (2018) equates to an inquirer by making the research practices visible and auditable to others to get a deeper insight into the findings produced from the study. Trustworthiness is important in narrative study as it implies the importance of understanding, not just the result that is produced but also emphasizes how it was produced (ibid.). Hence, Lincoln and Guba (1985) has suggested four criteria to establish trustworthiness in order to evaluate and judge the quality of qualitative research. They are explained below:

Credibility: Bryman and Bell (2015), states that the presence of this criterion is found in multiple accounts of social reality. However, based on numerous accounts within the society, it is the credibility of the account that a researcher would conclude at to determine the acceptability by others (Bryman & Bell 2015). The presence of credibility is important to determine how data analysis was carried out and that no relevant information has been excluded from the study. This was further elaborated by Bryman & Bell (2015) as the presence of credibility is important within the findings and conclusions to ensure that the research was carried out in good practice. Additionally, Gill, Gill and Roulet (2018) also suggest that this criterion cannot be fulfilled unless the sources of the research agree or have confidence with the researcher's interpretation or reconstructions of the results.

Transferability: This term is referred to as the degree of the application of results in other settings or groups (Bengtsson 2016). It also suggests that the number of samples used can be a good indicator of how generalizable results will be (ibid.). Creswell (2013) suggests that researchers must include a thick, rich description to convey their findings to the readers. This would benefit both the reader and the researcher as well as fulfil one of the criteria to assess the study. Therefore, having a rich description of the findings can give way to transfer the results from one context to another (Gill, Gill and Roulet, 2018). Thus, it is important to provide sufficient detail for the contextualization of the interpretations from the research participants

(ibid.) Moreover, it would also guarantee the researcher from relying on a single theoretical lens that would give meaning to the phenomena that are being researched (Doz 2011).

Dependability: Similar to reliability in quantitative research, Bryamn and Bell (2015), suggest that to ensure there is merit within a study, the researcher must comply with this criterion of trustworthiness. This means that the researcher must take an auditing approach while conducting the research. For example; store records of all steps in the research process, selection of participants, field notes, interview transcripts, and data analysis decisions. Preserving all this information can help the researcher to be properly evaluated by his/her peers at the end of the course (ibid.). This would ensure that the procedures were properly followed and the justification of the theoretical inferences. Dependability is further defined by Bengtsson (2016), as 'stability' meaning that during the research process, the data will change over time as well as alterations in researcher's decision during data analysing but, the key is to keep track of every development that takes place during the research process. Hence, ensure stability (ibid.).

Confirmability: Confirmability in qualitative research concerns the idea that the researcher have acted in good faith while conducting the research (Bryman & Bell 2015). However, it is agreed that complete objectivity is not possible in a research study, but it is also important to display that the researcher was not biased or allowed theoretical inclination within the research and its findings. Bengtsson (2016) also agrees with this view and adds that confirmability is concerned with the objectivity and neutrality of the data in the research. Although, Gill, Gill and Roulet (2018), suggests that confirmability is also a way for researchers to identify their assumptions and predilections within the findings of their study by making explicit considerations in the interpretations of the data. Further to that, it also entails that the researcher is seeking to understand the assumptions or values that shape their research (Gill, Gill and Roulet, 2018).

This study was completed by assessing the quality of the data based on the criterion proposed by Lincoln and Guba (1985). Like for instance to ensure *credibility*, once the data was collected during the interview, it was then transcribed and sent back to the research participants to make corrections or further clarifications of any incorrect data. The returned corrected information was then used to complete the empirical findings and other chapters. This process is very much similar to that of validity that is often used to evaluate results in a quantitative study (Bryman & Bell, 2015). Moreover, to ensure *transferability*, the study was conducted using multiple theoretical lenses to give the readers a full view of the theories that surround the main theory. This study aims to discuss how a company is moving towards CE and using BM as a unit of analysis. Therefore, before directly focusing on CE oriented BMs, other surrounding theories like BM, BMI and CE were also discussed to broaden the theoretical perspective of the study. In relation to *dependability*, there were plenty of alterations while completing the study and constantly going back and forth to ensure that study discussed the themes as per the aim. Hence, all the additions or emissions were noted down and recorded by the author. Lastly, the study was conducted with the aim to provide results that were not initiated through personal bias or too much inclination towards any theory. The author intended to have maintained objectivity while completing the study and thus ensure *confirmability*.

3.7 Ethical Consideration

Ethical issues are found at various stages in a research study. Among many areas, Bryman and Bell (2015), consolidated them in four important areas. They are harm to participants, lack of informed consent, invasion of privacy and deception (Bryman & Bell 2015). Therefore, to ensure that the participants were voluntarily consenting to contribute to the study, they were asked to sign an informed consent form. Signing the form gave them the option to withdraw

their consent at any time without stating their reason. According to Bryman and Bell (2015), the advantage of such forms is that it gives the participants the scope to be fully aware of the nature of the research and the implication of their participation in the study. Hence, all the participants were given a clear idea of what the study was about through the proposal (sent prior to the interview) and how the information they were sharing would be used in the study. The interview was set based on their convenience and preferred method of communication. Nonetheless, the participants were given the opportunity to make corrections of the data before use and further to that, a completed version of the study was also sent to them. Through the completed version they were able to see how their information was presented in the study and further analysed with the theories and research questions that led to conclude the study. Hence, the study was completed in good faith without causing any inconvenience to any participants.

4. Empirical Findings

This chapter presents the empirical findings from the case study. It begins with an introduction to the case study. This is followed by a focus on the case company's BM. The company's vision and strategies to adapt CE is presented under Business Model Innovation. A critical reflection of adapting CE is presented at the end of the chapter. All the information is collected through semi-structured interviews with the participants mentioned under section 3.4.1 (Table 3) and reflections from reports published by governmental and non-governmental institutions directed towards the plastic industry are also included.

4.1 Introduction to the case study

As mentioned in section 3.3.2, the study focused on a case company which is the unit of analysis referred in the research question. Additionally, to gain deeper insight into specific issues addressed by the case company, further snowball sampling was conducted to include other participants who could comment on those issues. Therefore, this section introduces all the participating organizations and government agency that has participated in this study. Section 4.1.1 introduces the case company (Trioplast Industries AB), 4.1.2 Essity (customer of Trioplast) and 4.1.3 The Swedish Environmental Protection Agency (government agency responsible for environmental policies in Sweden). The perspectives of all participants are discussed in the upcoming sections.

4.1.1. Trioplast Industries AB

Trioplast AB was founded by Vilhelm Larsson in 1965 in Smålandsstenar. Since then it has been a family business for almost 20years. Later, in 1984, the company was solely owned by Bo Larsson and the new parent company, Trioplast Industries AB was founded. However, as of 2018, the company was sold to Altor Fund IV. From the very early years of business, the company has continued to expand within the plastic packaging industry through the acquisition of different companies and factories. Today the group consists of 15 companies altogether. These expansions have enhanced the group to become global from a local actor. Today the company headquarter is located in Smålandsstenar (Sweden) with 10 production units scattered around Sweden, Denmark, and France. Among them, 7 units are in Sweden, 1 in Denmark and 2 in France. Moreover, within their production units they have 2 units for recycling and one of their divisions has lamination with non-woven capability. Most of their factories have printing capability and some additional converting such as bag converting. Today the company consists of over 1000 employees with a turnover of 43000 million (Trioplast 2019d). They sell their products across various locations in the global market. According to statistical figures, in 2018 their sales were split between Sweden (26%), Europe (67%) and other countries (7%)

The company's vision is driven by its customer's present and future needs. Thus, they constantly strive to be the first choice in polyethylene film solutions. To achieve this vision, their mission statement emphasizes its customers and products. It includes i) Focus on core markets with their selected core products ii) Become a natural part of their consumers competitiveness iii) Offer sustainable premium products and solutions with the highest possible service level vi) Their offerings are guaranteed through manufacturing and procuring world-class raw materials and by having the industry's best value-based sales and marketing by far. Through their expert knowledge of creating efficient, sustainable and customized products differentiate them from their competitors.

4.1.2 Essity

Essity was previously part of SCA hygiene until 2017 when it was listed on Nasdaq Stockholm (Essity 2019b). Today it is a global leading hygiene and health company with 47,000 employees and headquarters in Stockholm, Sweden (Essity 2019a). Their net sales in 2018 were approximately SEK 118.5 billion (EUR 11.6 billion) (ibid.). The company sells hygiene and health products in around 150 countries under brands like TENA and Tork as well as others. like JOBST, Leukoplast, Libero, Libresse, and Zewa. Their products are divided into 6 categories of Baby Care, Consumer Tissue, Feminine care, Incontinence Care, Medical Solutions and Professional Hygiene Solutions. Their mission is to sustainably develop, produce and market and sell first-class products in hygiene and health.

4.1.3. Swedish Environmental Protection Agency/ Naturvårdsverket

The Swedish Environmental Protection Agency (EPA) also known as Naturvårdsverket (in Swedish), was founded in 1967. It is a public agency that is responsible for developing and implementing various environmental policies on behalf of the Swedish government (Naturvårdsverket 2019a). The work of the agency is funded through government grants, in which part of the funding is used for running of the agency and the rest for various environmental issues including environmental research and environmental monitoring (ibid.). Today the agency has five business departments and four management and support departments (Naturvårdsverket 2019c). They are; *climate department, sustainability department, nature department, policy development department and environmental analysis department, director general's office, administrative department, communication department and human resource* department. The agency's mission is to promote and coordinate good living environment as well as demonstrate opportunities for sustainable development (ibid.). The activities of the agency are regulated in an instruction decided by the Swedish government i.e. each year their goals, requirements and financial framework is declared in a regulatory letter (Naturvårdsverket 2019a). Moreover, in relation to the plastic packaging industry the agency works with actors from within the industry to investigate and monitor the environmental effects towards the use of plastics. Their idea is to provide increased knowledge to the actors through dialogue, seminars and workshops (Naturvårdsverket 2019b).

As mentioned earlier that the work of EPA is to investigate environmental issues on behalf of the Swedish government. Therefore, during the last five years the following action plan on plastics and legislative measures were agreed and are being implemented:

1. *EU Action Plan on Circular Economy* which also addresses plastics
2. *EU Plastics Strategy* legislation in the form of a proposal for a Directive on Single-use of plastics (May 2018) – action plan to ban single-use plastic when alternatives are readily available
3. *Marine Strategy Framework Directive* – an action plan for combating marine littering.
4. *Nation policies* on plastics within the Member States of the EU – Sweden, for example, uses different instruments like ban/restrictions/economic & fiscal instruments like charges, extended producer responsibility)

Based on the introduction to the case study, the next section will demonstrate the BM of Trioplast as well as reflect on issues familiar to other contributors to the study.

4.2 Business Model of Trioplast Industries AB

BM defined as a representation of the elements in an organization is reflected as the analytical framework of this study. Hence as discussed in chapter 2 about the different value categories proposed by Richardson (2008), the interview with the Sustainability Director of Trioplast has been broken down accordingly. This was done to understand the company's existing strategies in its BM. It is also used for later reference to visualize how the company is adapting to CE in addition to further innovation strategies.

Value Proposition
The company started the business by implementing ideas of producing packaging materials using the then-new material polyethylene film. While the company was growing it continued producing within its polyethylene film base but broadened its product range. Hence, creating product divisions. Today, the company has 4 product divisions (Trioplast 2019a). They are; *stretch film, industrial film, hygiene film/ consumer packaging* and *carrier bags.* Their customer base is mainly comprised of business entities which indicates they follow a B2B BM (business to business). A description of their offerings and supplying industries is illustrated in Table 4.

Table 4 Offerings and users of Trioplast Ind. AB (own processing)

Division	Products	Users
Stretch Film	Pallet stretch film, refuse bag, agricultural film, construction, and building film.	Agricultural industry, construction and industrial manufacturers
Industrial Packaging	FFS film (Form Fill Seal), stretch hoods, shrink film.	Industrial manufacturer and processors, forest industry, construction, and retailers of meat, fish and other food products.
Hygiene film/ customer packaging	Polyethylene films and laminates used as barriers in baby diapers, incontinence diapers, and surgical items	Hygiene and food industry
Carrier bags	Carrier bags and sacks	Food retailers and companies that sell consumer durables

Based on their current position in the plastic packaging sector, the Sustainability Director of Trioplast addresses the company's competitive advantage as being *reliable*, *long-term* and an *active* player in the market. She mentioned that these are the features that attract their customers and exists within their business activities. Therefore, she added that their engagements and close relationship with customers through open dialogues make them reliable to work with. Moreover, as a long-term player, the company is focused on future goals of becoming an independent cutting-edge company. She added that they are also constantly involved in various engagements that lead to product development in different segments in the long run. Finally, as an active player, she explained that the company is very much open towards adapting new innovative approaches to entail improvements for their customers and surroundings. Their objective of innovation is not only within its products but also in the way they market and sell their packaging solutions.

These features play an important role to promote their competitive advantage against their competitors and in an industry, which has several producers with similar offerings. These goals

clearly identify their objectives on how they do business and reflect on their relationship with their customers and other actors of the plastic packaging sector.

Value creation and delivery
In relation to value creation and delivery, The Sustainability Director of Trioplast stated that they have been taking initiatives to ensure that their production process is contributing towards a sustainable future. Currently, within their production process, they are trying to develop in-house recycling technology based on their knowledge and experience in this area. The company also ensures that all its internal wastes are utilized internally as well as product that is not delivered to its customers (Trioplast 2019c).

In application, the Sustainability Director explained that currently a majority of their final products can be recycled. For example, their product 'bale wrap' has a functional life of more than 2 years and their medical laminates have a shelf life after conversion of 5yrs. After production, many of their products are sold in roll formats on pallets as they sell to businesses for further use. Some of their products are also packed in special packaging upon request from their customers. Afterward, they are delivered to customers. She also added that their plants mainly utilize green electricity and they further plan to reduce their energy consumption. Although energy consumption is not significant to the cost of the final product, but often customers have requirements about energy consumption. For example, during the interview with the Lead Product Developer of Essity, he mentioned that their company also ensures the presence of renewable energy for production of their plastic and paper packaging. They are working in collaboration with their suppliers towards their goal of 2025 of ensuring renewable materials and energy in their paper and plastic packaging.

In addition to their role as a producer, the Sustainability Director also specified they are active in a number of extended producers' responsibility (EPR). According to Leal Filho *et al.* (2019), EPR is an environmental policy which extends the producers' responsibility to the end of life phase of their product like take-back, recycle or final disposal. In Sweden there is legislated producers' responsibility for eight different product groups including plastic packaging (Naturvårdsverket 2019d). This is one of the efficient waste management policies that has helped EU to collect and recycle waste that also contains plastics (Leal Filho *et al.* 2019). As for Trioplast, their carrier bag segment lies under the EPR Directive. They also participate in voluntary EPR for agricultural plastics.

EPR is also an important area for the Swedish Environmental Protection Agency (EPA). During an interview with the Advisor from the Recycling Unit, she emphasized the importance of EPR directive for producers of the listed materials. As stated in the EU Commission (2019), an EPR is an approach that ensures that the producers would financially contribute to the cost of waste management. It is also considered a better design would help to reduce costs. The motive behind EPR is to make producers be obligated to take responsibility both operational or financial at the end of life phase of their products (EU Commission 2019). This scheme plays an important part in the waste management required via EU directives on waste and in national legislation (ibid.).

The Advisor from the Swedish EPA further explained about the eligibility of being considered as a producer in Sweden. She mentioned that anyone who places packaging products or newspaper in the Swedish market is defined as a producer and has a producer responsibility. The purpose of the EPR scheme according to the Swedish EPA is to ensure that the packaging wastes are reduced by a) they are produced in a way that their volume and weight are limited to maintain good level of safety and hygiene b) the packaging is only used when necessary. She further added that the EPR scheme is also designed to limit the harm to the environment of the

materials and substances in packaging as well as ensure proper disposal of packaging and achieve given material targets.

In relation to the role of the Swedish EPA regarding EPR directive, she added that the agency is responsible for compiling information from producers and to evaluate and enforce producer's compliance with the EPR provisions. At present, the producers are required to provide information on the amount of packaging supplied to the Swedish market and on the collection, recycling and material utilization of the packaging. Producers are also urged to join a collection system or merge with so-called material companies and through such provide appropriate collection systems. She emphasized that it is mainly the producer who is responsible for fulfilling the obligations, even if they instruct another party to carry out the collection and reporting. Although, the producer can agree with someone else to perform the reporting, but it is still the producer who is responsible for this being done and that the information is correct. Afterward, the collection system will collect the information from the producers and report them to the Swedish EPA. Hence, the Swedish data on producer responsibility is then reported by the Swedish EPA to the EU-commission.

She also discussed that the regulations on producers' responsibility are subject to changes from 1st January 2021 and 2022. For example, from 2021 the producer is obliged to register with the Swedish EPA and provide further information such as how it meets the requirements of the regulation to provide a collection system for when the packaging becomes waste. Alternatively, the producer can show that someone who is authorized to operate a collection system has undertaken to take care of the packaging when it becomes waste. On the other hand, from the year 2022, she explained that it becomes obligatory for producers to report to Swedish EPA no later than March 31st. The producers are required to provide information on the amount of packaging that has been provided or released in the Swedish market during the previous calendar year (i.e 2021). Although, it is normal that a producer agrees with someone else to perform the reporting, but it is still the producer who is responsible for this being done and that the information is correct. However, if delayed in providing information, the producer will be required to pay an environmental sanction fee of SEK 10,000.

In addition to reporting, producers, once they are member of a collection system such as FTI (Svenska Förpacknings och Tidningsinsamlingen AB), are also required to pay packaging fees in relation to the amount of packaging material their operations generate (fti 2019a). This fee is calculated based on the weight and differs between the different types of materials as well as its purpose of packaging (household or business) (fti 2019b). Thus, the funding for the collection of packaging and newspaper is Sweden is partly carried out from the contributions of the producer's fees as well as through the sale of collected and sorted materials. Hence, according to the EU Commission (2018b), the financial resources that are collected can also be used to raise public awareness about correct waste management and ensure high quality through separate collection of wastes. This points to the importance of the EPR directive. Therefore, the companies involved in this study (Trioplast and Essity) have also confirmed that also make contributions to the EPR directives through the payment of fees for their products

Value capture

Value capture focuses on revenue streams and cost (Richardson 2008). According to the Sustainability Director, the company experiences an uneven revenue stream across all its product divisions. She mentioned that this depends on various factors like; the demand of the customers, type of product (whether customized or general) or size of the value chain. Therefore, a brief idea was also presented to enable a clear understanding. The profit margins

are categorized as high, medium and low instead of numeric figures. Therefore, a description of each product division with its profit margin is given below:

Division Stretch Film: After the production of products in this segment, they reach the distributors, who then re-distributes the products among retailers/wholesalers. Afterward, the products are sold to the final consumer. Profit margins in this segment tend to be high.
Producer→ distributor→retailers/wholesalers→ final consumer = high profits

Division Industrial Packaging: Most products in this segment are customized based on the specification and demand of the customers. Due to this reason, the profit margin is medium.
Producer→ Customer → final consumer = medium profits

Division Hygiene films/ Consumer Packaging: These products are sold to companies who use the products as packaging material to pack their own products before selling to the final consumers. Since the final product is a combination of products, the profit margin is low.
Producer→Customer→ final consumer = low profits

Discussions about cost were mainly focused on their current offerings. At present, she mentioned that it is cheaper to use recycled materials in production but often an increase in demand for good fractions of recycled polyethylene tends to increase the overall price. However, she added that since their material is the core of their production process, the final price is usually affected by the price of the materials used for production. Hence to ensure a reasonable price, most sustainable products are a combination of GPE (Green Polyethylene) and rPE (recycle Polyethylene).

4.3 Business model innovation

Before understanding how the company is using BMI strategies in their existing BM, it is important to know the reason which directed them towards CE. The Sustainability Director of Trioplast, mentioned 'plastic packaging as a very debatable and controversial topic in today's time due to its negative externalities'. Therefore, to ensure a sustainable future, the intention is to adapt innovation-oriented strategies in their BM to deliver more sustainable packaging products for their customers. Based on the value categories of BM discussed in section 2.2, circular strategies of Trioplast are elaborated as follows.

Value Proposition
The Sustainability Director explained that although they have planned to make additions of new features within their existing BM, but the company will continue producing and selling their current offerings. Their objective in the future is to be an integral part of their customers' green journey from the beginning as well as produce *sustainable* superior products in combination with strategic support from their end. The concept of *sustainable plastic packaging* was also discussed with an Expert in Sustainable use of plastic from the Swedish EPA. She mentioned a few points that they consider when they address issues of sustainable plastic. She explained that the plastic needs to have a value that does not unnecessarily consume or end up in the wild. It can be reused, recycled and turned into new goods. Free of hazardous substances and must be made from raw materials that have low environmental impact (Naturvårdsverket 2019b). It also includes that the plastic must consist of renewable or recycled raw materials (ibid.). Given the idea about sustainable plastic, the company has similar vision and is working towards achieving it as mentioned by the Sustainability Director of Trioplast. Moreover, she added that in accordance with their existing vision, the company also intends to be more transparent about its sustainable product portfolio. By transparent she emphasized that 'we plan to adopt more

transparent understanding of sustainable product development from both ours as well as customers side'. For example, with some of their customers' special meetings are held with broader teams to ensure that there is a clear understanding of sustainable product development from both sides. The need to be more transparent was further emphasized by their customer Essity, that as Trioplast's customer they expect the producer to be more open about complying regulations in their production process. For example, display clear document of statement complying with the REACH guidelines or following the safety assessment sheet (SDH) which states the use of certain chemicals in the production process. This would help customers such as Essity to have clear knowledge about the material and chemical contents used in the production process.

According to Bocken, Schuitc, and Kraaijenhagen (2018), CE requires stakeholders' collaboration for maximizing value of offerings. Similarly, the Sustainability Director added that the company engages with several actors within its value chain to partner in sustainable projects and organizations. For example, with recycling company (example Stena Recycling), initiatives and research organizations such as RISE, Chalmers KTH, and ISO-standardisation committee. ISO is an important engagement for them as they help to develop new standards, testing the developed methods and develop product safety validations standard (Trioplast 2019c). Troplast's management systems are also certified under the following certification schemes; ISO 9001 for quality improvement, ISO 14001 for environmental work, ISO 50001 for energy management and ISO 22000 for food safety (Svensk Certifiering 2019; Trioplast 2019b). Moreover, to strengthen sustainability initiatives within the organization, they also plan to conduct frequent sustainability workshops which are also part of their sales offer. In relation to engagements with actors within the industry the Director also emphasized that they have indirect involvement with the Swedish Environmental Protection Agency (EPA) through funding of standardisation groups within environmental aspects for plastics and the projects in connection with that. The company also participates in projects initiated by Swedish EPA concerning their expertise in those areas.

The company intends to increase its sustainability profile with a partial change in their value proposition by not only selling their sustainable products but also including services for its customers. Ritzén & Sandström (2017) suggest that extending the value propositions through inclusion of new services in addition to existing offerings can also lead to sustainable innovations. The Sustainability Director added that these services include Life Cycle Assessments (LCA) of products, regulatory updates on plastics (example from EU Commission) and providing strategic support to customers to help them develop and change to a more sustainable product portfolio. She also mentioned that by becoming a product and service-based system for their customers, they will be able to ensure that their customers are choosing the right packaging based on their needs. It will also help the customers take part in product design with the producer as well as have a good understanding of the regulations issued by the EU Commission on the plastic packaging producers.

Value creation and delivery

In relation to value creation and delivery, the Sustainability Director explained that the process of producing their products would remain the same. This is because their technology and material compositions are their core values. So, to achieve their vision of sustainable product portfolio, they intend to work further on their material and technology. Like for example, she elaborated that their carrier bags were produced using minimal Post-Consumer Recycled (PCR) materials for more than 7 years now. However, last year they have decided to further increase the PCR material content up to 80% to manufacture their carrier bags. This can be indicated as an attempt to encourage more usage of PCR in their products. However, the usage of PCR as

material content has varying perspectives from the actors involved in their value chain. For example, traceability of PCR contents is an important area for customers such as Essity. This has been emphasized by the Lead Product Developer, Essity as 'we need to ensure that the PCR contents used in the production process are safe from contamination since our product line focuses within the health and hygiene segment. This is a challenge we face in relation to traceability of PCR use'. On the other hand, he also mentioned that irrespective of the challenges towards traceability of PCR, the company is actively engaged to meet goals for PCR use in their plastic packaging. Currently, as a member of Ellen MacArthur Foundation the company is committed to meet the goal of using 25% PCR in their plastic packaging by 2025. This in addition to their own commitment to ensure 85% renewable and recycled materials in both paper and plastic packaging during the same period. Therefore, this shows that although there are challenges but companies such as Essity are committed to collaborate and find solution to overcome issues related to PCR. Moreover, despite the current challenges of PCR use, the Sustainability Director of Trioplast emphasized that they will continue to engage in performing various research projects to design products that could include more PCR contents. These projects are financed by state funding with a combination of funding from their end as well. But the whole value chain is included in these projects to strengthen collaboration.

In relation to product design, the Sustainability Director mentioned that the company is currently trying to configure a possible solution to incorporate more usage of recycled content in their products. This is an important segment of their production process and product design. She emphasized that a preliminary proposal is maybe to put more recycled material at the center and fill it up with virgin materials to sustain quality standards. Thus, the goal is to put more PCR materials in their products. Currently, they are selling products with 25% PCR in their stretch films. On the other hand, she also mentioned that their core technology would remain the same. But they plan to make investments in technology for measuring chemical composition. The aim of this investment is to be able to test the chemical composition in the recycled materials to ensure product safety. The issue of chemical composition in recycled material may also act as a barrier in some circumstances. As addressed by the EU Commission (2018) that incidental contamination or lack of information about chemical composition within the materials may act as a barrier when plastics are discarded as wastes. Therefore, these uncertainties can also reflect in the demand for recycled plastics when used in products with specific safety requirements (EU Commission 2018). Similar issues were also addressed by Lead Product Developer, Essity when he mentioned the issue of transparency from the producers' end.

Value capture

Currently, there is no approximate forecast of profit margins and expected cost for their sustainable product portfolio. This is because the demand for sustainable packaging has just started to grow. The company has been ahead of market requests on developing environmentally friendly products with advanced technology and material content.

As mentioned earlier, they intend to make investments for advanced technology and further research and development within their field. In relation to revenue, their goal is to increase their revenue by being at the forefront with their sustainable offer as well as experience changes in the current uneven distribution of profits among its product divisions.

4.4 Challenges of adapting to a circular economy

While Trioplast is taking various steps to ensure circularity through investments, engagements and collaborations, the company faces several challenges to meet their vision of ensuring

sustainability within their production process. For example, the issue of *traceability* as addressed previously in section 4.3 and is seen as a problem for both the producer and the consumer. Therefore, lack of traceability raises issues of product safety such as the risk of contaminated PCR content as pointed out by the Lead Product Developer, Essity. This issue was again raised during an interview with an Expert in sustainable plastic use (Swedish EPA), who explained the problem and gave reference as to how the problem may be dealt with in future. She mentioned that when doing high-value large scale recycling, one of the problems faced by producers is the different composition of the collected plastic materials. Thus, often small-scale producers who lack resources for testing and acquiring technical knowledge about the materials face difficulties to obtain 'clean' material flows required for high-quality recycling. Therefore, the report of MiW and IMPEL (2019), pointed out to a solution stating that supplier of materials needs to provide certain hazardous substances to the European Chemicals Agency (ECHA). This would help the ECHA to set up databases that can be used by the waste treatment operators which in turn can contribute towards traceability of recycled contents. The Sustainability Director of Trioplast also gave an example of how traceability of recycled materials could help them with efficient utilization. She mentioned that 'we have a supplier who only collects and recycles pallet stretch films. This is very helpful for us because stretch films usually come in with known material composition. So, when recycled we can determine how and where we can use the recycled content in the product design and the manufacturing process'. The EU Commission (2018) also addressed this issue in relation to the number of separate collection and sorting systems. It mentioned that it was important to introduce more collection and sorting systems to avoid contamination and retain high safety standards for recycled materials (EU Commission 2018)

There are also challenges in relation to the absence of regulations and *standardization* of recycled products. This is a problem that has been addressed by Trioplast and other actors. For example, the Sustainability Director of Trioplast mentioned that standardization does not only affect the acceptance rate of products but also the quality of the products. She added 'that since recycled materials are a mix of different types and grades of plastic, recycled content does not guarantee as a reliable source of raw material'. This makes usage of recycled materials in products an unattractive choice. Moreover, this issue was also discussed with an Expert in Sustainable use of plastic from Swedish EPA. She explained that plastic comes in different types and they require separate recycling in order to produce good standard of the plastic feedstock again. Hence, a mixture of different types of plastics can result in low-value applications. This issue was further addressed by Trioplast's customer Essity, that the expectation from their producers is to ensure standardization of PCR quality, particularly the grade of PCR used in production of plastic packaging. The Lead Product Developer of Essity mentioned that 'there is certainly a lack of alignment with the grade required and the one used for production. Hence it is important that the PCR used for production should be of a standard grade'. The EU Commission (2018), also addressed this issue of standardization and mentioned the same barriers as have been pointed out by Trioplast but also added that often these recycled materials are not available when required in high-volume with specific safety requirements. A similar issue was again pointed out by the Lead Product Developer of Essity about the quantity of packaging material. He mentioned that 'we need access to a large volume of LDPE flexible packaging that has a good grade (quality-wise)'. However, this is not always available as the quality of these packaging varies due to factors like its material content. On the other hand, the EU Commission (2018) acknowledged this issue and is working with the European Committee to overcome the problem of standardization and develop quality standards for sorted plastic waste and recycled plastics in the long run. The uptake of Swedish EPA in this matter is to improve collection and sorting systems as different waste flow require different technologies to process. Therefore, by citing MiW & IMPEL (2019) an Expert from the Swedish EPA

mentioned that a key measure that could be used is the setting up of standards for sorting facilities. This could be in the form of a certification of sorting facilities that achieve a minimum quality standard (MiW & IMPEL 2019)

Another challenge that was pointed out by the Sustainability Director of Trioplast was the lack of co-operation within the industry players as well as the regulatory bodies. She mentioned that 'there must be cooperation between the industry actors to ensure plastic production is produced with less environmental impacts'. For example, she mentioned that the research-based on developments of plastic products within the EU was not coordinated and most actors within the industry work independently. Therefore, more cooperation and sharing of the research results are required among the industry players and research institutes. She also emphasized that 'this would also save money and time from doing the same research independently as results are usually similar'. Hence, sharing results would help the industry to look forward to performing research on areas that have yet not been explored for sustainable plastic production. Although there are available directives by the EU Commission on Circular Economy yet there are still many grey areas for research within the industry she mentioned. A different view was addressed by the Lead Product Developer of Essity in relation to collaboration. He mentioned that their company would collaborate in more commitments and alignments towards any upcoming regulations and engagements. He added that they intend to work more closely with Ellen MacArthur Foundation who has a good influence on circular economy within the EU. The company also hopes that through such influence, they hope to gain better access to materials with standard quality and reliability in future. Although, the view of Trioplast and Essity varies as one mention about R&D while the other addresses about adapting upcoming regulations. Therefore, the important aspect here is that both companies are addressing the same concept of collaboration but from different perspectives. Therefore, perhaps more open dialogues between the actors could help them to be on the same path and work closely to achieve their vision of CE. Collaboration is important to foster CE, as according to Bocken *et al.* (2014) as value is no longer created independently but rather through collaborations between actors within the same industry.

5. Analysis

This chapter will present the empirical findings from chapter 4 by organizing them according to the conceptual framework in order to answer the research questions. The chapter begins by focusing on the current and planned strategies to incorporate CE visions in the case company's BM. This is followed by a critical reflection on the company's journey in adapting CE. The chapter ends with a summary of the analysis using a table and a figure to foster clear understanding of the findings and its relevance to the research question.

The conceptual framework of the study was built to critically reflect on how CE implementation takes place in a BM. Hence, to understand this concept, the research question was designed focusing on a single producer in the plastic packaging sector. The research questions are as follows:

1. *What is the vision and strategy for adopting a circular economy in the company's BM?*

2. *What are the challenges for adapting to a circular economy in BMs in the plastic packaging industry?*

5.1 Strategies and vision for circular economy

In order to answer the first research question, BM is used as a unit of analysis. The strategies of the case company were divided among the three value categories (value proposition, value creation, and delivery and value capture) of the BM. These value categories have been previously proposed and defined by Richardson (2008) and a detail illustration of them is presented in section 2.2. Through semi-structured interview with the case company, their customer and environmental agency, an overview of the company's current and planned strategies were gathered. The case company's customer and the environmental agency contributed to obtaining detail insights on the challenges and other similar issues that were also addressed by the case company. The analysis will further explain how the case company intends to meet its vision of moving to CE through their innovative strategies. Hence the CE principles of slow, close and narrow loops will be viewed as a vision to achieve from the case company's perspective. Thus, the strategies being used or planned to be adopted in case of each value category is explained below:

5.1.1. Value proposition

Value proposition within a BM focuses on the offerings of the company, who they are made for and why people should buy the product. These have been explained as offerings, target customers and competitive strategy of the business by Richardson (2008). Therefore, the findings from the interview with the Sustainability Director reveal that their current value proposition consists of 4 different product divisions; stretch film, industrial film, hygiene film/ consumer packaging and carrier bags (also illustrated in table 4). Hence, in order to adapt CE principles, the company intends to partially change its value proposition by adding services in addition to its current offerings. Services as such would include, Life-cycle Assessment (LCA) of products, regulatory updates on plastics (example from EU Commission) and providing strategic support in customer's decision making to enable sustainable choices. The Sustainability Director, Trioplast explained that the goal behind the service offerings is to ensure that the customers are choosing the right packaging according to their needs. Also, through services such as LCA, the customers will be able to gain deeper knowledge about the

useful life of their product. Moreover, regulatory updates will also help them to be updated about the current plastic production and use regulations. These measures from the findings also reveal, that when producers offer services to develop products according to the customer's needs, the product is likely to have an extended life as well as serve its purpose. Bocken et al. (2016), explains this as 'slowing the loop' meaning that through service loops and careful product design it is possible to extend product life as well as its utilization period. Slowing the loop is regarded as one of the circular principles as it helps to slow the flow of materials in a value chain (Bocken et al. 2016). The idea is to ensure that consumers are able to use products for a longer time period than its existing utilization period, leading to lower production of newer products and use of materials.

On the other hand, the findings also indicate progressive engagements of Trioplast with other actors of the industry to partner in sustainable projects and organizations. Organization as such includes RISE, Chalmers KTH, ISO-standardisation committee and Stena Recycling company. These engagements point towards enhanced collaboration between actors involved in the same industry and can help to foster implementation of CE in the plastic value chain. This is also important because to ensure successful CE implementation, it is necessary that all the actors are involved in the process through close relationships and collaborations as well as create a network-centric environment within the industry (Bocken et al. 2014).

5.1.2. Value creation and delivery

Value creation and delivery is very closely linked to the value proposition. This is because value creation is focused on how the offerings are produced including the key activities, materials, technology and channels used for production (Richardson 2008). According to the Sustainability Director, Trioplast, the use of recycled materials (PCR) has been part of their material content for quite some time now. She added that currently their carrier bags are produced using 80% PCR in ratio to virgin material content as well as recycled their internal waste. Moreover, the findings showed that for Trioplast, their material and technology are the core values of their production process. Hence, using recycled materials is an important part of their product design. This has led the company to work towards configuring product design in which more PCR content can be accommodated without compromising the quality. Although, barriers like standardization and traceability of PCR have been hindering its use. This barrier was also found from the perspective of their customer, Essity who requires large volume of LDPE plastic packaging which must be contamination free. Also, the Swedish EPA and reports from the EU Commission has addressed this issue and plans to resolve this in the long run. However, irrespective of the hinders, the company is continuing to invest in technology which would enable them to test chemical content in recycled materials, By testing the chemical content the company would be able to ensure that the recycled contents are safe for use in production. This would also help them to be more transparent about the safety of their material content and production process to their customers. Hence, the findings reflect, that the interviewed customer, Essity have similar expectations from Trioplast. Essity, as an independent company and a member of Ellen MacArthur Foundation is also required to ensure use of 25% PCR in their plastic packaging by 2025. They also have their own goal of using 85% renewable and recycled materials in both paper and plastic packaging during the same period. These targets reflect that using recycled materials for production is not only a need but a requirement from multiple actors to lead towards CE and sustainability.

The concept of using recycled materials is quite important in CE because according to Bocken *et al.* (2016), it helps to close and narrow the material loop. This means that when recycled materials from the post-use phase are reused in production of new productions, it enables a

circular flow of materials as well as encourage less use of resources. Moreover, the increased attention towards using recycled content has also promoted a greater understanding of recycling and other waste management systems (Bocken et al. 2016). For example, it was stated in the findings by the advisor from the Swedish EPA that producers of 8 different material group including plastic packaging are required to follow the EPR directive. The EPR is a smart tool to foster efficient waste management and producers obligated under this directive needs to pay a certain amount of fees to foster better waste management of their products. Therefore, the EPR extends the responsibility of the producers after-sales and post-use phase (Naturvårdsverket 2019d). Again, through these engagements, the findings reflect on greater collaboration between the actors of the plastics value chain.

5.1.3 Value capture

According to Richardson (2008), value capture focuses on profits (revenue model) and cost (economic model). Therefore, the findings show that at present Trioplast experiences an uneven profit ratio across its 4 product divisions. According to the Sustainability Director of Trioplast, there are varying factors across the product divisions that lead to uneven profit margins. For example; demand of the customers, type of product (whether customized or general) and the size of the value chain. These factors lead the company to experience high, medium or low profits from their offerings. Although with the implementation of CE principles, the company hopes to overcome its uneven profit margins from its products. Moreover, with the inclusion of services, the company may also benefit from additional revenue streams. Therefore, one of the vital reasons to move towards CE is that it also opens new markets and opportunities for companies to explore and do business while enjoying additional revenue streams (Bocken et al. 2014). On the other hand, in relation to cost, the findings show that the current cost structure tends to increase when greater fraction of recycled materials are used hence switching to virgin materials is often a cost-effective solution. Although, the company is making investments in technology and research to overcome barriers related to recycled materials and reduce cost. In relation to cost structure after implementation of planned strategies there is no projection as the demand for Trioplast's sustainable product portfolio just beginning.

5.2 Challenges of adapting to a circular economy

The second research question critically reflects on the implementation of a circular economy in the plastic packaging sector. The challenges have mainly been addressed by the case company Trioplast. Afterward, a similar discussion on these issues was held with actors from the plastic industry. The additional discussions helped to see the challenges from a broader perspective and have a clear understanding of the hinders. The findings show that the challenges Trioplast faced were known to other actors and reports from the EU Commission and other institutions also acknowledged them.

According to the Sustainability Director (Trioplast), the company faces certain challenges in the case of recycled materials. They are viewed as *traceability* and *standardization* of PCR. The issue of traceability was explained by an expert from Swedish EPA, that the problem arises from the collection of different compositions of plastic and recycling them together makes it difficult to obtain a clean material flow. This is also a hinder when producers want to produce high-quality products using recycled materials. A similar view was also expressed by Trioplast's customer Essity. As a company selling multiple types of hygiene and medical products, they need to be assured that the packaging materials are contamination free. Hence without the knowledge of traceability of the recycled materials there is always a risk of contamination that may affect the products inside the packaging. According to Trioplast, it is

important to know about the origins of the recycled contents as it helps them in product design. To understand this issue more clearly the Sustainability Director gave an example of their engagement with a supplier who only collects and recycles pallet stretch films. As a producer of stretch films, they are already aware of the material composition of stretch films. Hence, when using the recycled material from the supplier they (Trioplast) are able to determine how and where the material can be used in product design as well as in manufacturing process. Further to the issue of traceability, the EU Commission (2018) also addressed this issue and stated the importance of the introduction of more collection and sorting systems to combat this barrier.

Standardization of recycled content is also another problem similar to traceability. As was determined from the empirical findings that without traceability there are certain risks that customers are not willing to take. Similarly, without standard grades of recycled material, the final quality of the product is also affected leading to lower acceptance. This issue was also explained by the Expert from Swedish EPA, that when different grades of plastic are recycled together it usually results in a low-grade application. Hence as plastics come in different chemical compositions, they require separate recycling in order to produce good quality plastic feedstock again. The Sustainability Director of Trioplast further added that the absence of standardization raises questions to reliability of recycled materials when determining material composition for manufacturing products. Trioplast's customer Essity also cited the same issue in reference to non-reliability of recycled materials as their priority is to ensure that their products are packed using safe and clean plastic packaging. Therefore, the issue of traceability and standardization impacts the use of recycled materials as well as proves a barrier for the implementation of the closed-loop principle described by Bocken et al. (2016).

From an industry perspective, the Sustainability Director (Trioplast) also shared another challenge in relation to collaboration between actors. She mentioned the actors conducting independent research on same issues which has led to same results. Therefore, more collaboration by sharing results could save time and money as well as help the industry actors to focus on areas that require more research and development. The issue of collaboration was also mentioned by Trioplast's customer Essity, where the company showed interest in their engagements with institutions such as Ellen MacArthur Foundation (EMF) and hoped that through their (EMF) influence issues related to traceability and standardization would be resolved in the long run. Collaboration is an important feature of CE. Hence, in order to adapt circular principles, it is important that all actors work closely and create a network-centric environment (Bocken et al. 2014).

Concluding the analysis, to foster a clear understanding of the strategies and vision to adopt a circular economy, the next section presents a summary of the analysis. The section includes a table to highlight the current and innovation strategies of Trioplast and continuing with figure to explain how the strategies adapted may coordinate to achieve the vision of circular economy for Trioplast.

5.3 Summary of the analysis

In reference to the findings from sections 5.1 and 5.2, a primary illustration of the innovations in Trioplast's BM is shown in Table 5 below. The table illustrates the 3 value categories (value proposition, value creation and delivery and value capture) and highlights the current strategies (existing BM) and their innovation strategies (business model innovation). The table has been created to summarize the areas in which innovations are considered. Hence excluding the factors that remain same. For example; there is no change in the target customer segment of

Trioplast hence the table does not mention 'customer segment' under value proposition. The changes in the value categories give a preliminary idea as to how the company is transforming its existing BM into a CBM. Although, the Sustainability Director, Trioplast has mentioned that the company will continue to do business within its existing structure while making innovations towards sustainability which in the long run may evolve to a CBM.

Table 5: Summary of analytical findings (own processing)

Value categories		Existing strategies	Innovation strategies
Value proposition	Offering	Produce plastic packaging	Sell production in addition to services
	Competitive Strategy	Reliable, long-term and active	Include services like LCA, regulation update in addition to products sales
Value creation & delivery	Production Process	Recycle internal waste	Design products with recycled contents, reduce chemical usage
Value Capture	Income	Profits across divisions are uneven	Change in uneven revenue streams in their product divisions
	Cost	Recycled materials gets expensive when used in bulk	No data available as demand is growing

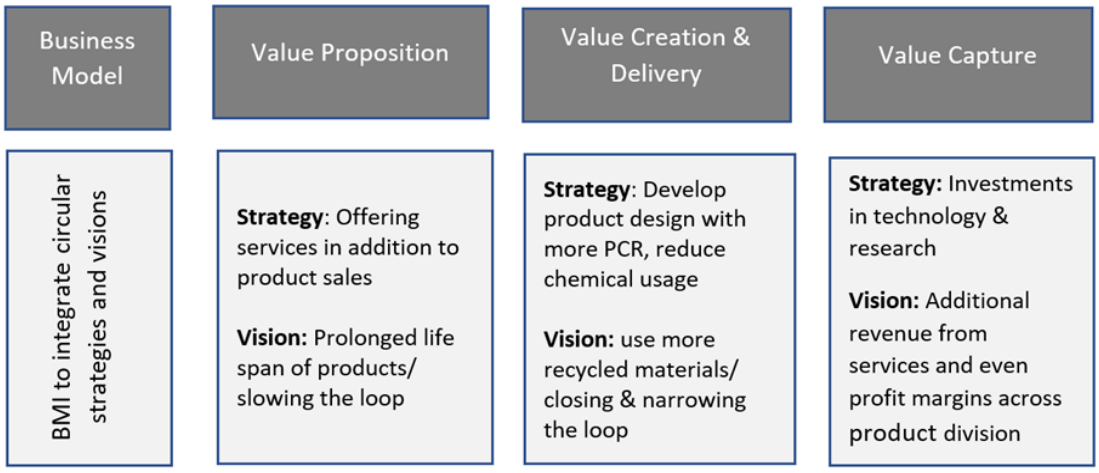

Figure 6: Strategies and visions to adapt CE principles (own processing)

In reference to the first research question, the vision to adapt circular strategies through BMI is to be able to create a CBM. According to Nußholz (2018), businesses move towards CBM with the vision of adapting circular strategies such as prolonged useful life and closed material loop in addition to the existing economic value of their products. In relation to implementation of circular strategies in a firm's BM, Stål and Corvellec (2018) emphasize that CBMs can be considered as a template to guide businesses on how they should align themselves with the CE strategies. Moreover, Geissdoerfer *et al.* (2017), describes that adapting circular strategies in BMs and supply chain is a precondition to enable sustainable production which is necessary for better economic and environmental performance. Although among several other strategies such as increasing efficiency or dematerialization, circularity is one of the strategies that enable sustainable BM (Geissdoerfer *et al.* 2017). Therefore, to summarize the BMI of the company within its BM, Figure 6 emphasizes the strategies and vision that may help the company to incorporate CE and generate sustainability in its activities and towards the plastic packaging sector.

6. Discussion

This chapter will discuss the findings in connection to the existing body of knowledge from chapter 2. It is broken down into two sections. The first section focuses on the strategy and vision of adapting to CE and the second section focuses on the challenges associated with CBM.

6.1 Incorporating circular economy in the firm's BM

According to Pieroni, McAloone and Pigosso (2019), the concept of sustainability and CE has attracted growing interest by academia, politicians and corporate representatives. Hofman (2019) suggests the interrelated problems of ecological, social, and economic categories indicate societal change and a move towards sustainability. While Ghisellini, Cialani, and Ulgiati (2016) point out that implementing CE would result in better use of resources aimed to have a greener economy, more employment opportunities and improved wellbeing and equity in relation to use and access of resources. Therefore, Merli, Preziosi and Acampora (2018) address that both CE and sustainability are somewhat linked to each other. Thus, implementing CE can be implied as obtaining sustainable benefits. Vermunt *et al.* (2019) state that moving to CE requires changes across all levels of society. Although the study does not cover CE implementation in such a broad range but rather focuses only at the micro-level. An important element within the micro-level is the production and consumption of goods and services (Merli, Preziosi & Acampora 2018). Therefore, in order to move towards sustainable pathways, it is important to make changes in production and disposal methods after consumption (Vermunt *et al.* 2019). Therefore, companies by using their BMs can play a big role in this transitioning process (ibid.).

According to Bocken *et al.* (2014), BM as a tool that illustrates shows a company conducts its business and defines its competitive strategy. Nußholz (2017) explains that a BM is understood as a structural management tool that is used to present the company's structure and value creation process. Moreover, it is also used to describe how an organization converts its resources and capabilities into economic value (ibid. p.4). From a strategic point of view Richardson (2008), emphasizes that with a little development within the BM framework it can be used to show the strategic process to design or check on how the company is executing its strategy. Hence, structuring a BM around the concept of value would help the company to create, transfer and capture value according to their internal activities and relationships with other actors as such suppliers and customers (Urbinati, Chiaroni & Chiesa, 2017). Hence, based on the importance of BM to companies, this study has used BM as an analytical framework to understand how the case company is taking steps to move towards CE. Additionally, Ranta, Stenroos and Mäkinen (2018) highlight the importance of BM in CE as it helps to understand the economic outcomes as the company embraces social and environmental benefits. However, to reach this vision and implement these strategies, existing literature suggests adoption of Circular Economy models which is relevant for any new industrial paradigm (Urbinati, Chiaroni and Chiesa, 2017). This means that companies need to adapt their business model to CE principles or create a new one (ibid.).

Bocken, Schuitc, and Kraaijenhagen (2018), also add that from a strategic point of view, large companies already understand the importance of BMI to deal with external conditions. This is also similar to the circumstances of the plastic packaging industry as one of their vital reason for innovation is to continue business and growth as well as taking steps to ensure to reduce environmental and social impacts. This has been referred by Antikainen and Valkokari (2016), that in order to tackle the challenges of the linear economy, BMI may be used to create, deliver or capture value through changes in the BM elements. BMI has further been elaborated as a

useful tool for companies in analyzing, structuring and communicating, which may help to resolve complexity in organizational configuration and activities (Geissdoerfer et al. 2018). Therefore, in CE, BMI also plays an important role to change the fundamental ways of doing business for companies especially to adapt sustainability approaches (Bocken, Schuitc & Kraaijenhagen 2018). Using framework of BM proposed by Richardson (2008) the implementation and incorporation of CE strategies is discussed below.

6.1.1 Value proposition

Emphasizing the first element i.e value proposition. Fjeldstad & Snow (2018), explains that value proposition is what the customers value and are willing to pay for. It includes the company's offering and the target customer to whom this value is being offered to (Bocken, Schuitc & Kraaijenhagen 2018). Additionally, Richardson (2008) also includes that a strong value proposition is when the company offers its target customers greater value than its competitors. According to the findings, Trioplast, since it was founded, has been dedicated to producing sustainable plastic packaging with less environmental impacts. For example, their carriage bags have been produced using good fraction of PCR materials (currently 80%) for more than 7 years now. This has reduced their dependence on virgin material for production of carrier bags. Moreover, they also use renewable energy in their production process by utilizing green energy in all their plants (Trioplast 2019c). Therefore, in today's market majority of the companies who use plastic packaging for their products, follow sustainable goals such as ensuring the use renewable energy or recycled materials in their packaging. Similarly, the findings show that Trioplast's customer Essity also follows such goals. For example, Essity as a company has a goal to ensure 85% renewable and recycled materials in both paper and plastic packaging by 2025. Features such as the use of recycled materials and renewable energy make Trioplast's offerings attractive to their target customers. Included with these features are also their core values which are presented as the company's competitive advantage. Their core values include being a reliable supplier through developing close relationships with customers, having sustainable visions for future through product development and active in adapting to innovative approaches for their customers and surroundings.

In relation to their strategies of adapting CE within their value proposition, the findings reveal that Trioplast plans to offer services alongside their product offerings. Although their vision is not to completely create a product-services system, but rather to achieve the goal of a longer and functional system. According to Urbinati, Chiaroni, and Chiesa (2017), value proposition in a CE should focus on a product-service system (PSS) which is a mix of tangible and intangible offerings to meet the customers' needs. By adding services such as LCA assessments, the producer can design products that have longer life with minimal use of resources and energy during production and also recoverable after use (Leal Filho *et al.* 2019; Urbinati, Chiaroni & Chiesa 2017). This correlates the CE strategy of slowing the loop proposed by Bocken *et al.* (2016) in which the material flow is slow down during production, through product designed for prolonged use and reuse over time. According to Hofman (2019) the reason to slow flow of materials is to inherit the value of the products and their components by ensuring maximum number of times of product use. Although Merli, Preziosi and Acampora (2018), mentions that this strategy has limited application as it requires changes in production and consumption patterns. Although, implementing this strategy in product design could help to reduce resource use during production and depletion of natural resources. According to Planing (2018), by incorporating services in their BM, it displays even more customer-orientation in their BM as services are usually accomplished through direct customer contact. Moreover, ensuring that their customers have regulatory updates on plastic (example, updates from the EU Commission) can help to create awareness among its customers on how the government is focusing on CE.

Customer awareness is perceived as barrier to CE which has been discussed in section 2.1.2. According to Mont (2002), some companies are implementing elements from PSS in their existing BMs while others are using it as a survival strategy to stay in business. Additionally, the inclusion of services enables business to see new market opportunities, trends or stay competitive by developing products for consumption based on environmental limits (Mont 2002). Therefore, through regulation updates to customers and adapting their product development with the recent regulation can be seen as an indication to capture newer market opportunities and continue business. According to Bocken et al. (2014), for manufacturers the product still remains important but the concept of providing services ensures that customer experience is fundamental in their value proposition/ offerings. This has also been pointed out by Bocken, Schuitc and Kraaijenhagen (2018), that in the present day, many large manufacturing firms are using product and service-based strategies in their value proposition. This may be triggered by the increasing competition in the market where it is not possible to compete with rivals by only developing products. Planing (2018) mentioned that today around one-third of manufacturers are offering services (example a proportion of 60% in the USA). This development apart from the uncertainties may act as a catalyst for creating circular economy and creation or re-development of existing or newer BMs (ibid.)

6.1.2 Value creation and delivery

Value creation and delivery is an important element of a BM. It emphasizes on how value is created on the offerings (value proposition). According to Richardson (2008), this value category includes numerous activities that the company undertakes to produce, sell and deliver products to its customers. Hofmann (2019) states that CE oriented BMs are attractive as they help to reorganize value creation architecture in a BM to ensure a sustainable supply chain. However, Vermunt *et al.* (2019) explain that the key challenge to designing a CE oriented BM is related to its value creation and capture because it needs to be designed in a way that would bring economic value, environmental and social benefits. Chesborough (2010) adds that companies may have economic benefits if they develop the capability to innovate value categories within their BMs. This is because different BMs generate different economic yields. So, by innovating an existing BM with the same value proposition may lead to different outcomes (Chesbrough 2010). On the other hand, Schulte (2013), suggests that companies must make small innovations within their BM before enjoying the benefits of CE oriented BMs such as CBMs. This is usually due to various barriers of adapting CBMs such as reluctance from other actors in the value chain (Schulte 2013). Similarly, from the findings, it was seen that currently Trioplast for some of their products uses fractions of recycled materials/PCR content in combination with virgin materials during production. Ghisellini, Cialani and Ulgiati (2016) mention that at present the worldwide implementation of CE is rather at an early stage which mostly focuses on recycling rather than reuse. A similar stance is also observed in Trioplast's current strategies. Moreover, according to Bocken *et al.* (2016), in a circular approach the company's focus shifts from generating profits by selling products to using the flow of materials as a newer source of profits. Hence, this strategy to use recycled materials can be identified as a circular approach for product design known as closing the loop (Bocken *et al.* 2016). According to Merli, Preziosi and Acampora (2018), CE is often summarized as extending the resource value of materials through recycling and industrial symbiosis which links its connection with closing the loop strategy. According to Antikainen and Valkokari (2016), to build a circular value chain, collaboration is required between the actors involved. Moreover, closing the loop does not always require to be within a certain system boundary but can also be a combination of BMs that together close a material loop. Similarly, the EPR scheme in which producers are given the responsibility to ensure the disposal of post-consumer products can also be viewed from the perspective of closing the material loop (Leal Filho *et al.* 2019). According to Leal Filho *et al.* (2019), it also helps producers to build bridges and collaborations with

recyclers and reverse logistics systems. Hence, findings also show that Trioplast is an active member of the EPR scheme ensuring close collaboration with other actors as well as making financial contributions to foster collection of post-used plastic materials. Ghisellini, Cialani and Ulgiati (2016) also agree that the adoption of CE programs entails that the company must use different strategies to improve the circularity of its production system as well as cooperate with its stakeholders over the supply chain to achieve an effective circular pattern. Further to the findings, Trioplast at present is also trying to configure ways of using greater fractions of recycled content in their products without compromising quality. According to Bocken *et al.* (2016), narrowing the loop is also another circular principle which intends to use fewer resources, therefore, creating options for resource efficiency. However, Merli, Preziosi and Acampora (2018) suggest that in order to reduce resource use, companies need to rethink about their product and process design to foster CE implementation. Therefore, considering use of more recycled materials will perhaps help Trioplast to use fewer virgin materials and thus the product will be less dependent on natural resources.

6.1.3 Value capture

According to Nußholz (2017), value capture elaborates on how the company makes profit as well as capture other forms of value. Moreover, Richardson (2008) elaborated that value capture does not only consider the revenue model (i.e the sources of profit) but also the economic model which covers the costs, margins, and various financial aspects of the company. Hence a combination of these two shows how a company can make money. From the findings, it was stated that Trioplast has an uneven revenue stream across its 4 product divisions. This depends on various factors like the demand of their customers, type of product (whether customized or general), size of the value chain and so on. In comparison to the profit margins of their other product divisions, they tend to make higher profits in their stretch film division. Findings show that perhaps their expert knowledge and size of the value chain may contribute towards such. In relation to cost, with their current material composition of recycled and virgin materials, the price tends to rise if they use good fraction of recycled materials as per demand. However, the idea to include services in value proposition may suggest added revenue. Although this has not been specifically confirmed by Trioplast but expectations of even profit margins across product division revealed in the findings. Although Bocken, Schuitc and Kraaijenhagen (2018) explain that in a CE oriented BM in which offerings are extended from products to services investments may take longer time to return as revenue irrespective to product sales.

6.2 Challenges of adapting to a circular economy

The second research question emphasizes on the challenges of adapting circular economy in the company's BM. The challenges are discussed according to the findings of section 5.2 and critical reflection of CBM addresses in section 2.4.1.

According to Bocken, Schuitc, and Kraaijenhagen (2018), CBM is a rationale of how a company aims to create, deliver and capture value in order to close and slow its material loop. The aim of using CBM is to keep the product value at the highest level to slow its resource loop (Bocken, Schuitc and Kraaijenhagen, 2018). Therefore, as indicated by Frishammar & Parida (2019), BM transformation usually requires changes in ways around which value is created, delivered and captured. Moreover, various studies have also indicated that changes within business activities are often difficult for the organization as well as the individuals involved (Oghazi & Mostaghel 2018). Similarly making changes in a traditional BM which focus only on generating economic value to CBM which aims to slow, close and narrow material flow can be challenging in many areas (Vermunt *et al.* 2019). However, the difference between the theory and Trioplast is that they have already adapted CE strategies in few areas of their BM

alongside long-term visions. A similar strategy has been pointed out by Schulte (2013) stating that since many actors within the value chain of a product may not be interested to adapt CE, hence slow adaption to CE principles in existing BM can help to revolve to a new BM in the long run,

According to Stål and Corvellec (2018), in CBMs the value creation does not involve virgin materials, but rather uses the value retained in used products to produce new offerings. The findings in section 5.2 show that in the use of PCR, there were several challenges from both the producer and consumer sides. For example, traceability/reliability of PCR contents is a major issue for the producer which also affects the demand for the products produced from it. According to Simon (2019), cross-contamination in plastic products is a major issue that leads to a drop in quality of the secondary product. For example; as mentioned by the Trioplast's customer Essity, that they required large volume of contamination-free plastic packaging for their hygiene products which is not always available. Hence, even if the volume is available there is a challenge to asses the reliability of the PCR contents from the producer's end (Linder & Williander 2017). Moreover, Simon (2019) also pointed out that often due to high industrial standards, customers show lower acceptance of recycled products. Bocken, Schuitc and Kraaijenhagen (2018), also mentioned that customers perceive products with recycled content as lower in quality and urges to pay less in comparison to other products. This has also been pointed out by the case company and their customer, that standardization of PCR is also another problem alongside traceability. A similar constraint was also identified in the guidelines report of MiW and IMPEL (2019) where the authors mentioned that mixtures of different types of plastic can only create low value of new products. Therefore, in relation to the low value of products produced from PCR, Oghazi and Mostaghel (2018) stated that often within CBMs there lies a challenge when producing high-quality products mainly due to using circular strategies such as closing or narrowing the loop. The concept to use recycled materials is present in both the strategies to encourage reuse and recycling of products which hinders high-quality product production (Bocken *et al.* 2016). Another reason to show the importance of standardization is pointed out by Linder & Williander (2015) that not all products can be remanufactured. Often product design or components can hinder recycling. For example, Simon (2019) explained that it is important to design primary products that can be recycled in order to improve the quality of the secondary product.

Stakeholders' interest is an important element of CBM. As suggested by Antikainen & Valkokari (2016), CBMs require co-operation between the actors of the value chain which is often a complex network of different actors. This situation has also been highlighted by Schulte (2013) as adapting CBM is not always easy due to the vested interest of certain actors in the current linear economy. Also, it might not have favourable outcome for some actors involved in the value chain (Schulte 2013). In section 5.2, the case company referred this issue as lack of coordination between the actors of the plastics industry, especially in the area of R&D, where most actors performed research in the same areas and obtained similar results. Hence, collaboration among the actors could save time and cost of conducting research. The importance of collaboration between actors in a value chain has been emphasized by Nußholz (2018) where the author pointed out that to integrate ideas and CE strategies in a BM, collaboration among actors in the value is important for BMI.

CBM paradigm requires the collaboration of actors within the value chain to maximize the value of products and materials (Bocken, Schuitc and Kraaijenhagen, 2018). This also means that profits are often misaligned in the value chain (Planing 2015). A similar scenario is observed in the profit allocation of the case company. The findings show that the profit margins vary across their product divisions which according to them lies on factors like demand of the

customers, type of product (whether customized or general) or size of the value chain. Hence, as can be understood that shorter value chains usually have higher profit margins while profit for customized profits has medium margins. Planing (2018) also identified that misaligned profits are sometimes related to imperfect designs. As such when a product is returned for remanufacturing or recycling, then this leads to the optimization of product design that is mostly based on cost and production efficiency (Planing 2018). This means that the profits from a better design could also occur at the end-of-use phase within the value chain (ibid.). This may be similar to their hygiene/ customer packaging division, where the profits are low but perhaps the margin is higher at later part of the value chain.

7. Conclusion

Plastic comes with many advantages of convenience and low cost but its negative impact on human health and environment has been a major concern over time (Leal Filho *et al.* 2019). In relation to plastic packaging, EU Commission (2019) states that though the packaging is not a product, but it is very strongly associated with the products consumers buy. According to Palm and Myrin (2018), the plastic value chain faces serious sustainability issues as such the utilization of fossil feedstock, insufficient waste management and resource inefficiency. Irrespective of the sustainability issues, the production of plastics has increased continuously over the past 50 years and it is predicted to double in the next 20 years (Leal Filho *et al.* 2019). With the growing environmental concerns and increasing demand, it is important for the plastic sector to take measures towards sustainability like adapting to CE.

Although, the concept of CE is often suggested to be an aid to achieving sustainability within businesses, but its conceptual barriers are one of its obstructions. For example, CE to date remains an unexplored area as it is portrayed as a collection of vague and separate ideas from several fields and schools of thoughts. Moreover, about implementation of CE in businesses, the progress has been at a very slow pace. One of the visible hinders of this aspect is the lack of theory development focusing on a single business and its operations. Hence, majority of the research around CE has focused on a single category as such financial or economic indicators or either on whole industry or segment. This gap in knowledge has led to building the aim of the study around implementation of CE focusing on a company within the plastic packaging sector. Moreover, BM was chosen as the analytical framework of the study to understand CE implementation because there is lack of literature that focuses on the design and management of CE oriented BMs. It is important to build clear understandings of BMs because when CE principles of slow, close and narrow loops are implemented, it would affect areas of product design, production, use, disposal and waste management (De Mattos & de Albuquerque 2018).

Building on the aim and research question to study strategies and visions of adapting CE, the study has used theories such as business model, business model innovation, circular business models and circular economy. These theories were used in connection to the empirical findings to answer the research question and contribute towards the gap in knowledge on CE implementation from a business perspective. The study was prepared using a qualitative research design and a case study approach. A case study was a good fit for the study because it helped to investigate the empirical phenomena using multiple theories. Primary data was collected through semi-structured interviews with representatives from the case company, their customer company and government agency working with environmental policies. Data was afterward analysed and complied with the quality assurance procedures before it was presented in the study.

The qualitative research design helped the author to have enough time to process and understand the findings are based on the theories used. Therefore, the findings showed that although the case company had no vision to change their overall way of doing business but is gradually incorporating CE strategies in their BM. The BM concept for this study was viewed using the value categories proposed by Richardson (2008). Within value proposition, the findings showed that the company plans to introduce services such as LCA in addition to their existing product offerings. Services help companies to be in close connection with customers as well as include customers' role in product design. Therefore, through incorporation of services, it is expected that the company may be able to achieve its vision of slowing the material loop. Services such as LCA may help them to manufacture products that can last longer as well as meet the needs of the customers. Hence, longer product use may reduce dependence on consumption of new

products which can slow down production. Moreover, within value creation and delivery CE is heavily dependant on the use of recycled materials. From the findings it was revealed that the company is already using its internal waste for production. Moreover, they are also trying to configure product designs that could accommodate more recycled materials without compromising the product standard. Using recycled materials can help to close and narrow material loops as the dependence on virgin materials is reduced and existing materials are circulated in the value chain as long as it has a value. One of the important reasons for companies' interest in CE is the scope and opportunities to capture new markets and revenue streams. Similarly, under value capture, the findings show that the company expects to have even profit margin across all their product divisions as well as benefit additional revenue streams from services in the long run.

Although, findings also show that incorporating these strategies comes with challenges. For example, in the empirical findings the case company elaborated that they face challenges of traceability and standardization in the use of recycled materials. This was further confirmed by their customer Essity, who explained that although they are willing to buy products with recycled materials, but lack of traceability and standardization raises issues of contamination which can affect their products after packaging. The interviewees from the Swedish EPA further elaborated that when plastics of many different kinds are recycled together, they produce low-value feedstocks which can hinder when manufacturing high-quality products. Hence, more recycling and sorting stations are required as proposed by the EU Commission (2018). The findings also reflected the lack of unity within the plastic packaging sector which was also addressed by the case company. Hence, it is important for all actors to work together in order to create a network-centric and circular economy. Thus, similar is also the motive behind this thesis study. The author hopes that from the findings of this study which highlights the journey of a single company within the plastic packaging sector, other actors who are struggling or have implemented CE strategies would share their findings with the industry actors. This would not only foster more collaboration but also contribute actors to adopt sustainable practices at all stages of the value chain within the plastic packaging sector.

Future Research

This study used BM to understand the innovation strategies adopted by a plastic packaging producer. Due to the increased environmental and social effects, the plastic industry is urged to embrace sustainability in its production process. It is also important for the industry actors to diffuse awareness among plastic consumers on CE strategies like reuse and recycle to foster triple bottom line approach. Perhaps more research with broader perspective like involving more actors needs to be conducted so that deeper insight can be gained to understand the challenges of CE implementation within the industry. Similar research focusing on single company may also be carried out to highlight different strategies and challenges and help to develop theory on CE implementations.

Bibliography

Journals and Publications

Achtenhagen, L., Melin, L. & Naldi, L. (2013). Dynamics of Business Models – Strategizing, Critical Capabilities and Activities for Sustained Value Creation. *Long Range Planning*, vol. 46 (6), pp. 427–442. DOI: https://doi.org/10.1016/j.lrp.2013.04.002

Agyemang, M., Kusi-Sarpong, S., Khan, S.A., Mani, V., Rehman, S.T. & Kusi-Sarpong, H. (2019). Drivers and barriers to circular economy implementation: An explorative study in Pakistan's automobile industry. *Management Decision*, vol. 57 (4), pp. 971–994. DOI: https://doi.org/10.1108/MD-11-2018-1178

Antikainen, M. & Valkokari, K. (2016). A Framework for Sustainable Circular Business Model Innovation. *Technology Innovation Management Review*, vol. 6 (7), p. 8

Babbitt, C.W., Gaustad, G., Fisher, A., Chen, W.-Q. & Liu, G. (2018). Closing the loop on circular economy research: From theory to practice and back again. *Resources, Conservation and Recycling*, vol. 135, pp. 1–2. DOI: https://doi.org/10.1016/j.resconrec.2018.04.012

Barriball, K.L. & While, A. (1994). Collecting data using a semi-structured interview: a discussion paper. *Journal of Advanced Nursing*, vol. 19 (2), pp. 328–335.

Bengtsson, M. (2016). How to plan and perform a qualitative study using content analysis. *NursingPlus Open*, vol. 2, pp. 8–14. DOI: https://doi.org/10.1016/j.npls.2016.01.001

Berg, B.L. & Lune, H. (2017). *Qualitative research methods for the social sciences*. Ninth edition. Boston: Pearson. (Books a la carte)

Bini, L., Bellucci, M. & Giunta, F. (2018). Integrating sustainability in business model disclosure: Evidence from the UK mining industry. *Journal of Cleaner Production*, vol. 171, pp. 1161–1170

Bocken, N.M., De Pauw, I., Bakker, C. & van der Grinten, B. (2016). Product design and business model strategies for a circular economy. *Journal of Industrial and Production Engineering*, vol. 33 (5), pp. 308–320

Bocken, N.M.P., Schuit, C.S.C. & Kraaijenhagen, C. (2018). Experimenting with a circular business model: Lessons from eight cases. *Environmental Innovation and Societal Transitions*, vol. 28, pp. 79–95

Bocken, N.M.P., Short, S.W., Rana, P. & Evans, S. (2014). A literature and practice review to develop sustainable business model archetypes. *Journal of Cleaner Production*, vol. 65, pp. 42–56

Bryman, A. & Bell, E. (2015). *Business Research Methods*. Oxford University Press.

Chesbrough, H. (2010). Business Model Innovation: Opportunities and Barriers. *Long Range Planning*, vol. 43 (2–3), pp. 354–363. Available at:

Creswell, J.W. (2013). *Research design: qualitative, quantitative, and mixed methods approaches*. 4th. ed

De Jesus and Mendonça, S. (2018). Lost in Transition? Drivers and Barriers in the Eco-innovation Road to the Circular Economy | Elsevier Enhanced Reader. DOI: https://doi.org/10.1016/j.ecolecon.2017.08.001

De Mattos, C. & de Albuquerque, T. (2018). Enabling Factors and Strategies for the Transition Toward a Circular Economy (CE). *Sustainability*, vol. 10 (12), p. 4628.

Doz, Y. (2011). Qualitative research for international business. *Journal of International Business Studies*, vol. 42 (5), pp. 582–590.

EMF (2012). *Towards the circular economy Vol 1: Economic and business rationale for an accelerated transition*

EMF (2013). *Towards circular economy Vol 2: Opportunities for the consumer goods sector*

EMF (2017). *The new plastics economy: catalyzing actions*
EMF (2017b). *The new plastics economy: rethinking the future of plastics and catalyzing action*
EMF & WEF (2016). *The new plastic economy: Rethinking the future of plastics*
EU Commission (2018). *A European Strategy for Plastics in the Circular Economy*
EU Commission (2019). *Sustainable Products in a Circular Economy - Towards an EU Product Policy Framework contributing to the Circular Economy*
Ferrari, R. (2015). Writing narrative style literature reviews. *Medical Writing*, vol. 24 (4), pp. 230–235.
Foschi, E. & Bonoli, A. (2019). The Commitment of Packaging Industry in the Framework of the European Strategy for Plastics in a Circular Economy. *Administrative Sciences*, vol. 9 (1), p. 18
França, C.L., Broman, G., Robèrt, K.-H., Basile, G. & Trygg, L. (2017). An approach to business model innovation and design for strategic sustainable development. *Journal of Cleaner Production*, vol. 140, pp. 155–166.
Freitas, A. (2018). Comparative Analysis of Plastic Packaging Recycling in Portugal and Sweden. p. 106
Geissdoerfer, M., Morioka, S.N., de Carvalho, M.M. & Evans, S. (2018). Business models and supply chains for the circular economy. *Journal of Cleaner Production*, vol. 190, pp. 712–721.
Geissdoerfer, M., Savaget, P., Bocken, N.M.P. & Hultink, E.J. (2017). The Circular Economy – A new sustainability paradigm? *Journal of Cleaner Production*, vol. 143, pp. 757–768.
Gentles, S.J., Charles, C., Ploeg, J. & McKibbon, K.A. (2015). Sampling in Qualitative Research: Insights from an Overview of the Methods Literature. *The Qualitative Report*, vol. 20 (11), pp. 1772–1789
Ghisellini, P., Cialani, C. & Ulgiati, S. (2016). A review on circular economy: the expected transition to a balanced interplay of environmental and economic systems. *Journal of Cleaner Production*, vol. 114, pp. 11–32.
Gill, M.J., Gill, D.J. & Roulet, T.J. (2018). Constructing Trustworthy Historical Narratives: Criteria, Principles and Techniques. *British Journal of Management*, vol. 29 (1), pp. 191–205. Available at: https://onlinelibrary.wiley.com/doi/abs/10.1111/1467-8551.12262 [2019-11-29]
Gorissen, L., Vrancken, K. & Manshoven, S. (2016). Transition Thinking and Business Model Innovation–Towards a Transformative Business Model and New Role for the Reuse Centers of Limburg, Belgium. *Sustainability*, vol. 8 (2), p. 112.
Guba, E.G. & Lincoln, Y.S. (1994). Competing Paradigms in Qualitative Research. *Handbook of Qualitative Research*, pp. 163–194
Guldmann, E., Bocken, N.M.P. & Brezet, H. (2019). A Design Thinking Framework for Circular Business Model Innovation. *Journal of Business Models*, vol. 7 (1), pp. 39–70.
Hackin, F., Björkdahl, J. & Wallin, N. (2018). *Strategies for business model innovation: How firms reel in migrating value | Elsevier Enhanced Reader*. DOI: https://doi.org/10.1016/j.lrp.2017.06.009
Hofmann, F. (2019). Circular business models: Business approach as driver or obstructer of sustainability transitions? *Journal of Cleaner Production*, vol. 224, pp. 361–374.
Kallio, H., Pietilä, A.-M., Johnson, M. & Kangasniemi, M. (2016). Systematic methodological review: developing a framework for a qualitative semi-structured interview guide. *Journal of Advanced Nursing*, vol. 72 (12), pp. 2954–2965.

Kalmykova, Y., Sadagopan, M. & Rosado, L. (2018). Circular economy – From review of theories and practices to development of implementation tools. *Resources, Conservation and Recycling*, vol. 135, pp. 190–201.
Kirchherr, J., Piscicelli, L., Bour, R., Kostense-Smit, E., Muller, J., Huibrechtse-Truijens, A. & Hekkert, M. (2018). Barriers to the Circular Economy: Evidence From the European Union (EU). *Ecological Economics*, vol. 150, pp. 264–272.
Korhonen, J., Honkasalo, A. & Seppälä, J. (2018). Circular Economy: The Concept and its Limitations. *Ecological Economics*, vol. 143, pp. 37–46.
Lam, C.-S., Ramanathan, S., Carbery, M., Gray, K., Vanka, K.S., Maurin, C., Bush, R. & Palanisami, T. (2018). A Comprehensive Analysis of Plastics and Microplastic Legislation Worldwide. *Water, Air, & Soil Pollution*, vol. 229 (11), p. 345.
Laubscher, M. & Marinelli, T. (2014). Integration of Circular Economy in Business.
Leal Filho, W., Saari, U., Fedoruk, M., Iital, A., Moora, H., Klöga, M. & Voronova, V. (2019). An overview of the problems posed by plastic products and the role of extended producer responsibility in Europe. *Journal of Cleaner Production*, vol. 214, pp. 550–558.
Lewandowski, M. (2016). Designing the Business Models for Circular Economy—Towards the Conceptual Framework. *Sustainability*, vol. 8 (1), p. 43. DOI: https://doi.org/10.3390/su8010043
Linder, M. & Williander, M. (2017). Circular Business Model Innovation: Inherent Uncertainties: Circular Business Model Innovation. *Business Strategy and the Environment*, vol. 26 (2), pp. 182–196.
Lüdeke-Freund, F., Gold, S. & Bocken, N.M.P. (2019). A Review and Typology of Circular Economy Business Model Patterns. *Journal of Industrial Ecology*, vol. 23 (1), pp. 36–61.
Manninen, K., Koskela, S., Antikainen, R., Bocken, N., Dahlbo, H. & Aminoff, A. (2018). Do circular economy business models capture intended environmental value propositions? *Journal of Cleaner Production*, vol. 171, pp. 413–422.
Maxwell, J. (2009). Designing a Qualitative Study. *The SAGE Handbook of Applied Social Research Methods*. 2455 Teller Road, Thousand Oaks California 91320 United States: SAGE Publications, Inc., pp. 214–253.
Merli, R., Preziosi, M. & Acampora, A. (2018). How do scholars approach the circular economy? A systematic literature review. *Journal of Cleaner Production*, vol. 178, pp. 703–722. DOI: https://doi.org/10.1016/j.jclepro.2017.12.112
Michelini, G., Moraes, R.N., Cunha, R.N., Costa, J.M.H. & Ometto, A.R. (2017). From Linear to Circular Economy: PSS Conducting the Transition. *Procedia CIRP*, vol. 64, pp. 2–6. Available at: https://linkinghub.elsevier.com/retrieve/pii/S2212827117301567 [2019-10-08]
MiW & IMPEL (2019). Making the circular economy work: Guidance for regulators on enabling innovations for the circular economy (prevention and recycling of waste)
Mont, O.K. (2002). Clarifying the concept of product–service system. *Journal of Cleaner Production*, vol. 10 (3), pp. 237–245
Murray, A., Skene, K. & Haynes, K. (2017). The Circular Economy: An Interdisciplinary Exploration of the Concept and Application in a Global Context. *Journal of Business Ethics*, vol. 140 (3), pp. 369–380.
Newcomer, K.E., Hatry, H.P. & Wholey, J.S. (2015). Conducting Semi-Structured Interviews. *Handbook of Practical Program Evaluation*. Hoboken, NJ, USA: John Wiley & Sons, Inc., pp. 492–505.
Noor, K.B.M. (2008). Case Study: A Strategic Research Methodology. *American Journal of Applied Sciences*, vol. 5 (11), pp. 1602–1604.

Nußholz, J.L.K. (2017). Circular Business Models: Defining a Concept and Framing an Emerging Research Field. *Sustainability*, vol. 9 (10), p. 1810.
Nußholz, J.L.K. (2018). A circular business model mapping tool for creating value from prolonged product lifetime and closed material loops. *Journal of Cleaner Production*, vol. 197, pp. 185–194.
Obrecht, M., Haddad, R.E., Elbary, R.A., Lukman, R.K. & Rosi, M. (2019). Promoting Sustainable and Circular Plastics Use in Egipt with Implementation of Ecodesign Principles. *System Safety: Human - Technical Facility - Environment*, vol. 1 (1), pp. 441–448.
Oghazi, P. & Mostaghel, R. (2018). Circular Business Model Challenges and Lessons Learned—An Industrial Perspective. *Sustainability*, vol. 10 (3), p. 739.
Osterwalder, A. & Pigneur, Y. (2010). *Business model generation: a handbook for visionaries, game changers, and challengers*. John Wiley & Sons.
Palm, E. & Myrin, E.S. (2018). Mapping the plastics system and its sustainability challenges. p. 36
Pels, J. & Kidd, T.A. (2015). Business model innovation. (Dr, R. S., ed.) *International Journal of Pharmaceutical and Healthcare Marketing*, vol. 9 (3), pp. 200–218.
Pieroni, M.P.P., McAloone, T.C. & Pigosso, D.C.A. (2019). Business model innovation for circular economy and sustainability: A review of approaches. *Journal of Cleaner Production*, vol. 215, pp. 198–216.
Planing, P. (2015). Business Model Innovation in a Circular Economy Reasons for Non-Acceptance of Circular Business Models. *OPEN JOURNAL OF BUSINESS MODEL INNOVATION*,
Planing, P. (2018). Towards a circular economy - how business model innovation will help to make the shift. *International Journal of Business and Globalisation*, vol. 20 (1), p. 71.
Prieto-Sandoval, V., Jaca, C. & Ormazabal, M. (2018). Towards a consensus on the circular economy | Elsevier Enhanced Reader. *Journal of Cleaner Production*, *179*, pp. 605–615. DOI: https://doi.org/10.1016/j.jclepro.2017.12.224
Ranta, V., Aarikka-Stenroos, L. & Mäkinen, S.J. (2018). Creating value in the circular economy: A structured multiple-case analysis of business models. *Journal of Cleaner Production*, vol. 201, pp. 988–1000.
Richardson, J. (2008). The business model: an integrative framework for strategy execution. *Strategic Change*, vol. 17 (5–6), pp. 133–144.
Ritzén, S. & Sandström, G.Ö. (2017). Barriers to the Circular Economy – Integration of Perspectives and Domains. *Procedia CIRP*, vol. 64, pp. 7–12. Available at: http://www.sciencedirect.com/science/article/pii/S221282711730149X [2019-09-12]
Robson, C. & McCartan, K. (2016). *Real World Research*. John Wiley & Sons.
Roos, G. (2014). Business Model Innovation to Create and Capture Resource Value in Future Circular Material Chains. *Resources*, vol. 3 (1), pp. 248–274.
Rosa, P., Sassanelli, C. & Terzi, S. (2019). Towards Circular Business Models: A systematic literature review on classification frameworks and archetypes. *Journal of Cleaner Production*, vol. 236, p. 117696.
Schulte, U.G. (2013). New business models for a radical change in resource efficiency. *Environmental Innovation and Societal Transitions*, vol. 9, pp. 43–47.
Stål, H.I. & Corvellec, H. (2018). A decoupling perspective on circular business model implementation: Illustrations from Swedish apparel. *Journal of Cleaner Production*, vol. 171, pp. 630–643.
Suárez-Eiroa, B., Fernández, E., Méndez-Martínez, G. & Soto-Oñate, D. (2019). Operational principles of circular economy for sustainable development: Linking theory and practice. *Journal of Cleaner Production*, vol. 214, pp. 952–961.

Suter, M. (2019). Beyond PET: an extended Deposit-Return System for plastic packaging in Sweden: A Qualitative Investigation of Challenges and Lessons from future and earlier Deposit-Return Systems.
Trioplast (2019c). *Sustainability Report 2018*
Tudor, V.C., Marin, A., Vasca, D.Z., Micu, M.M. & Smedescu, D.I. (2018). The Influence of the Plastic Bags on the Environment. *Materiale Plastice*, (4), p. 595=599
Tura, N., Hanski, J., Ahola, T., Ståhle, M., Piiparinen, S. & Valkokari, P. (2019). Unlocking circular business: A framework of barriers and drivers. *Journal of Cleaner Production*, vol. 212, pp. 90–98.
Urbinati, A., Chiaroni, D. & Chiesa, V. (2017). Towards a new taxonomy of circular economy business models. *Journal of Cleaner Production*, vol. 168, pp. 487–498.
Van Eygen, E., Laner, D. & Fellner, J. (2018). Circular economy of plastic packaging: Current practice and perspectives in Austria. *Waste Management*, vol. 72, pp. 55–64. DOI: https://doi.org/10.1016/j.wasman.2017.11.040
Vermunt, D.A., Negro, S.O., Verweij, P.A., Kuppens, D.V. & Hekkert, M.P. (2019). Exploring barriers to implementing different circular business models. *Journal of Cleaner Production*, vol. 222, pp. 891–902.
WCED (1987). *Report of the World Commission on Environment and Development : Our Common Future Acronyms and Note on Terminology Chairman' S Foreword*. Oxford: Oxford University Press.
Wirtz, B.W., Pistoia, A., Ullrich, S. & Göttel, V. (2016). Business Models: Origin, Development and Future Research Perspectives. *Long Range Planning*, vol. 49 (1), pp. 36–54
Yin, R. (2009). *Case study research: Design and methods*. 4. ed. Thousand Oaks, CA: SAGE Publications, Inc.
Zucchella, A. & Previtali, P. (2019). Circular business models for sustainable development: A "waste is food" restorative ecosystem. *Business Strategy and the Environment*, vol. 28 (2), pp. 274–285.

Internet sources

Essity (2019a). *Essity – En överblick*. Available at: https://www.essity.se/om-essity/kort-om-essity/ [2019-12-03]
Essity (2019b). *Vår historia*. Available at: https://www.essity.se/om-essity/kort-om-essity/historia/ [2019-12-03]

fti (2019a). *For producers - Förpacknings- och tidningsinsamlingen,*. [text]. Available at: https://www.ftiab.se/1349.html [2019-12-28]

fti (2019b). *Funding - Packaging and newspaper collection*. [text]. Available at: https://www.ftiab.se/194.html [2019-12-28]

Naturvårdsverket (2019a). *About the Swedish Environmental Protection Agency*. *Swedish Environmental Protection Agency*. Available at: http://www.swedishepa.se/About-us/ [2019-12-02]

Naturvårdsverket (2019b). *Hållbar plastanvändning*. *Naturvårdsverket*. Available at: https://www.naturvardsverket.se/Miljoarbete-i-samhallet/Miljoarbete-i-Sverige/Uppdelat-efter-omrade/Plast/ [2019-12-09]

Naturvårdsverket (2019c). *The Agency's organisation*. *Swedish Environmental Protection Agency*. Available at: http://www.swedishepa.se/About-us/Organisation/ [2019-12-03]

Naturvårdsverket (2019d). *Vägledning om producentansvar*. *Naturvårdsverket*. Available at: https://www.naturvardsverket.se/Stod-i-miljoarbetet/Vagledningar/Avfall/Producentansvar/ [2019-12-09]

Svensk Certifiering (2019). *Certification ISO 9001, ISO 14001*. Available at: https://www.svenskcertifiering.se/certifiering.html [2019-12-23]

Trioplast (2019a). *About the Trioplast Group*. Available at: https://www.trioplast.com/sv/om-trioplast/om-trioplastkoncernen/ [2019-09-17]

Trioplast (2019b). *Certificates*. Available at: https://www.trioplast.com/en/about-trioplast/certificates/ [2019-12-23]

Trioplast (2019d). *Trioplast Group*. Available at: https://www.trioplast.com/en/about-trioplast/trioplast-group/ [2019-11-13]

Appendix 1: Interview Guide

This interview guide was used during the interview with *Group Innovation, Sustainability & CSR Director* of *Trioplast Industries AB* on *13th November 2019*.

Introduction
Your name and title
Can you summarize the background of the company? (example; history, operations, revenue)

Business Model
What does your existing business model look like in the following perspective?
a) What is your value proposition
b) How is value created and delivered to market/ customers
c) How do your capture value in return – revenue streams?

Circular economy
What is your vision on circular economy?
How are you going to adapt your business model to circular economy?
What are the challenges of adapting to circular economy?
How do you intend to overcome these challenges?

Business Model Innovation
What are the implications for your value proposition – does it need to change?
What are the implications for how you produce your products and deliver these to market/ customers?
What are the implications for capturing value in return – your revenue streams?

Appendix 2: Interview Guide

This interview guide was used during the interviews with the advisors from the *Swedish Environmental Protection Agency* on *1st* and *13th November 2019 respectively*. Also included is the guide of a brief interview with the *Lead Product Developer of Essity on 16th December 2019.*

Introduction (*for all interviewees*)
Your name and title
Can you summarize the background of the company/ agency? (example; history, operations, revenue)

Swedish Environmental Protection Agency

Circular economy and regulations
How is sustainable plastic addressed according to the Swedish EPA?
What is the view of Swedish EPA on uptake of recycled plastics?
What the view towards the issue of traceability of recycled plastic materials?
What legislative measures have been implemented by the Swedish EPA during the last few years?

Extended Producer Responsibility (EPR)
Who is a producer according to the Swedish EPA?
What is the extended producer responsibility scheme?
How does it work?
What is the vision from implementation of the extended producer responsibility scheme?

Essity

PCR use in plastic packaging
What is the company's view towards using PCR content in plastic packaging?
Will this perspective change in future considering any upcoming regulations?
Does the company commit towards any goals to meet its PCR requirement?
What challenges does the company face in relation to plastic packaging?
What is the company’s expectation from its supplier (producers) of plastic packaging regarding PCR use or any other factors?