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KEY STAKEHOLDERS INFLUENCE ON THE TRANSITION TOWARDS CIRCULAR ECONOMY BASED OPERATIONS IN THE PLASTIC FOOD-PACKAGING ECOSYSTEM IN FINLAND

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ABBREVIATIONS

C2C	Cradle-to-cradle
CE	Circular economy
EC	European Commission
EMAF	Ellen Mac Arthur Foundation
GFN	Global Footprint Network
IE	Industrial ecology
SA	Stakeholder analysis
ST	Stakeholder theory

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ABSTRACT

The current issues of resource scarcity and rising consumption shows the need to move towards a circular economy (CE) where resources are kept alive and valuable as long as possible by closing material loops and changing the way we operate. Plastic food-packaging especially has an inefficient resource usage due to the short lifecycle, difficulties in recycling and a higher risk of leakages. A shift from a take-make-dispose logic towards a circular material flow requires involvement from all stakeholders affecting or being affected by each other. It needs common goals and circular principles which steer stakeholders' operations. There is a research gap for understanding stakeholder's role, interest and influence on CE-based operations.

This study follows an explorative research design as it aims is to get a better understand of stakeholders' roles, interest and influence. Further, it seeks new insights for the strategic actions needed for the Finnish plastic-food packaging ecosystem to move towards circular economy-based operations. In order to study the phenomena, the theoretical base of a stakeholder analysis has been utilized. The empirical analysis was conducted in the Finnish plastic food-packaging ecosystem as a single case study and six sample companies as embedded cases have been interviewed via qualitative methods by using semi-structured interviews.

The findings classify the stakeholders in the ecosystem according to the influence and interest model and indicate three classes of stakeholders being of importance for the transition: Key players, subjects and context setters. The government and the retailer companies have been identified as key players with strong influence to drive the transition forward. Furthermore, the findings unfold several challenges to overcome for a successful ecosystem transition to CE-based operations and suggest how the stakeholders can take influence on those.

KEY WORDS: circular economy, stakeholder theory, stakeholder analysis, stakeholder influence, ecosystem management, plastic food-packaging

1. INTRODUCTION

"A new circular plastic paradigm will create great value for business and society. Many actions can be taken individually, but we need collaborative effort to make a meaningful shift." Andrew Aulisi, Senior Director, Pepsico (in: EMAF 2017a, p.8)

1.1. Motivation of study

In modern society we humans tend to follow the constant urge to fulfil all our desires by consuming more and more. However, this does not come without a price to the earth`s ecosystem. The Global Footprint Network (GFN), an international research organization is yearly calculating the so-called earth overshoot day, the moment we have used up the resources the earth can naturally sustain within one year. According to GFN, this means it would currently require 1,7 planets to support humanity's demand on the earth's ecosystem. Our current production and consumption patterns are represented by a trivial linear model with a "take-make-dispose" logic. For the process of raw material extraction and further industrial processing, companies utilize and waste a huge amount of energy and resources. After a generally brief usage phase, eventually goods reach the end of the lifecycle and get discarded. During this process as well as at the end of a product`s life it leaves us with waste. In a world of finite resources where our current consumer behaviour constantly races the demand for new goods, this presents an inefficient approach. Even though the overconsumption of resources is not yet drastically intervening with our everyday lives, resource scarcity and other environmental problems are already a highly discussed topic today.

Moreover, nearly every product utilizes packaging as a means of protection, but after the good has been received it loses its purpose. "*Plastics due to their light weight nature, flexibility, and durability, are particularly effective in packaging applications*" (Hahladakis & Iacovidou 2018, p. 1395). On the contrary, plastic packaging is based mainly on non-renewable fossil fuel, contains various types of plastics and after initial usage time ends up dirty which makes recycling challenging (Sitra 2017). Due to extremely short lifecycles, the plastic economy, especially with emphasize on its area of application for packaging, may be seen as an industry with high inefficient resource usage and bad environmental impacts.

The global demand for plastic had undergone more than a twenty-fold surge over the last half-decade - rising from 15 million tons in 1964 to 322 million tons by 2015 - and is estimated to double once more over the next twenty years (EU 2018; EMAF 2016). With the current growth in plastic production and the leakage to the oceans, prognoses claim that "*by 2050, there will be more plastic than fish in the ocean*" (Sitra 2017, para. 1). In Europe, each year around 51,2 million tons of plastic waste are collected, but only 31,1% are currently recycled and 27,3% are discarded in landfills (PlasticEurope 2018). The biggest sector for plastic demand is advocated by packaging especially used for food or beverage (PlasticEurope 2018). Even though the recycling rates have constantly gone up over the last 10 years (4,7 tons in 2006 - 8,4 tons 2016), the simultaneous drastic growth in production calls for an inevitable change in the current plastic economy. It indicates it as an ecosystem with huge development potential away from inefficient resource usage and leaking of the material flow.

To tackle the issues, we are and will still be facing in the future it needs a change in the way the economy works nowadays. Away from the current linear model towards a material and energy flow inspired by a natural symbiosis circle where resources are kept alive and valuable. This concept is called circular economy (CE) and has become widely popular in the attempts of answering resource scarcity issues and minimizing negative environmental impact (Tura et al. 2019; Ghisellini et al. 2016). The aim of CE is keeping resources in the system as long as possible even though products reach the end of their lifecycle via closing material loops. This can be achieved for example through recycling, reuse, refurbish, upcycling, or downcycling of materials. Further, it addresses the need to rethink value creation logic and transform our consumer behaviour away from a pure ownership mindset. It needs circular principals, which steer firms' operations towards minimizing input of new resources as well as eliminating output of waste, closing material loops to keep resources in the ecosystem and supporting sharing or leasing business concepts. The main core of CE is to achieve a positive environmental, societal and economic outcome (Parida et al. 2019).

Several governments around the world such as China as a forerunner and the European Union including Finland are currently boosting CE operations as a means of increasing positive societal value and ensuring a sustainable future for our planet. According to Sitra, a Finnish Innovation Fund accelerating the transition to a CE, the estimated value creation potential for Finland's economy could be between 1.5 - 2.5 billion by 2030 (Sitra 2015). Likewise, the European Commission (EC) has understood the potential of CE and included it to its mission for the coming years. They identified five priority-sectors in their Action Plan for CE to speed

up the transformation with one of them being plastic (EC 2015). Following on that prioritization, the EC has published specifically a strategy for plastic in January 2018. "*The strategy aims for more efficient recovery and recycling of plastics and product design that promotes the reuse, reparability and recycling of plastic products while creating the conditions for new circular economy innovations and investments*" (Ministry of the Environment 2018, The Strategy for Plastics, para. 1). The strategy also states that "*95 % of the value of plastic packaging material, i.e. between EUR 70 and 105 billion annually, is lost to the economy after a very short first-use cycle*" (EC 2018, p. 2).

From a business perspective, the figures suggest a potential for economic growth for firms through implementing CE in their everyday operations. Companies can make individual changes in their value chain by following strategies such as the cradle-to-cradle design, R framework or adapting sharing business models. Moreover, by simply making their own resource usage more efficient through reducing waste, minimizing energy and other raw-material inputs, they may gain cost-saving opportunities (Sitra 2015). Those activities such as business model innovations and cradle-to-cradle design can be achieved through adaptation on the individual level. Still, an individual contribution is not enough as it limits to some degree a complete circular implementation. Closing the material loop and keeping resources in the cycle for as long as possible may be hard to achieve in isolation (Antikainen & Valkokari 2016). Thus, to drive forward, it needs all stakeholders in one ecosystem to share common goals, interests, and motivation towards CE-based operations.

Many networks or platforms for knowledge transfer as well as initiatives for collaborative solution creation have been launched over the last years. For example, the EMAF organized a multi-industry global initiative to define the new plastic economy (EMAF 2017b). Those initiatives call out for collective contribution from all entities affecting or being affected by each other within one ecosystem. Thus, strategic actions defining the transformation towards CE-based operations should be considered from a whole business ecosystem's point of view which means including all stakeholders involved in a specific segment or service. The plastic packaging ecosystem contains many different stakeholders, not just the plastic packaging producer – the firm using the package for their good, the consumer buying the good, the waste collectors, the incineration plant processing the waste, the governments supporting with regulations, the employees making strategic decisions. Making the vision of CE reality "*will require action from all players in the plastic value chain, from plastic producers and designers, through brands and retailers, to recyclers. Similarly, civil society, the scientific community,*

businesses and local authorities will have a decisive role to play in making a difference" (EC 2018, p. 5). Moreover, as Andrew Aulisi (in: EMAF 2017a, p.8) stated "*it needs a collaborative effort to make a meaningful shift*". To align all stakeholder operation towards CE, the initial step is to understand each stakeholder's role, interest, and their influence on a successful transition towards CE.

1.2. Research gap

CE is a relatively young research stream gaining importance through different institutions and scholars over the last decades. Related concepts such as performance economy or industrial symbiosis as well as more practical principles such as the cradle-to-cradle or biomimicry have shaped the understanding of CE and may be used to describe different schools of thought (EMAF 2019b). The EMAF has published many practical case studies and reports about CE in multiple industries. Through the foundation, CE has become fairly good structured concerning its origin and scope. CE studies have mainly focused on conceptual insights aiming to identify the main definition, as well as principles, barriers, and limitations of the concept (Kirchherr et al. 2017; Korhonen et al. 2018a; Tura et al. 2019; Zink & Geyer 2017). Other studies have focused on the relationship of the concept of CE with corporate social responsibility, sustainability or sustainable development (Suarez-Eiroa et al. 2019; Korhonen et al. 2018b). Attempts have as well been made in understanding the potential of growth through a transition away from linear towards circular business models (Bocken et al. 2014; Lewandowski 2016) and providing new frameworks on how companies can adopt or innovate their current business model on an individual level (Urbinati et al. 2017). Some recent research papers also acknowledge the urgency of CE approaches regarding materials and more closely plastic packaging material. Therefore, EMAF has published three reports calling out for a rethinking in the plastic ecosystem, researching the need of new strategies for recycling and reuse of plastic materials as well as new principles for safer material flow of plastic between 2016 and 2017. Their main agenda is to create a new plastic economy but, even though they acknowledge the need for collaborations, they do not explain how those collaborative efforts should look like. They neither clarify how to identify and define the role of different stakeholders in the transformation nor how they can influence or delimitate the vision of CE on an ecosystem level.

For a successful transformation towards a circular economy, it is clear that a full system shift supported by more than just one actor is needed. It requires "*co-evolving* [of different actors']

capabilities and roles" (Wheeler et al. 2003, p. 4). This means all stakeholders in an ecosystem have to set common goals and interests and make collective strategic actions (Gupta et al. 2019). Furthermore, De los Rios and Charnley (2017, p. 109) state that a "*systemic transformation can be hindered when some actors involved are not aware of the role they are expected to undertake*". And Gupta et al. (2019, p. 3) have declared "*a stakeholder perspective is critical and can provide the required framework for a shift towards the CE paradigm*".

Therefore, to understand the stakeholder's roles and their influence on one another in the plastic food-packaging ecosystem in Finland, this thesis utilizes the stakeholder approach (SA). Popularized through Freeman's (1984) book "Stakeholder Management: A stakeholder approach", the importance of stakeholder theory (ST) in strategizing has become widely known. The ST understands long-term success as a condition evolving through creating value to all its stakeholders, not just the shareholders (Freeman 1984), which consequently means a firm has to scan and understand the needs of its stakeholders. Previous studies have been examining this approach through numerous angles and introduced different frameworks to the field. In order to understand which stakeholders are important for the management, they do not only need to sort stakeholders to certain classes, but also understand which of the classes they should respond to (Mitchell et al. 1997). Mitchell et al. (1997) introduced a framework for classifying stakeholders through learning about their power, legitimacy, and urgency. Frooman (1999) introduced a typology of resource relationships to understand the stakeholder's influence on each other, combining stakeholder influence with resource interdependence. Many more scholars argue that the stakeholder theory can be useful when applied in sustainable management (Hörisch et al. 2014).

To summarize, the CE field from the scientists' side has been widely driven by theoretical and conceptual approaches, which leaves a gap for empirical studies. Furthermore, even though the need for an ecosystem perspective in the transition to a circular economy has been acknowledged, recent publications have focused on material, design and/or individual based strategies for a transition to a circular economy. Additionally, regarding plastic packaging, it has been recognised as an important ecosystem, but there is a research gap for understanding the role of all stakeholders as well as the influence they have on each other in the ecosystem. These circumstances call for strategies to drive stakeholders' behaviour towards necessary changes. To find out the stakeholder's role, motivation and influence variables, parts of the

stakeholder approach may be utilized with the requirement to adjust it to an ecosystem-level perspective.

1.3. Research question

The main objective of this research is to understand how key stakeholders influence each other when moving towards CE-based operation in an ecosystem, thus, how they influence on the transition to CE-based operations. Furthermore, the focus is on examining the Finnish market and, hence, understanding Finnish stakeholders. The selected ecosystem of plastic food-packaging is therefore suitable as it clearly offers a lot of opportunities for sustainable improvement and simultaneously has been identified as a priority issue by the EU in the transition to a CE. This research also attempts to expand the circular economy literature by examining it through the lenses of a stakeholder perspective. To do so, it is necessary to explore how insights from the stakeholder theory (ST) can be used to understand how a transition can be successfully achieved and how stakeholders' influence may support or prevent the change towards CE-based operations in the ecosystems.

Hence, the present thesis seeks to answer the following research question:

> ***RQ: How can key stakeholders influence the transition towards CE-based operations in the plastic food-packaging ecosystem in Finland?***

In order to address the main question, the thesis is guided by two sub-objectives:

> *RO1: Who are the key stakeholders in the plastic food-packaging ecosystem?*
> *RO2: What are the necessary changes needed to transition towards CE-based operations in the plastic food-packaging ecosystem?*

The first research objective aims to identify those stakeholders which are of higher importance for ecosystem to transition to a CE. Here, the focus is set on understanding the roles stakeholders take and whether their role is supporting and influencing or whether they are currently hindering the transition due to their role or actions. The second research objective aims to identify the challenges which have to be overcome, and the necessary changes which need to happen in order to successfully transition to a CE. By combining the results of the research objectives, the research question can be answered. To understand the stakeholders

influence on the transition, it is not only to look at what influence they can have on one another when transitioning towards CE-based operations, but also how they take influence on the whole ecosystem transition.

1.4. Scope and delimitation of the study

To fulfil the requirements of a master thesis a scope on one narrow ecosystem was chosen – the Finnish plastic food-packaging ecosystem. By delimiting to Finland as a single case country and choosing plastic food-packaging as a material choice the research might have restricted managerial and theoretical outcomes. This should be taken into account in the discussion of the results.

The thesis will utilize the CE research stream to recognize what CE means and how a transition of the Finnish plastic-packaging ecosystem to a CE can be successful. It will also look at its origin, development, and relation to different schools of thought, which can be identified as different perspectives on the whole concept of CE. Furthermore, in order to answer the research question, the literature will include general principles and strategies for CE. However, even if CE is closely related to sustainability, corporate social relationship and sustainable development studies, this thesis will not name literature regarding the interconnection between those. Furthermore, this thesis does not attempt to understand circular business model opportunities in the plastic packaging ecosystem. Thus, it will not respond to business model innovation or value creation point of view on CE.

The SA has been chosen as a means to address the research question. As well as CE, the underlining idea of the concept lays in a paradigm shift in how a business is managed. Freeman (1984) states that a business has to create value not just for the shareholders, but for all stakeholders involved in the firm's operations. It can be assumed that the stakeholder theory and the circular economy perspective may share some common goals concerning business ethics. Moreover, the ST field provides many tools and frameworks, such as stakeholder identification, salience or interest and influence grid. With those, the stakeholder environment can be mapped and their influence on each other can be understood in the plastic food-packaging ecosystem. However, as the SA field has been scanned through many lenses it also needs an adaptation of the approach in the context of CE.

1.5. Structure of the study

This thesis is structured in five chapters. The present chapter introduces the current issues within plastic packaging and circular economy, as well as explain the research gap and research question at stake.

In the second chapter, the literature review aims to explain the theoretical background used for conducting this study and giving the base for the framework. Therefore, the chapter is divided in three parts, starting with the concept of circular economy, its origin and the principles of CE-based operations. After that the stakeholder theory is examined regarding stakeholder identification, differentiation and influence. Finally, the last part discusses the concepts concerning the plastic food-packaging ecosystem and therefore leading to the theoretical framework in form of a stakeholder analysis through an ecosystem perspective.

Next, the methodological chapter seeks to clarify the choices for the research strategy. Therefore, it also illustrates the detailed sample criteria for the embedded case companies and the techniques used for the data collection and analysis. The research methodology part is concluded by explaining how data quality and credibility of this study has been ensured.

Thereafter, the empirical findings are demonstrated in the fourth chapter. Structured along the theoretical framework, this chapter first identifies the stakeholders of the ecosystem. Next, it discusses the interest and variables of influence of the stakeholders in the plastic food-packaging ecosystem as well as the stakeholder's challenges with CE-based operations. Concluding with a discussion of the key findings and answers to the research question, it compares the empirical and theoretical results.

The final chapter represents the theoretical, managerial and political implications, and points out the limitations of the study as well as the suggestion for future research.

2. LITERATURE REVIEW

This section provides an overview of the different theories used in this research. In order to ensure a good overview, the literature review will firstly explain the core and emergence of the concept of circular economy (CE), which leads to the explanation of the contemporary school of thoughts currently associated within CE. Then, to explain a successful transformation towards CE, the principles needed for CE-based operations are pointed out.

The topic under research is who are the key stakeholders which are relevant for the ecosystem transition and how are these stakeholders influencing one another when moving towards CE-based operations. Therefore, the second part of the literature review will continue with the introduction of the stakeholder theory (ST). Here, stakeholder analysis (SA) models and the attributes of stakeholder influence are pointed out. The last part will explain its combination regarding the aim of this research to understand the stakeholders' influence on the plastic food-packaging ecosystem. Both theories can be aligned to create a research framework for studying the stakeholder's role in the ecosystem and stakeholder's impact on an ecosystem transition towards CE.

2.1. Circular economy literature review

The growth in popularity and interest towards the concept of CE in the last decades has been strongly driven by practitioners and cannot be tracked down to a certain date or author, but to several academics, business leaders and political institutions (EMAF 2019a). Especially national governments and policymakers from the EU, Japan, Finland and business foundations and firms such as Unilever, or UPM have made their efforts to develop and accelerate the use of the concept (Korhonen et al. 2018a; Murray et al. 2017; Bocken et al. 2017). The CE literature is just in its initial phase, which leaves yet an unexplored gap for more scientific in-depth studies (Ghisellini et al. 2016; Korhonen et al. 2018a). Some see it as a new concept requiring a paradigm shift, others as a framework to gain greater sustainability, either way, described, "*CE is an alternative to a tradition take-make-dispose linear economy*" (Bocken et al. 2017, p. 476). However, a successful transition towards CE needs changes in the operations from all sides.

2.1.1. Definitions of CE

At the current state, there is not one unified and unambiguous definition of CE (Reiki et al. 2018). As a study by Kirchherr et al. (2017) demonstrates, there are currently at least 114 definitions. Yet there have been many scientists attempting to create a consensus on the many points of views (Prieto-Sandoval et al. 2018; García-Barragán 2019). The EMAF is one institutional forerunner in the transformation to a CE and has given the most applied (Kirchherr et al. 2017, p 226) and as well most renowned (Geissdoerfer et al. 2017, p. 759) definition, as follows: *"[CE] is an industrial system that is restorative or regenerative by intention and design. It replaces the 'end-of-life' concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse, and aims for the elimination of waste through the superior design of materials, products, systems, and, within this, business models"* (EMAF 2012, p.7). This emphasizes the main idea of moving towards full regenerations with the aim to replace the 'end-of-life' logic completely. Moreover, it underlines some necessary changes in the operations such as the switch to renewable energy and the reduction of waste as output. However, it can be argued that this offers a rather complex definition, but still only gives fragments of what CE means. The variety of definitions shows that CE has many different notions necessary for a comprehensive understanding of the concept.

As the term of the concept already highlights, circularity plays an important part which implies that something is starting and finishing at the same place (Oxford dictionary 2019a), thus creating a closed loop. The notion of closed material flow is found in several definitions. Affirmed by Stahel (2016, p. 435) who describes CE as an economy aiming to "*turn goods that are at the end of their service life into resources for others, closing loops in industrial ecosystems and minimizing waste"*. An interesting notion mentioned by Stahel is also the ecosystem point of view. Adapted from nature, the ecosystem point of view emphasizes the complex relationship that exists between all components and participators within the system and that to reach closed loops all members of the ecosystem have to work together.

Material flows are also taken into account by Geissdoerfer et al. (2017, p. 759) characterizing CE "*as a regenerative system in which resource input and waste, emission, and energy leakage are minimised by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing,*

refurbishing, and recycling". This interpretation gives concrete practical suggestions on how a closed material loop could be built and maintained. Looking at those definitions, they highlight the importance of improved resource management through minimizing input (raw materials, resources, energy) and eliminating output (waste, emission).

Another set of definitions concentrates as well on the goal of CE to create higher economic growth and social value. Murray et al. (2017, p. 369) state CE as *"an economic model wherein planning, resourcing, procurement, production and reprocessing are designed and managed, as both process and output, to maximize ecosystem functioning and human well-being"*. Thus, this definition explains CE as a potential means to increase not only the social value but also improve the value of the whole system. Reiki et al. (2018, p. 246-247) add that "*CE is widely posed as alternative model of production and consumption, a growth strategy enabling the 'decoupling' of resource use from economic growth, thereby contributing to sustainable development"*. Thus, there is a general understanding that by keeping materials in the cycle, the value of the materials can be sustained and kept high, which as a result leads to economic growth. The potential that can be achieved through a successful transformation to CE has also been recognized by the European Commission: "*In a circular economy, the value of products and materials is maintained for as long as possible. Waste and resource use are minimised, and when a product reaches the end of its life, it is used again to create further value. This can bring major economic benefits, contributing to innovation, growth and job creation"* (EC 2019c, para. 1). Those definitions underline the transformation away from a simple profit maximization growth strategy by adding a desire to bring wider economic and social value to the growth purpose of a company.

Some recent scholars further emphasize the need for a complete paradigm shift in the way our system works in order to drive the discussion of CE to the next level. Line in line with a business' ecosystem view, the whole organization and affected stakeholders have to be exposed to a fundamental change for CE to happen (Ritzen & Sandström 2017). This calls out for a shared understanding and common language (Saidani 2019) on all different levels of an ecosystem. Going beyond the previous definition and including this notion, Kirchherr et al. (2017, p. 224–225) characterize CE as "*an economic system that is based on business models which replace the 'end-of-life' concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes, thus operating at the micro level (products, companies, consumers), meso level (eco-industrial parks) and macro*

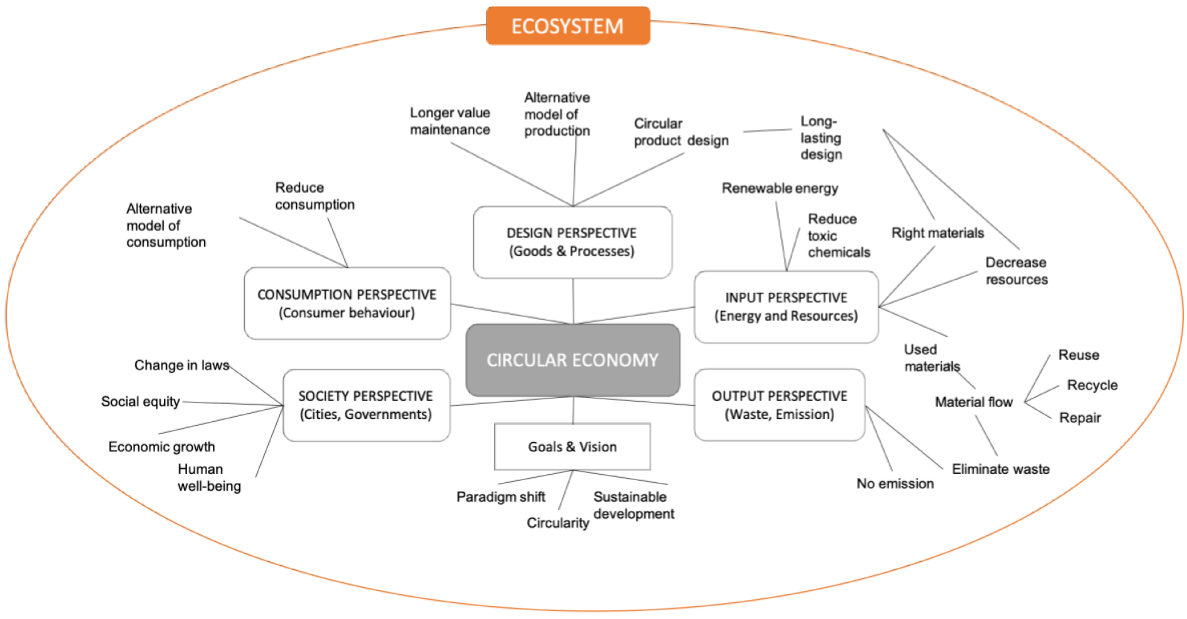
level (city, region, nation and beyond), with the aim to accomplish sustainable development, which implies creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations". Another fully comprehensive definition was offered by Priesto-Sandoval et al. (2018, p.610) who define CE as *"an economic system that represents a change of paradigm in the way that human society is interrelated with nature and aims to prevent the depletion of resources, close energy and materials loops, and facilitate sustainable development through its implementation at the micro (enterprises and consumers), meso (economic agents integrated in symbiosis) and macro (city, regions and governments) levels. Attaining this circular model requires cyclical and regenerative environmental innovations in the way society legislates, produces and consumes".* This shows by far a more unified complex definition including several different ankles of CE. It needs a collaborative work among those who exist in a circular model and shows the three different levels where CE transformation should happen: micro, meso and macro level.

Table 1. Overview of keywords in existing definitions of CE.

Author	**Keywords**
EMAF 2012, p. 7	Restorative and regenerative system; replace end-of-life; renewable energy; reduce toxic chemicals; reuse; minimize waste; superior design.
Stahel 2016, p. 435	Closing loops; ecosystems; minimizing waste
Geissdoerfer et al. 2017, p. 759	Regenerative system; minimizing resource input, waste, emission, and energy; closing loops; long-lasting design; repair, reuse, remanufacture, refurbish and recycle.
Murray et al., 2017, p. 369	Design; resources; output; maximize ecosystem functioning; human well-being.
Reike et al. 2018, p. 246-247	Alternative model of production and consumption; decoupling of resources; economic growth; sustainable development.
EC 2019c	Value maintenance; minimizing waste and resources; economic benefits; growth.
Kirchherr et al., 2017, pp.224–225	Replace end of life; reducing, reusing, recycling, recovering material; reduce consumption processes; operating on micro, meso and macro level; sustainable development; creating environmental quality, economic prosperity, social equity.
Priesto-Sandoval et al. 2018, p. 610	Paradigm shift; nature; close loops; sustainable development; micro, meso and macro level implementation; regenerative environment; change in law and consumption.

Table 1 displays an overview of keywords mentioned in all definitions which highlights that there is a variety of interpretations. It shows that CE is certainly not a trivial undertaking but synthesizes several different perspectives, which require changes on many levels. Common attributes included are the core goals 'circularity' (or in similar wording like closed loops, restorative design, replacing end-of-life), 'sustainable development' and 'paradigm shift'. Even though the articles analysed have been published within a period of two years (2016-2018), a profound understanding has emerged and shows that academics set their focus on several notions within CE. Thus, the definitions further point out different perspectives (minimizing waste output, decreasing resource input, redesigning products and processes, changing consumption behaviour, increasing social value and economic growth, include all levels in the ecosystem), which have to co-exist in a circular economy in order to reach the vision and make a full transition to a CE. Therefore, a mind map can be drawn where the keywords can be classified in the different perspectives and the goal (Figure 1).

Figure 1. Perspectives in CE and its attributes.



2.1.2. The emergence of school of thoughts

The different notions that are presented in the variety of definitions may have occurred from the development of the concept over the years. Even though the awareness of CE only increased in recent years, the core idea has already emerged much earlier. Academics such as Ghisellini

et al. (2016) and Geissdorfer et al. (2017, p. 759) suggest that Pearce and Turner have originally introduced CE in 1989. These authors investigated "*the linear and open-ended characteristics of contemporary economic systems*" (Geissdorfer et al. 2017, p.759). However, even earlier Boulding's (1966) stated that economy and environment have to co-exist in equilibrium, as the earth is a closed system with infinite capacity and only through circulation resources can become unlimited. Furthermore, Stahel and Reday (1976) have introduced a 'loop economy' as a means of preventing waste, creating jobs and improving resource efficiency. Likewise mentioned by Stahel (1982) was the idea of a business model moving away from ownership to selling utilisation of goods, now familiar as the performance economy.

The core idea of CE derived from many scientific disciplines such as ecology, economy, engineering, design and business, and can be associated with a variety of other related concepts (Prieto-Sandoval et al. 2018). EMAF (2019b) state the relation of CE to seven sub-concepts building the backbone of CE. EMAF describes those as school of thoughts: Cradle-to-cradle, performance economy, biomimicry, industrial ecology, natural capitalism, blue economy, and regenerative design. However, the literature does not show a consensus on the most relevant ideologies. Therefore, Geissdoerfer et al. (2017) names that the theoretical influences are cradle-to-cradle, laws of ecology, looped and performance economy, regenerative design, industrial ecology, biomimicry and the blue economy. Bocken et al. (2017) in his article about 'taking the circularity to the next level' associates CE with industrial ecology. And Korhonen et al. (2018) as well describe industrial ecology as constituting to CE but add the industrial symbiosis, the cradle-to-cradle and the sharing economy (which is closely related to the performance economy). Likewise mentioned by De los Rios and Charnley (2017) are the industrial ecology, cradle to cradle, performance economy and biomimicry.

According to the frequency with which the related concepts were found in the review of the literature, four schools of thoughts may be detected as most relevant and important to CE: 1) Industrial ecology (including industrial symbiosis), 2) cradle-to-cradle, 3) biomimicry and 4) the performance economy (service economy). The following paragraphs will introduce their main idea and ideologies roughly. As well as when studying the definitions of CE, it can be observed that each of the school of thought sets their focus on a certain aspect whether it is more on the design of a product, the material choices or the business model of a company. This leads to the conclusion of this chapter to connect the perspectives of CE with the attributes of

the four school of thoughts (see Figure 2, p. 27). To an extend the school of thoughts supplement the perspectives of CE and enrichen the holistic view of CE.

Industrial ecology

The concept was initiated in the late 1980s in an article by Frosch and Gallopoulos (1989) who reacted to raising concerns about the negative impact the 'end-of-pipe' approach of industrial waste had on the environmental. The industrial ecology (IE) tries to understand the function of natural ecosystems to resemble an industrial ecosystem towards the natural rules. According to Graedel and Allenby (2003), the goal is to view an industrial system "*not in isolation from its surrounding system, but in concert with them*". In practice, it wants to revise the flow of material and energy in industrial and consumer activities and the effect it has on the environment (White 1994). New industrial models should be built just like a biological ecosystem aiming for a closed loop process, where output of one process may become input for another process (EMAF). Thus, IE has its focus on the balance of inputs and outputs, improving resource efficiency by collaborative multi-industrial partnerships. This relationship perspective of IE has been labelled as an **industrial symbiosis** where competitive advantage can be achieved via a cooperative network through eco-industrial clusters. A community of different organizations within geographical proximity willing to physical exchange materials, water, energy, by-products and/or services, thus creating synergistic possibilities (Baldassarre et al. 2019). "*By working together, businesses strive for a collective benefit greater than the sum of individual benefits that could be achieved by acting alone*" (Chertow 2000, p 314). However, just as in the natural biological symbiosis itself, the exchange of resources in eco-industrial parks is usually limited to a geographical place.

In comparison, the idea of IE seems to be very similar to CE. However, it is closely related to the notion of resource-related definitions and supports firms with closing or narrowing material loops. Its principles and ideas might help companies to improve their resource efficiency (eco-efficiency) and collaborations efforts by moving the strategy for competitive advantage to a collaborative approach through eco-industrial communities (industrial symbiosis). Many scholars have underlined the connection of IE in the transformation towards CE (Saavedra et al. 2018). Thus, Baldassarre et al. (2019) framed industrial symbiosis as a business model archetype within CE and as an example names the eco-industrial park at Kalundborg in Denmark.

Cradle-to-cradle

An architect, William McDonough, and a chemist, Michael Braungart, introduced the Cradle-to-cradle (C2C) approach in their book 'Remaking the way we make things' (2002). Combing intentional design of products with the chemistry science, they call out for a new approach for product design by moving from a cradle-to-grave towards a C2C pattern. "*The Cradle to Cradle framework focuses on design for effectiveness in terms of products with positive impact and reducing the negative impacts of commerce through efficiency*" (EMAF 2019b, para. 1). As stated by Llorach-Massana et al. (2015, p. 244), C2C enhances eco-efficiency (reduce or minimize damage) with **eco-effectiveness** and aims to accomplish "*the state of zero: zero waste emission, zero resource use and zero toxicity*". Eco-effective solutions maximize the value of goods without creating a negative footprint. To achieve the goal of eliminating waste out of industrial and commercial processes C2C framework employs three principals:

(1) The first principle is **'waste equals food'**. Alongside the idea of the state of zero, waste is eliminated by being routed to another circle of resources. The idea is to see waste as a nutrient for something else. This requires an imperative division of resources into two different categories: biological and technical. First are **biological nutrients** which demonstrate biodegradable materials that are consumed during their lifecycle or can safely return to the environment. Second are **technical nutrients**, which do not have a natural degradation or abrasion. Even though materials may still have a value at the end of their lives, they are in general harder to be re-entered in the system. Thus, second materials have to be circulated to stay in a closed loop via recycling, reuse or similar strategies. This results in a biological metabolism and a technical metabolism. However, many times when 'waste' is re-entering the cycle, their material value goes down due to quality or functionality loses. This process is described as 'downcycling' materials and is used to create a low-value product. As a counterstrategy, Braungart and McDonough (2002) suggest '**upcycling**' instead of where an old product gains value in new material flow.

(2) The second principle is to **'use clean and renewable energy'**. Adapted from the nature metabolism where plants need the sun. All kind of operations should utilize clean and renewable energy sources (Llorach-Massana et al. 2015). This includes all manufacturing activities of a C2C design-based product like heating, lighting, machinery and others where energy is needed. The energy source is not delimitated to

only solar energy, but moreover all kind of sources such as solar, wind, geothermal, gravitational, and biomass energy (McDounough & Braungart 2002).

(3) The final principle is to **'celebrate diversity'**. Just like nature values diversity of species, animal, cultures and solution, there is not just one design which fits it all. Process, manufacturing and product designs should be aligned as effective as possible to the environment it operates to create their niche. (McDounough & Braungart 2002)

C2C can be understood as a "*framework for designing products and industrial processes that turn materials into nutrients by enabling their perpetual flow within one of two distinct metabolisms: the biological metabolism and the technical metabolism*" (Braungart et al. 2007, p. 1343). The notion in this sub-concept is focused on the design, suggesting that already before the product design the principals and idea of C2C should not be neglected. Following its core ideas and rules, flows will not create 'waste', but rather new nutrients. It leads to closed material circles enabling a beneficial footprint for a product. Thus, this school of thought offers a framework and principles to strengthen the material input or output as well as the design of the CE concept.

Biomimicry

This approach has been shaped by biologist, Janine M. Benyus, in her book 'Biomimicry: Innovation inspired by nature' (1997). The core idea of biomimicry is to learn from nature itself when developing environmental or sustainable innovations (Reap et al. 2005). The earth and its ecosystem have evolved over billions of years gradually developing a highly efficient system which was capable of solving many problems on the way. Neither the humans nor the methods of production are immune to the 'guidelines', 'standards' and 'operating conditions' of life (Goldstein & Johnson 2015). Businesses and humans, who learn from those natural patterns, find answers to environmental issues and see opportunities to eliminate the negative impact. For example, through studying a leaf, engineers can get a better understanding of how to design a sufficient solar cell or by studying birds they can find inspiration for aerodynamics in vehicles. Benyus (1997) explains biomimicry-based innovation is inspired by nature relying on three principles:

(1) **Nature as a model**: Aims to study nature and adapt the processes, systems, forms, and strategies to solve human problems.

(2) **Nature as measure**: Biomimicry uses an ecological standard to judge the sustainability of innovations.
(3) **Nature as a mentor**: Seeing the learning potential from the natural world rather than only seeing it as a source for resources.

Benyus approach offers an alternative design model, which she believes will revolutionize the industrial production mechanism. In regards of CE, biomimicry can be seen more as a means for learning from the nature to improve the design of a product or even a business model in the first place in order to accelerate the transformation of CE.

Performance economy

As well as CE, this approach has been popularized by Walter Stahel who introduced it firstly as a 'functional service economy' (1994). The core lies in the optimization of the usage time, "*…to create the highest possible use value for the longest possible time while consuming as few material resources and energy as possible*" (Stahel 2008, p. 128). In an industrial economy, the firms take responsibility over the product until the point of sales and partly until the warranty time ends, after that utilization of the goods, quality or disposal becomes the consumers' responsibility. However, in most cases, it is not the buyer who knows the product components neither how to best maintain it. Thus, the buyer usually just disposes goods at the end of their lifecycle and buys a new one. This leads to a constant production of new products using new resources and under the circumstances of resource scarcity and carbon emission, which are set free during production processes, it does not apply a very sustainable process. To counteract the oversupply the system has to shift from selling a product to selling a service (service economy). "*The performance economy thus aims to enhance sustainability through a more dematerialized system*" (Geisendorf & Pietrulla 2018, p. 775). The three goals of a performance economy are creating new jobs, increasing wealth and decreasing resource consumption (Stahel 2008). One key principle of the performance economy is to choose **sufficiency strategy** (works in a functional service economy) over efficiency strategy (works in an industrial economy). Instead of encountering sustainable challenges such as pollution or waste management with increasing the efficiency of the counteracts, the environmental unfriendly outcomes should be prevented in the first place. Just like the motto, treat the root cause of the problem instead of the outcome of the problem. Taking waste management as an example, instead of only aiming to increase recycling rates of waste, a sufficient solution would be to prevent the waste in the first place. Moreover, efficient recycling means that products should be circulated back at the

end of their life, which indeed closes the loop but leaves the responsibility of returning the waste openly. In a performance economy, however, by choosing a sufficiency strategy, the firm would not sell the product, but only the performance of the product whereas the ownership would stay with the firm. Unlike with an efficiency strategy, the payment is delivered when the performance has been given and not when the property right has been transferred. Additionally, it is no longer the manufacturing quality which accounts for the liability but rather the usefulness and quality of the performance.

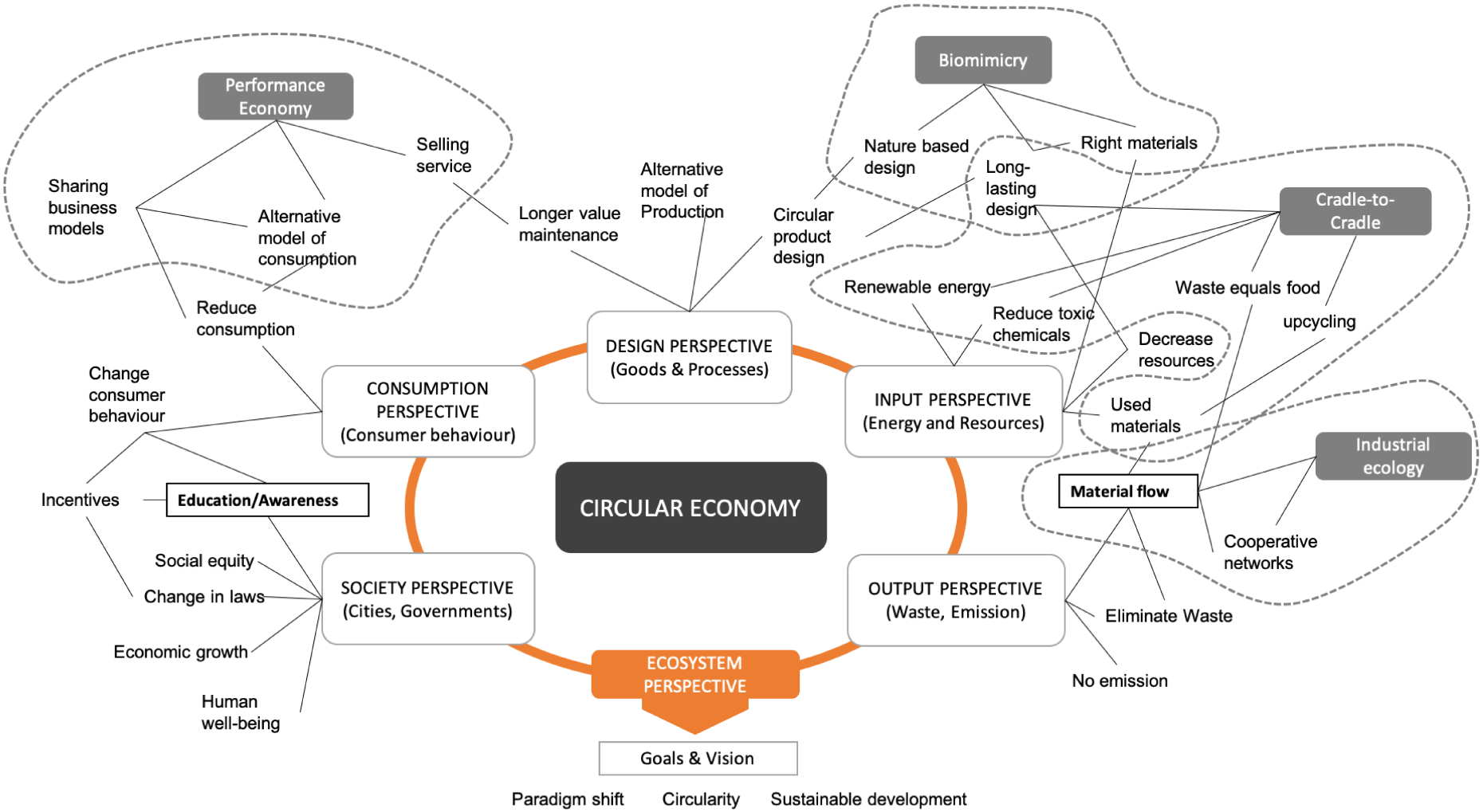
Thus, compared to the core concept of CE, the performance economy focus is on a business shift from a production-oriented industrial to a performance-oriented **service economy**, which means instead of selling products selling services (Stahel 2010). The main goals are product's life extension, long-life goods, reconditioning activities, and waste prevention, which should lead to smart solutions. These ideas from this sub-concept can be used to create new innovative business models like sharing and are useful to drive a change in consumer behaviour which is a notion of CE.

Many of those school of thought alone may sound very similar to the general understanding of CE, however, it can be argued they do still differ in their scope. Connecting the general idea of the sub-concepts with the introduced perspectives of CE shows the focus.

Table 2. School of thoughts compared to CE perspectives.

School of thoughts	**CE perspectives**					
	Input	*Output*	*Design*	*Consumption*	*Society*	*Ecosystem*
Industrial ecology (Industrial Symbiosis)		Eliminate 'end-of-pipe' approach				Synergistic benefits of collaboration
Cradle-to-cradle (Eco-effectiveness)	Zero resource Use of renewable energy	Zero waste Waste equals food	Design for effective-ness Celebrate diversity			
Biomimicry			Learn from nature			
Performance economy (Service economy)	Consuming fewer resources and energy		Sufficiency strategy Extend product life	Selling service instead of products		

Figure 2. Integrated attributes of CE concept.



2.1.3. Principles for CE-based operations

The core ideas of the different school of thoughts explained above broadens the understanding of CE. Each of those introduces more attributes that are important for a successful transition to a CE. They show the width and complexity of the concept and underline a need for an integrated approach from all sides where the attributes of the sub-concepts have been aligned with the initially identified perspectives of CE. This has been illustrated in figure 2. Each of those perspectives provides guidelines on how ecosystem members need to operate to achieve the vision of CE, thus they give ideas for CE-based operations. To understand CE-based operations one has to specify on the definition of an operation. The common understanding of the term is often associated simply as a synonym for a company or business organization. According to Oxford this is just one aspect of the term. They define an operation as an "*action of functioning*". For a firm to function, so to say to operate, they have to be involved in activities usually including a number of people (Oxford dictionary 2019b). For this thesis, operations are understood as actions or activities taken by firms, institution or other actors involved in the ecosystem functioning and that influence the transition to a CE.

Operations are not usually taken randomly, but rather work towards one vision guided by a set of preliminary decisions. Those guidelines which help steer the operations can be described as principles. A principle is "*a fundamental truth or proposition that serves as the foundation for a system of belief or behaviour or for a chain of reasoning*" (Oxford dictionary 2019c). Furthermore, Suarez-Eiroa et al. (2019) refer to those necessary rules needed for a successful transition to CE as operational principles. According to them, they "*describe theoretical strategies that explain how CE systems* [should] *operate*" (Suarez-Eiroa et al. 2019, p. 956). Thus, the purpose of operational principles in CE is to give the base for firms, governments, consumers and other stakeholders' strategic actions. So, to speak they should guide the members in an ecosystem towards CE-based operations.

Throughout the CE literature, scholars have had a different understanding of what to associate with principle. One of the most frequent principles pointed up is the act of reducing, reusing and recycling (Tura et al. 2019; Kirchherr et al. 2017; Reike et al. 2018). Those indeed give guidelines for managers to steer their operation, but they are used in many different contexts. Reduce has been associated not only with the need to minimize waste but also with consuming less (Ghisellini et al. 2016) and using fewer materials in the production. Reuse especially points

out the necessary actions to bring products back to a closed loop, thus aiming to minimize waste (Graedel et al., 2011). Recycling mostly underlines the need to keep the value of materials up even beyond the first lifecycle of a good or product and as well refers to the need for better waste management. Furthermore, another core principle named is the system shift which demands aligned actions on three levels of the system (Kircherr et al. 2017; Yuan et al. 2008). The first level is the macro system, meaning a need to change the structure of the entire economy. The second, the meso system, emphasizes the need for eco-industrial parks where actors work together and exchange resources. Lastly, the micro system level underlines necessary actions need to happen from firms, consumers and individuals. Those principles above are rather practical and can be found in different frameworks within CE literature. Suarez-Eiroa et al. (2019) name seven different principles along with the following elements: Resources, wastes, production, distribution, consumption, design and education. From all principles, they derive practical strategic suggestions. The first two principles refer to the need to adjust the resources entering a system as well as the waste exiting. With the second and the third principle the need to recirculate resource back to the production step or any other step in the lifecycle as well as to extend the good's life. The fifth principle explains the need to reduce the system size via the number of resources consumed. Next principle calls out for changes in the design for CE. The last principle, which has not been mentioned by many scholars, is the education of skills, knowledge and values of CE (Suarez-Eiroa et al. 2019).

This literature review proposes a similar illustration of the main principles of CE, based on the attributes of CE (Figure 2) and the suggestions by Suarez-Eiroa et al. (2019). By utilizing the knowledge derived from the theory above, the author defines core principles for the base of operations and companies' actions, divided into the perspectives of CE suggested in the first chapter of this literature review (Table 3). The author suggests, by following the principles and aligning the operations of all members with those principles, the vision of a full circularity of the economy can be achieved.

Input perspective

In the CE literature input can be associated with everything that enters the circle, besides product materials, also water, energy. In a circular system aiming to be regenerative, a division input is divided into different types (EMAF 2016). Resources can be either renewable, thus they are natural rebuild and can be re-entered in metabolism, for example via decomposing etc (Suarez-Eiroa et al. 2019). On the other side, resources can be non-renewable, hence, their

supply is finite such as earth minerals, fossil feedstocks or natural gas (EMAF 2016). This leads to the conclusion that the actions of all actors should be steered towards using the right resources. As CE as well aims to promote sustainable activities, it aims to minimize the negative impact on the environment. Thus, with the current concerns about resource scarcity, finite materials should be saved. This includes the key point of considering renewable energy sources such as wind or solar power over other sources (Elia et al. 2017). Further in CE the general amount of new inputs has to be reduced with the aim to be eliminated, rather reused, recycled or recovered materials have to function as input (Reike et al. 2018). This leads to the first operational principle to regulate the input of all kind of resources entering the circle including water, natural resources, energy.

Output perspective

Since CE stands for a closed loop system, the emergent of any kind of output does not support this outcome. Hence, the action of firms and all individuals in an ecosystem should be oriented towards eliminating waste out of the system (EMAF 2016). As suggested by the C2C sub-concepts core idea of waste equalling new nutrients, output should be divided into biological nutrients, which can be easily re-entered and technical nutrients which cannot be easily re-entered. Elia et al. (2017) therefore state that firms' strategies would be aligned with the idea of minimizing the output of technological waste and adjusting the emission rate of biological wastes. In their agenda for waste management, the EU (2008) points out a priority list of actions: 1) prevention, 2) preparing for re-use, 3) recycling, 4) other recovery, i.e. energy recovery, and 5) disposal in the landfill. If not possible to prevent waste completely, then it should be made possible to reuse which could be for example via repairing products. Biological nutrients can be easily recycled or recovered; however, technical nutrients might have to first be reassembled and then, if possible, recycled via expensive technical processes. In a CE, output should not end up in a landfill. The second operational principle is to minimize the output of waste and emissions and re-enter it to the cycle via reuse, recycle, recover or reassemble.

Consumption perspective

As principles one and two already point out it is important to reduce the input and output of resources, therefore the general consumption of resources has to be reduced as well (Ghisellini et al. 2016). Suarez-Eiroa et al. (2019) express that the issue is related to stock optimization, as resources are scarce, leaving a need to minimize the total quantity circulating within the system. In order to create a system where less is consumed, operations have to be steered towards

sharing models or selling services. The role of the producer is also to use fewer materials during production. Furthermore, going beyond extending producer responsibility, other stakeholders have to be made aware of their responsibility, especially the consumer. This calls out for higher transparency from the producers' side. Also, it needs actions towards changing the consumer behaviour which at the moment can be described as addicted to growth. "[E]*ducation is a tool to counteract this behaviour*" (Suarez-Eiroa et al. 2019, p. 958). The operational principle related to this perspective is to reduce consumption throughout the whole system including reinvention of business models and education of consumers.

Society perspective

CE aims to fulfil sustainable criteria to create sustainable development, which can be seen as well in the other principles when scholars talk about minimizing the negative externalities, emission, pollution and impact on the environment. Actions of actors in a CE should be aligned towards creating higher social value, such as social equity or human well-being (Murray et al., 2017; Kirchherr et al., 2017). Furthermore, scholars and practitioners in the CE field have identified huge economic growth potential and new job opportunities from implementing CE strategies. The literature of CE suggests that legislative and governmental bodies are a potential driver for this development if not taken voluntarily. Via laws or setting incentives, policymakers can steer companies towards operations that accelerate the transition towards a CE (Kalmykova et al. 2018). This principle is emphasising actors in a circular economy to align their actions towards increasing social value and sustainable developments.

Design perspective

At the moment, products, goods, processes are not yet always making it possible to follow all principles above, thus it needs changes in their design stages. Since CE wants to keep a closed material loop it emphasizes to maintain the value of resources as high and long as possible during its lifecycle and possible secondary usage stages. A design which aims to create long-lasting products increases the value during its life. To keep the value up also after the initial life of a product, resources need to be recycled, recovered, or reused. Hence, a product should be designed in the way that it could be easily reused, for example being reassembled into its material components or easily recovered for example via repairing, following eco-innovation or design strategies (Korhonen et al. 2018; Elia et al. 2017). However, the producers of a product are often those who carry the most knowledge about the materials or the methods on how to repair, reuse, or dispose it in the best way. As a consequence, a business model design

which keeps the responsibility or ownership with those who have the best knowledge is another aspect of CE. Business model choices regarding their value propositions should be oriented towards selling services rather than products. Furthermore, production processes should be built to minimize negative impacts and risk for the environment, leading to the need for new innovative designs on this level as well. This leads to the third operational principle to re-design products, business models and processes towards circular solutions.

Ecosystem perspective

In a circular ecosystem, it needs all members who are involved directly or indirectly within the ecosystem to make the right choices for their business operations (Kalmykova et al. 2018). According to Kirchherr et al. (2017, p. 224), CE is "*a construct that is developed through a multi-stakeholder discourse*". For example, to connect the waste stage back to the input of the resource stage, different actors in the system have to share and work together. This is also pointed out in the definitions of CE which includes next to the micro level – individuals, consumer, enterprises – and the macro level – governments and states – it needs a meso level. This level explains the synergistic benefit of eco-industrial parks where a net of companies or institutions work together to create a collective competitive advantage. However, collaborations which support a transition towards CE-based operation can not only be successful physically but technologically as well. Platforms can make it easier to share knowledge or resources across markets (Tura et al. 2019). As actions need to be drawn towards collaborating, it needs a common understanding and shared language (Blomsma and Brennan, 2017). Therefore, the last operational principle is that all stakeholders within an ecosystem should collaborate and drive communication with all members.

To conclude, CE-based operations are taken by firms, institutes or individuals who align their strategic actions according to the principles above. If all of the principles are implemented by all actors in one ecosystem it may support the transition towards a CE. Thus, once it has been identified what operations in one ecosystem are not yet aligned with the principles explained above, the operations should be changed to fulfil those. An open question to solve here is, however, who are the key stakeholders which have a - positive or negative - influence on the transition towards CE-based operation in line with all the principle. "*One of the reasons for implementation difficulties […] lies in lack of adequate information about the key stakeholders, direct and indirect beneficiaries and other parties involved in the business cycle*" (Gupta et al. 2019, p. 2). Furthermore, Gupta et al. (2019, p. 3) state that "*There is a need of collective action*

on the part of the all major stakeholders falling in the ambit of a complete business cycle. Thus, a stakeholder perspective is critical and can provide the required framework".

Table 3. Operational principles of CE.

Perspective of CE	**Principle for operations**
Input	Regulate the input of all kind of resources entering the circle including water, natural resources, energy.
Output	Minimize the output of waste and emissions and re-enter it to the cycle via reuse, recycle, recover or reassemble.
Consumption	Reduce consumption throughout the whole system including reinvention of business models and education of consumers.
Society	Align actions towards increasing social value and sustainable developments.
Design	Re-design products, business models and processes towards circular solutions.
Ecosystem	Drive communication and collaborations with all members.

2.2. Stakeholder theory literature review

As illustrated above, for a transition to CE, changes have to occur throughout the whole ecosystem and have to concern all stakeholders' actions. One of the main implementation challenges of CE-based operations is due to the lack of knowledge about the key stakeholders, their roles, interests to CE principles and influence on each other's operations. To make a successful transition happen to CE, there is a need to identify who is part of the ecosystem and how those participators can influence regarding the necessary changes.

This thesis utilizes different techniques from the stakeholder theory (ST) to support the identification and classification of key stakeholders, understand the variables of influence they can take and identify their roles in the ecosystem transition. Therefore, this part of the literature will first introduce the ST and its core understanding. Then, it will focus on explaining what stakeholders are, how they can be classified as well as how they can take influence on each other's strategic actions. The last sub-chapter will give a short introduction to business ecosystem theory and its connection to steering stakeholders.

2.2.1. Development of stakeholder theory

The ST is a broad research stream in the field of strategic management offering an alternative view to the shareholder theory. In the shareholder theory, the corporations' only social responsibility lies towards those parties who have a share in the firm (Milton Friedman 1970). The idea of business and society being interconnected to each other, thus actions taken by one influence the other, lead to the argument of a firm being a social construct with the responsibility beyond solely profit maximization function (Bowie 1981). The concept even though popularized by Freeman in his book "Strategic Management: A Stakeholder Approach", is not solely build on his contribution. The connection of businesses and society has been discussed inter alia in the concept of philosophy (Adam Smith 1759), business ethics, organizational theory or corporate social responsibility (Harrison & Freeman 1999) which have influenced the evolvement of the ST in different ways.

However, Freeman (1984, p. 1) who has given a huge contribution to the understanding of ST in the strategic management field, stated that the stakeholder approach "*can be used to enrichen the way we think of an organization*". He believed that the old organizational theories did not provide effective tools for the management to deal with the high levels of uncertainty they had to phase in the new fast-changing business environment of the late 1970s (Freeman 1984). "*Effective can be seen [to] create as much value as possible*" (Freeman et al. 2010, p. 9). The problem on how value is created and traded in the new business world, as well as the rising concerns about ethics and environment, became a hot topic for managers to integrate in their strategic decision-making process and lead to his argumentation to combine business ethics with organizational point of view to address responsibility concerns the management encounters.

Based on the idea that firms have relationships with individuals and other groups of its environment who are affected by their decision or action, but contrary also have the power to affect their performance in one way or another (Freeman 1984). Thus, organizations have relationships with all entities that have a stake in the business's activities and interactions as they are affecting the success of a firm. Therefore, Freeman concludes that for a business to be successful it has to create value for all those who have a stake in the firm's performance. Instead of focusing purely on the shareholder's interest of a firm, the managers should consider

demands from relevant stakeholders when making strategic business decisions (Freeman 1984). Managers cannot only look at one stakeholder in isolation but instead, they should understand the concerns of all stakeholders and explore the relationships to each stakeholder before setting objectives for the business course. With his contribution, Freeman offers a framework helping the management to deal with the rising environmental turbulences and uncertainties, understand the environment a company is operating in, and how this environment affects firms' operations towards success. His framework also attempts to give a base to manage a business more effectively.

Over the past decades, many models and techniques of the ST have emerged. According to Donaldson and Preston (1995), ST includes descriptive/ empirical, instrumental, and/or normative attributes. ST can be seen as descriptive because it describes "*what the corporation is"* (Donaldson and Preston 1995; p. 66) and how it is managed (Hörisch et al. 2014). It can be seen as instrumental as it offers a framework to understand and examine the connections, if any, between managing stakeholders and achieving the firm's performance goals (Donaldson and Preston 1995: p. 66). Besides, it can be seen as normative, as it discusses the purpose of business and gives moral justifications of ST (Hörisch et al. 2014). The basic notion of the original ST by Freeman considers all three aspects being inextricably linked (Hörisch et al. 2014). The basic notion is the recognition off the importance of stakeholder and their effective management for a business to achieve long-term success.

Table 4. Different types of stakeholder theory (Donaldson and Preston 1995, p. 66).

Types of stakeholder theory	**Focus**
Descriptive/empirical stakeholder theory	Description of how companies are managed; identification of relevant stakeholders
Instrumental stakeholder theory	Effects of stakeholder management on the achievement of corporate objectives
Normative stakeholder theory	Discussion of the purpose of business; moral justifications of stakeholder theory

Furthermore, scholars in the ST have provided multiple tools focusing on different aspects of how to manage stakeholders effectively. Some of them provided techniques that help to understand who stakeholders are and how to identify them. Others go beyond the simple identification and try to understand how to prioritize and classify them into different types of

stakeholders and other techniques provide processes on how to analysis stakeholders and draft strategies for further management accordingly.

Additionally, the usage of stakeholder analysis has been recognized as an important attribute by various scholars in regard to "strategy". Strategizing is being concerned with the act of planning on various levels, such as business or cooperate, and even with policymaking. Scholars such as Michael E. Porter (strategic groups, 5 forces) or Kenneth R. Andrews (SWOT) suggest when doing strategy formulation to not only look to the own internal capabilities but to also scan the environment. The stakeholder analysis offers a tool to identify stakeholder groups or key stakeholders, thus those who are necessary for the survival, can give important input to the operational planning process (Freeman 1984, p. 35). Furthermore, scholars such as Russell Ackoff and Charles W. Churchman connected the stakeholder analysis with organizational system strategy. Along with the logic that changes in the environment, including stakeholders' interest, are pressuring organizations decision-making process, a system can only be successful when stakeholder's participation can be ensured. Ackoff "*argues for the inclusion of stakeholder groups in solving system-wide problems*" (Freeman 1984, p. 37). With this thought, he connected the ST to collective strategies as a new field in the organizational theory. It needs the support and interaction of all stakeholder when redesigning a system to face societal problems. This is especially interesting for this research, as the aim is to look at the transition of one ecosystem towards CE-based operation. This, however, would require a whole system change, and all stakeholders affect the success of this change.

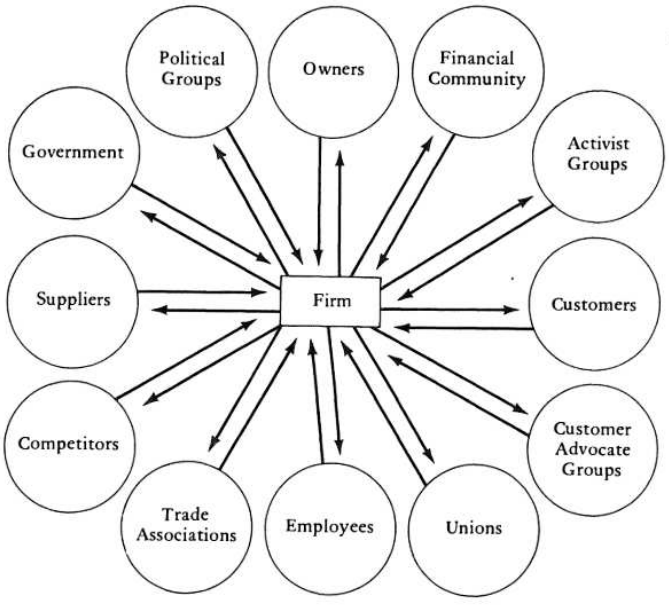
Thus, the initial ST has emerged from a single business strategy point of view for managerial decision-making to manage stakeholder and to understand stakeholder influence on the firm's activities towards high performance and long-term success. ST has also been used in different fields such as in project management, for understanding stakeholders' impact on the success of a project or in environmental management to manage stakeholders in regards of solving environmental problems. Scholars such as Checkland (1981) or Reed et al (2009, p. 1934) propose the "*whoever owns a problem should be a co-owner of the process to solve it*". Thus, managing and understanding stakeholder participation, interest, influence and power are important towards any desired outcome, which can be a firm's performance, project, redesigning a system, issues or phenomenon.

2.2.2. Who are stakeholders?

As ST has been so widely studied from diverse disciplines and scholars, it leads to a broad amount of different definitions (Reed et al 2009). However, the term "stakeholder" was first introduced by the Standford Research Institute in 1963 and was used to describe groups whose support was vital for an organization's survival. Stakeholders were defined as "*those groups without whose support the organization would cease to exist*" (Freeman 2010, p. 30). This understanding was the base for Freeman definition of stakeholders being "*…any group or individual who is affected by or can affect the achievement of an organization's objectives. Stakeholders include employees, customers, suppliers, stockholders, banks, environmentalists, government and other groups who can help or hurt the corporation*" (Freeman 1984, p.46).

To examine those groups, who have a stake in the organization's activities Freeman names generic stakeholder groups in an example map for a large organization (Figure 3). The map at that stage is rather trivial simply showing all persons, groups or institutions with a legitimate right, and not suggesting putting the interest or benefits of one over another (Donaldson & Preston, 1995). Freeman's preliminary definition is fairly broad but the most popular underneath scholars and gives the base for a diverse model to identify, classify and prioritize stakeholders.

Figure 3. Stakeholder map (Freeman 1984, p. 55).



Various scholars have attempted to create a more comprehensive explanation of stakeholders. Clarkson (1994; p. 5) defines a stakeholder as follows: "*Voluntary stakeholders bear some form of risk as a result of having invested some form of capital, human or financial, something of value, in a firm. Involuntary stakeholders are placed at risk as a result of a firm's activities. But without the element of risk there is no stake*". This especially means that stakeholders bear some form of risk towards a firm's activities.

Those definitions above are based on the perspective of organizations performance, whereas Gimble et al. (1995, p. 5) looking at ST usefulness for any kind of system. Thus, he states that stakeholders are *"all those who affect, and/or are affected by, the policies, decisions, and actions of the system".* Therefore, stakeholders are all those individuals, organized or unorganized groups of people *"who share a common interest or stake in a particular issue or system"* (Grimble & Wellard 1997, p. 175). In the context of environmental management, Reed et al. (2009, p. 1934) even goes further than simply naming individuals and groups of people as stakeholders. They base stakeholder definition as *"any naturally occurring entity that is affected by organisational performance"* (Reed et al. 2009, p. 1934), which can refer to living and non-living entities and may include mental-emotional constructs, such as the well-being of future generations. Many scientists have also suggested the natural environment itself as a stakeholder as it is affected by companies' actions, but also can affect business operations (Mitchell et al. 1997).

2.2.3. Stakeholder analysis

The stakeholder analysis (SA) is a practical tool for stakeholder management deriving from the ST. The idea of stakeholders affecting and being affected on the success of a firm or operation leads to the conclusion that to comprehend their influence, and how they may threaten or support the firms' performance or desired outcome of a process, it is necessary to analyse the stakeholder environment first. Many different methods exist to analyse from different viewpoints (Reed et al., 2009, p. 1947). According to Grimble and Wellard (1997), who base their definition of stakeholders on a system perspective, SA is the analytical approach or procedure helping to understand a system better through identifying key stakeholders, as well as to assess and compare their respective interest, roles and powers, as well as their relationships to each other in the system.

Frederick et al. (1992, p. 89) proposed one of the early SA-models and included a six-step SA for the purpose of strategic stakeholder management:

(1) Mapping stakeholder relationships is seen as the first step,
(2) Mapping stakeholder coalitions means to identify whether stakeholders can be aligned on specific issues,
(3) Assessing the nature of each stakeholders' interest aims to get a better understanding of their attitudes and motives of their involvement,
(4) Assessing the nature of each stakeholders' power by identifying types of power individuals or stakeholders may have,
(5) Constructing a matrix of stakeholder priorities aims to combine information's about their stake and their power,
(6) Monitoring shifting coalitions means to monitor dynamic variable of stakeholders' interest and their power on certain issues as those may change.

In the last decades, the SA tool has gained importance beyond the simple strategic stakeholder management but has found various practical implementations in different disciplines such as in project management (Aragonés-Beltrán et al. 2017) to understand which stakeholders support might be essential for the success of a project. Thus, according to PMI (2013; in: Aragonés-Beltrán et al. 2017, p. 452), SA for project management can be seen as a process of

(1) identifying stakeholders,
(2) analysing stakeholders' expectations and their impact on the project, and
(3) developing strategies for effectively engaging stakeholders in project decisions and execution.

Another discipline where SA has found application in practice is in the environmental management, as to solve an environmental problem those who have a stake in the problem should be involved in solving it. (Reed et al. 2009). In the context of natural resource management it is important to examine *"who these interested parties are, who has the power to influence what happens, how these parties interact and, based on this information, how they might be able to work more effectively together"* (Reed et al. 2009, p. 1947). They suggest a SA as a three-step process:

(1) The first step is to define "*aspects of a social and natural phenomenon affected by a decision or action*".
(2) The second step is to identify *"individuals, groups or organizations who are affected by or can affect those parts of the phenomenon"* which can go beyond simply individuals and peoples as stakeholder and may include non-human and non-living entities.
(3) The third step is to prioritize "*these individuals and groups for involvement in the decision-making process*".

Furthermore, SA can have a normative or an instrumental approach. The normative approach has been used to legitimise the decisions made through identifying to whom decision-makers are morally responsible to and involving them in the process (Donaldson & Preston 1995). A more pragmatically approach is offered by the instrumental perspective, which may be used by organisations, projects or policymakers to influence stakeholders. Thus, it aims to identify, explain and manage the behaviour of stakeholders towards desired results (Reed et al. 2009).

Results from conducting a SA can reveal multiple insight such key stakeholder in an initiative, project or for decision-making, their nature of their interest, inter-relationship, the different perspectives on actors included. Thus, they can be useful for organizations, individuals, policymakers or initiatives trying to achieve a certain goal, which involves stakeholders' actions (Brugha and Varvasovszky 2000). SA has also been investigated from an ecosystem level by Raum (2018) to identify the stakeholders involved in the UK forest ecosystem.

As this thesis aims to look at the plastic food-packaging ecosystem, the SA will be used in this way to understand, identify, differentiated and conduct strategies towards a successful implementation of CE-based operations in the ecosystem.

2.2.4. Stakeholder identification and classification models

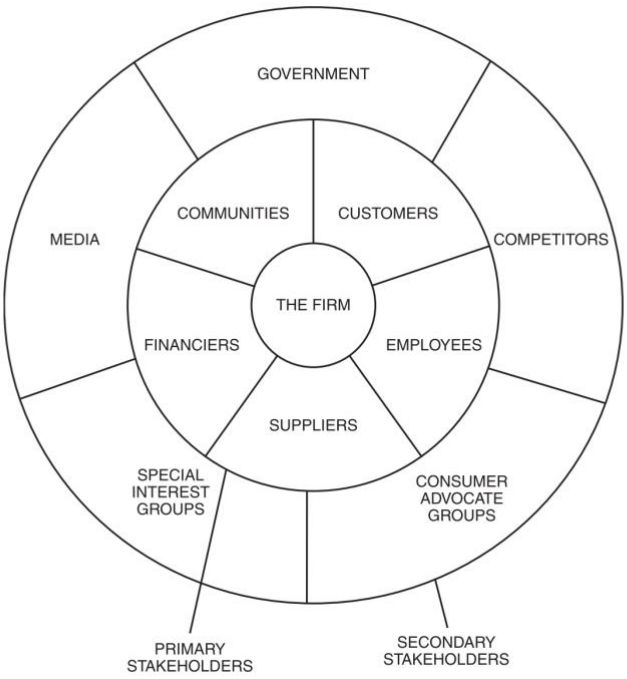
One part of the SA is the identification and classification of stakeholder. The ST states that if a firm seeks long-term success, it is the executive's job when deciding to observe stakeholders' needs, claims interest and manage their interest jointly. According to Freeman, when putting ST into practice managers "*must be willing to ignore certain groups who will have little or no impact on the corporation at this point in time*" (Freeman 1984, p 53). To manage effectively,

decision-makers need to identify stakeholder and understand their claims, interest or demands in the stake of a firm. However, to satisfy equally all different stakeholders' claims is not an easy job as sometimes interest may intervein with each other. It has been widely understood that it is impossible for firms to attend all actual and potential claims from all stakeholders. As a result of this statement, scholars in the ST field started to research the matter of how to differentiate stakeholder to spot those who have legitimate right on the firms' or operations objectives or those who's claims have to be prioritized for a successful realisation.

Stakeholder identification models

According to Freeman (1984), not all stakeholders have a direct relationship with the firm, but some influence the firm indirectly (Freeman 1984). Therefore, in a later version of his book Freeman et al. (2010) proposed a stakeholder identification map into different circles according to the state of their relationship (Figure 4). The inner circle contains of primary stakeholders who have high legitimacy towards the focal firm, thus without those the firm cannot achieve extraordinary performance. The outer ring, however, incorporates secondary stakeholder who can only influence the relationship the firm has with the inner circle, and has an indirect influence on the focal firms' activities.

Figure 4. Basic two-tier stakeholder map (Freeman et al. 2007, p. 8).



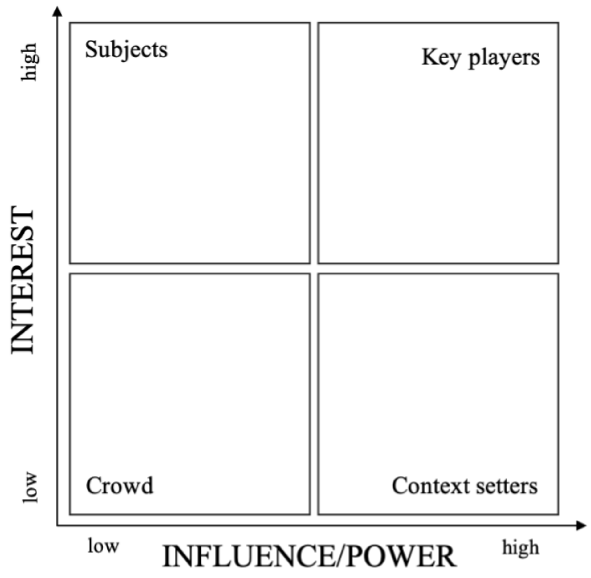
Stakeholder classification models

In terms of classification models, Mitchell et al. (1997) introduced a by far more sophisticated technique to explain who really counts, based on three attributes. As mentioned above, the prioritization of stakeholders is important, as it is impossible to satisfy all stakeholders' claims and interests simultaneously. Thus, it becomes a matter of strategic choices. In order to best prioritize stakeholders, Mitchell et al. (1997) introduced the stakeholder salience framework which aims to find out "*the degree to which managers give priority to competing stakeholder claims*" (Mitchell et al. 1997, p. 854). With the framework the dynamics of relationships with certain stakeholders are analysed and three different attributes being of importance here: *"(1) the stakeholder's power to influence the firm, (2) the legitimacy of the stakeholder's relationship with the firm, and (3) the urgency of the stakeholder's claim on the firm*" (Mitchell et al 1997, p. 854). The first attribute explains the stakeholder's power to influence a company. Thus, one stakeholder has the power to influence another; getting him to make an action, he would otherwise not have done (Pfeffer 1981). Often, power is achieved when an individual owns a certain resource and the other is dependent on it. Depending on the access towards resource, power can be executed in a coercive (physical resources like force or restrains), utilitarian (material or financial resources) or normative (symbolic resources) way (Etzioni 1964). Secondly, stakeholder relationships are then legitimacy when their actions are socially acceptable. This understanding derived from Suchman who defined legitimacy as "*a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions*" (1995, p. 574). The last attribute describes the urgency a stakeholder's claim has on the other one (Mitchell et al. 1997). Hence, a relationship is urgent when stakeholders' demands call for immediate action. Mitchell et al. (1997) propose that two conditions give the base for urgency: a relationship or claim (1) which is time-sensitive and (2) which is important or critical to the stakeholder. They further propose whether the stakeholder possesses one two or three of those attributes is the basis for the classification of stakeholders and as more attributes, he possesses as more salience he is to the firm.

Another classification model measures two attributes of stakeholders: Interest and influence which can either be high and low and depending on those the stakeholders can be divided into four classes according to a matrices diagram seen in figure 5 (Eden & Ackermann, 1998; De Lopez 2001, Reed et al. 2009). A stakeholder has a high interest in a project or firm performance when he is motivated to participate and has the will to make a desired outcome happen. Interest

can be established due to many reasons such as monetary (like financial benefit), but also to non-monetary (like image). Stakeholder who have high interest mostly are supportive of the cause towards a certain outcome. In the ST field, scholars often refer to influence coming from power (Freeman 1984; Beritelli & Laesser 2011; Reed et al. 2009). The first class contains 'key players' who have high interest and high power over a desired outcome and it is necessary for the success to have their active contribution (Reed et al. 2009). Those who have no interest but have a high influence are especially risky for the undertaking and are referred to as 'context setters'. 'Subjects' are those stakeholders who have high interest, but little or no power to impact, however, they might gain influence by alliances. The last class represents the 'crowd', which includes those who have little interest in power over the phenomenon and might be therefore rather irrelevant for a desired outcome (Reed et al. 2009).

Figure 5. Interest and influence classification model (compare Reed et al. 2009).



In the context of this thesis, depending on the category a stakeholder may be differentiated to, it offers insights on who are the stakeholders that really count for the desired outcome of CE. It may identify those stakeholders, which are in a position due to power or influence to drive the transition, but due to lack of interest not yet make the necessary changes (Context setters). It might be used to understand, who takes an unsupportive role, but its participation is crucial for success.

Variables of Influence

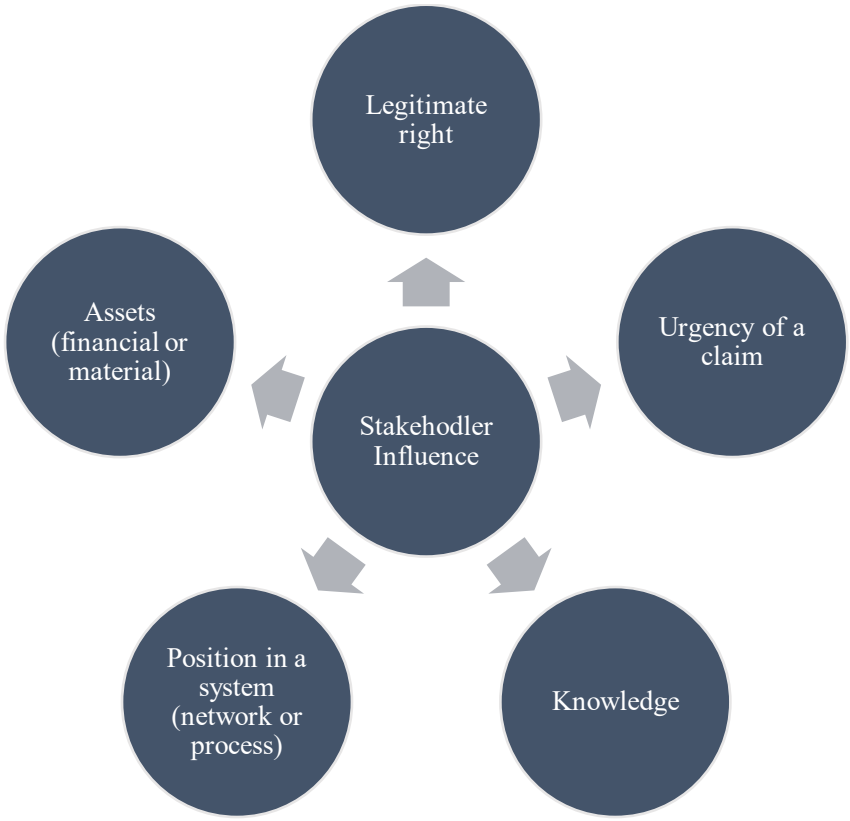
In order to understand the different degrees of influence, it is necessary to look at the attribute or variables used to measure influence in the ST field. Influence has been defined as a "*process of affecting the thoughts, behavior and feeling of others*" (Reed et al. 2009, p. 1942). Furthermore, the connection between influence and power has been pointed out either in the way that the scope of influence is dependent on power (Reed et al. 2009; Beritelli &Laesser, 2011) or that influence drives through power over resources (Mitchell et al 1997; Hein et al. 2017). Thus, the influence one stakeholder can have on another stakeholder's operations often derives from certain types of resources.

Mitchell et al. (1997) suggests a stakeholder salience model, which is built on the three attributes - legitimacy, urgency and power - also determines who of the stakeholders is more important and has influence. Thus, it can be argued that a stakeholder in possession of any of those three attributes or more also has an important role in reaching a desired outcome. Further, Friedman and Miles (2006) suggest that legitimacy is an important basis of influence and it is important to understand how a legitimate and rightful stake can be described. Urgency comes from whether a claim a stakeholder possesses over another has a time limitation or its implementation is critical for the success.

However, power is a broad term as mentioned above power can derive from many types of resources. Beritelli and Laesser (2011) suggested four variables of power one stakeholder has to influence another: (1) A superior position in a network can give vertical power over another. (2) Knowledge such as skills or due to experiences is another form of resource and can give power. (3) Having a certain position in a process may give process power. (4) If a firm owns assets such as money or land, they can have power over another who may need those assets to exist (Beritelli & Laesser, 2011).

Since this study aims to conduct exploratory research, the attributes of influence from the theory constitute as the base for the stakeholder analysis used for the empirical part. The variables that can be derived from the different scholars are legitimate right, urgent claim, knowledge, position in a system, assets. However, the author will if needed expand those from the empirical findings.

Figure 6. Variables of stakeholder influence.



2.2.5. Business ecosystem theory and stakeholder analysis

As this study aims to examine the whole plastic food-packaging ecosystem, it needs the viewpoint of an ecosystem instead of a single organization. The theory of business ecosystems, first introduced by Moore (1993), is still at its conceptual phase and provides yet another tool for strategy formulation (Zhang & Liang 2011). The interest in this perspective has gained higher awareness in the field of strategy as a means to replace an industry-based approach for analysing performance with the concept of an ecosystem (Teece 2014, in Jacobides et al. 2018, p. 2256). This implies that the boundaries of an organizations value creation go beyond the direct members, supplier and distributors, of a value chain.

By changing the view to a broader picture, an ecosystem analysis replaces the products levels limited thinking of suppliers/distributor being influential contributors with a system level including direct as well as indirect contributors to ecosystem health (Zhang & Liang 2011). Indirect actors in an ecosystem can be for example the media or the government as even though

they not directly involved, some scholars see them as powerful influencers (Iansity & Levien 2004; Zhang & Liang 2011). According to Iansiti and Levien (2004) firms cooperate with different actors across industries when striving for their business purpose. Similar to the understanding of stakeholders, "*the term ecosystem refers to a group of interacting firms that depend on each other's activities*" (Jacobides et al. 2018, p. 2256). Therefore, it is a logical result to connect those findings related to actors' roles of an ecosystem within the stakeholder analysis for this research, in order to deeply understand the roles of stakeholders and their influence on CE-based operations in the plastic food-packaging ecosystem.

But what kind of different roles can stakeholders take within an ecosystem? Scholars among the field have identified actors may take specific roles and related to those they may influence the performance of the whole ecosystem in various ways. According to Iansiti and Levien (2004), there are keystone organizations, value dominators, physical dominators, niche players, and commodity. Similar named are those five strategic roles by Zhang and Liang (2011, p. 158): Keystone, landlord, dominator, niche, commodity.

(1) *Keystone organizations* have an important and strong role within an ecosystem. They are in general interested in increasing the ecosystem health. Therefore, orient their business activities as well towards connecting actors to push for or offer new innovations. They "*work with others to create value and share value with contributors*" (Zhang & Liang 2011, p. 158).

(2) *Value dominators* or *landlords* are usually smaller players in an ecosystem, concerned just with one area. Their strategies are based on sucking the maximum amount of value out of the ecosystem, often not even created by them, but other actors. This makes them dangerous stakeholders, as they can damage the ecosystem health with their activities.

(3) The thirds type are the *physical dominators* which often own and control much of the ecosystem's assets. Having said this, they are also responsible for the creation of the value which they seek to extract.

(4) *Niche players* feed their role by "*leveraging complementary resources from other niche players or from an ecosystem keystone*" (Iansity & Levien 2004, p. 78). Their business

activities are focused on differentiation from others through developing specific capabilities and assets.

(5) The last category included the *commodity* players which are operating fairly independent to the other stakeholders. Their strategy focuses on cost-efficiency and they don't harm either strengthen the ecosystem health much.

Within all of the different roles, stakeholders can make decisions on how they are supporting or hindering the whole ecosystem health and performance. Keystone players are therefore important as they - even though more unconsciously - have a lot of power to influence others in the ecosystem, as they are pushing for innovation and collaboration to create new value. On the other hand, landlords may influence negatively, as they are using the ecosystem health for their own benefits.

2.3. Background of the plastic food-packaging ecosystem

As stated in the introduction, plastic packaging allocates a huge amount of the waste generated worldwide, but not only that. Plastic is also leaving a negative impact on our environment and influences scarcity issues of the finite resources our planet has to offer. Thus, environmentalist, governments and institutions have identified plastic as a priority problem which needs to be tackled to accelerate the transition towards a CE. The biggest application of plastic is found within the packaging and especially food and beverage packaging (Plastic Europe 2018a). To get there it needs changes in the way stakeholders in a plastic food-packaging ecosystem operate.

This chapter will firstly draft a plastic packaging lifecycle to introduce ecosystem stakeholders. This will be followed by examining the challenges between the current operations and necessary CE-based operations in the ecosystem. The last sub-chapter will illustrate the theoretical base used for analysing the ecosystem and its stakeholders, their role and influence on a transition towards CE-based operations in the ecosystem.

2.3.1. Plastic food-packaging lifecycle and ecosystem stakeholders

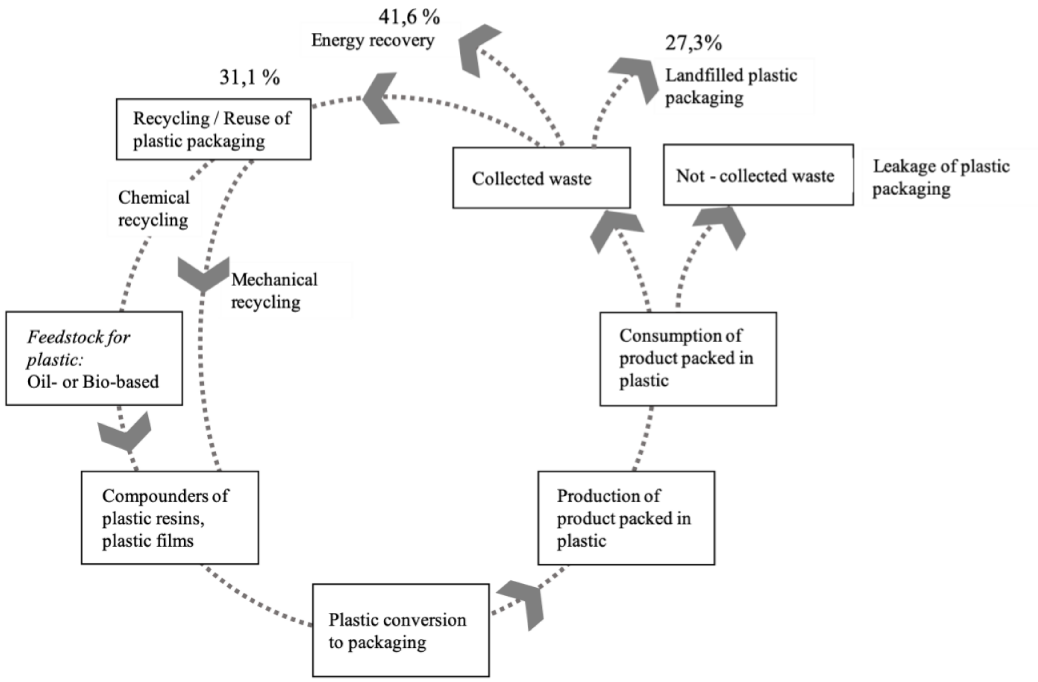
The European Commission has popularized the importance of transitioning to a CE with publishing a Circular Economy Package, which named plastic packaging as one of the main priorities for a successful transition. Precisely, in their action plan towards plastic waste included in the report about 'A European Strategy for Plastics in a Circular Economy' (EC 2018) they stated that changes have to happen throughout the entire plastic value chain. However, as explained above the value chain is an industry-based concept and in ecosystem viewpoint, the stakeholders can go across industries. Thus, instead of only focusing on the value chain of a plastic food-packaging to identify preliminary stakeholders of the ecosystem, the focus was based on a lifecycle of a plastic food-packaging (Figure 7).

It can be argued that all those who are directly involved in the lifecycle of a food-packaging can be seen as stakeholders of the ecosystem. However, acknowledging at this stage that this is not the entire list of stakeholders, also groups which are not directly involved with plastic can affect the ecosystem success. And as described in ecosystem management, stakeholders can belong to various industries. Therefore, this only gives a preliminary list of stakeholders. In order to identify those, it is beneficial to draft a current lifecycle and examine the different actors involved with plastic food-packaging, which is illustrated in figure seven. Also, in a CE, a lifecycle should be a continuous circle, where resources once they enter, never leave the circle. This is unfortunately not the current situation.

Raw materials for plastic can come from the feedstock, but they can also be based on renewable raw materials. Thus, resources are entering the cycle through raw material suppliers. Then there are the plastic compounders and producers which are those who take the raw material to manufacture the different types of plastic resins or in some cases even plastic films. After that are the companies who convert plastic or plastic films into packaging materials, so the manufacturing companies of packaging. The next step includes those who need or demand the packaging, which would be mostly the food producers. This is followed by the retailers, such as supermarkets who distribute it to the consumers of the food. Moreover, the last is the end of life stage, which would include waste collectors, waste management companies, recyclers and incineration plants or energy from waste operators. (PlasticEurope 2018a; EC 2018). This leaves a preliminary list of stakeholders who have direct involvement with a plastic food-

packaging. This list of stakeholders can give the base for companies to be interviewed for the empirical phase of this study.

Figure 7. Current lifecycle of plastic packaging in Europe (PlasticEurope 2018, elaborated by the author).



However, there are also stakeholder that are indirectly involved in the ecosystem, for example, plastic machinery manufacturers, transportation companies, policymakers, universities or the media (Germany Trade and Invest 2017).

2.3.2. Challenges between current operations and CE-based operations

CE aims to close the loop, be more sustainable and trigger a full system shift. To change a whole ecosystem towards fulfilling the CE principles, it first needs to be identified where stakeholder operations within the ecosystem are not yet corresponding to those, thus requiring changes. As this thesis specifically examines the plastic food-packaging ecosystem it needs an understanding of what necessary changes have to be made from all stakeholders in the ecosystem to successfully transform to CE-based operations. Thus, the challenges of plastic packaging towards achieving this vision of CE have to be evaluated in theory and analysed via the empirical study.

A first step is to look at the current plastic packaging lifecycle and determine the 'faults' in the system in regard to circularity. The EMAF claims that the current life of a plastic packaging is extremely short with lasting less than one year and plastic packaging currently experiences a 95% material loss after a short usage period (EMAF 2016). Looking at the current lifecycle (Figure 7) the loop has not yet reached a fully closed circle for multiple reasons. Several issues might cause those negative outcomes.

Firstly, the current design of packaging is too high degrees built on a single-use logic which consequently leads to the short lifetime. Furthermore, even though there are attempts to recycle the plastic packaging as a means to keep it in a closed loop, the recycling rates are not that high with only 31,1% of the collected waste in Europe (PlasticsEurope 2018a). This may originate from the many different types of plastic that can be chosen for the design of a packaging. Recycling becomes especially then challenging when those types are mixed with each other or with other types of waste, low quality plastic, or applications are returned dirty (SITRA 2016). Additionally, according to the EMAF (2016) report, even if plastic gets recycled it goes into lower-value applications which are then not again recyclable after second use. The third problem is that only 14% of the total waste is actually collected, leaving a huge amount of plastic packaging which leaks to our natural ecosystem. According to estimations, plastic packaging represents the major share of the plastic in the ocean (EMAF 2017a). This problem might be caused due to humans' unawareness as well as due to a lack of responsibility in the collection step. The leakage might also be supported by the constant and rapid rising demands for plastic in the last decades (PlasticsEurope 2018a). Another problem is that plastic uses a high oil consumption as it is deriving from fossil feedstock (EMAF 2016). Concluding, this leads to four concrete problems: Short usage period, Low ratio and value loss of recycling, high leakage and use of environmental unfriendly raw materials and production processes.

On the contrary, the benefits such as low cost, versatility, durability, and high strength-to-weight ratio of plastic make it a beneficial choice for packaging applications (Andrady & Neal 2009). Not only is plastic a cheap option, but it is also a very light material that can decrease the overall transportation weight. Less weight leads to reduced fuel consumption, thus decreasing pollution which is good for the environment. Furthermore, plastic packaging can preserve food and protect it from dirt and gems, hence, positively influencing the amount of food waste generated. This leads to the conclusion that eliminating the material option plastic

completely bears some disadvantages. Plastic may be a beneficial choice for packaging if the challenges can be overcome (EMAF 2017b).

To summarize, plastic as packaging is overconsumed and often redundant. The problems still overweight the advantages. It needs changes in the operations of the members in the ecosystem to overcome the drawbacks and fulfil the CE principles. Systematically analysing the named problems and their origin, it demonstrated that the current operations in the ecosystem are not yet in line with the principles of CE. Thus, table 6 compares the challenges directly to the principles.

Table 5. Challenges of plastic packaging with CE principles.

Challenges with plastic packaging	**Origin of the problem**	**CE principles**
Short usage period	Single-use logic	Design, Consumer
Low ratio and value loss of recycling	Types of plastic Quality of plastic Value loss through recycling process Lack of secondary market for plastic	Input Output Design Ecosystem
High leakage	Collection problem Consumer behaviour Lack of responsibility Rising amount of plastic waste	Output Consumer Ecosystem
Use of fossil feedstock	Material choices at the product design phase	Input Design

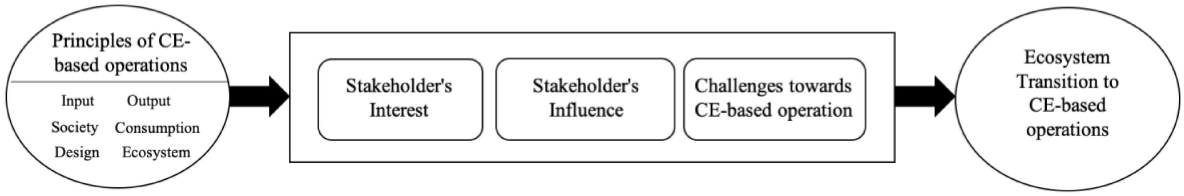
Once, the challenges have been identified, the next step would be to draw the necessary change needed to get to CE-based operations. A part of the changes may be achieved with individual initiatives. It is in companies' power to decide on the type of plastic and quality of plastic that would accelerate recycling or reusing opportunities. To reach the recycling step, it is the consumers' function to separate and return plastic waste, as well as to be aware of the risks of leaking plastic waste to the environment. Following the material flow, the incineration plants job would be to ensure higher and better recycling processes, which can be supported by correct packaging design. However, whether the recycled plastic at the end will be used for a secondary cycle demands joint intentions like the cross-value chain matchmaking cooperation. Thus, to tackle the issues stated above all stakeholders have to be involved, and their behaviour is depended on one another. In order to understand stakeholders influence on necessary changes

towards CE based operations, the stakeholders in the ecosystem should be mapped and influence of the stakeholders on the transition should be investigated.

2.3.3. Conceptual research framework

One of the causes for a not yet completed implementation of CE-based operations is due to the lack of information about those key stakeholders involved in the process and how they influence the transition to a CE (Gupta et al 2019). Raum (2018) has pointed out that a systematic stakeholder analysis can provide beneficial findings and information on an ecosystem level not only about key stakeholders, but also about future actions, such as new policies or stakeholder engagement strategies. The figure below shows a systematic stakeholder analysis generated for the purpose of this thesis, which will represent the conceptual framework for analysing the ecosystem. The outcome should be to successfully transition to CE-based operations in the plastic food-packaging ecosystem. In order to do this the stakeholders within an ecosystem should adopt the principles of CE-based operation, thus the CE literature sets the direction for the stakeholder analysis. Understanding the stakeholder's interest towards those principles and their influence on fulfilling those, gives the base for the stakeholder mapping. This information combined with the knowledge about the challenge's stakeholders are facing towards a transition, opens up on the necessary strategic future actions for the ecosystem stakeholders. The systematic research framework is combines theory of CE and SA and aims to give an answer to the research question.

Figure 8. Conceptual research framework.



3. RESEARCH METHODOLOGY

This research aims to identify the key stakeholder in the ecosystem and examine their influence on the transition towards CE-based operations in the plastic food-packaging ecosystem. A research methodology gives the framework for how knowledge is discovered and analysed systematically during research. To appropriately answer the research question, several choices have to be made. This chapter will justify the decision regarding the research methodology. The first part will begin with a discussion of the research design chosen for this thesis. Secondly, the criteria for selecting the right case companies are explained. This will be followed by a description of the techniques used for data collection and analysis. Lastly, the trustworthiness of this study will be investigated by discussing the reliability and validity of this study.

3.1. Research design

The research design represents a general plan on how to draft the empirical research so that it can relate to the research objectives and research question. Strategic choices for the approach, purpose and methods of the research have to be made within the aim of solving the research problem in the best possible way and within the constraints such as time, budget, skills and further (Ghauri & Gronhaug 2005).

When it comes to the **research approach**, three different logics are used to process scientific knowledge in business science. It can be a deductive, inductive or abductive relationship between theory and empirical findings. *Deductive reasoning* follows the basic idea of the theory being the first source of knowledge and with the base of theoretical knowledge hypothesises can be drawn and tested (Saunders et al. 2009). The process is linear going from theory to empirical research (Eriksson & Kovalainen 2008). Thus, to test the hypothesis based on the relationship between two or more concepts or variables quantitative data collection methods are often used. The basic notion for *inductive reasoning* is that theory can derive from observations and facts and insights may lead to propositions and later on to theories (Ghauri & Gronhaug 2005). Thus, the general process follows the logic of going from empirical research to theoretical outcomes (Eriksson & Kovalainen 2008). An inductive research approach aims to scan the nature of a problem and to do so, the data collection methods are often more qualitative with smaller sample sizes (Saunders et al. 2009). However, as it is fairly hard to find a clear-cut between the two alternatives, many researchers may involve both logics to a

certain point in the process of their study which can be described as *abductive reasoning* (Eriksson & Kovalainen 2008). In this study, the researcher used theoretical knowledge to shape the research framework, however, clarifies that the existing theory about stakeholder analysis has to be adapted to fit the research purpose. Further, abductions are also explained as "*the process of generating new ideas"* and are often seen in explorative researches by aiming to find "*concepts that create the basis of […] an explanation to the phenomenon described"* (Eriksson & Kovalainen 2008, p 23). Therefore, the reasoning of this study follows an abductive logic.

The classification of the **research purpose** determines the research strategy. The research design can be either classified as exploratory, descriptive or casual, depending on the structure of the problem (Ghauri & Gronhaug 2005). *Descriptive research* is used when a research problem is well-understood, and its aim is to produce the information needed to solve the problem in a structured way. It is especially then used to study an event, specific situation or scan a profile of a person (Saunder et al 2009). A *causal research* is also built on a structured problem which is underlined with a cause and effect situation and the aim of the research is to examine if and how a cause results in an effect (Ghauri & Gronhaug 2005). Other scientists may also refer to it as *explanatory research* with the focus "*to explain a relationship between variables"* (Saunders et al 2009: 140). In an *exploratory research* the research problem is at a preliminary stage, unstructured and the search for the solution of the problem is flexible as new information arrives which may change the direction of the research. Further, exploratory research is conducted to get a better understanding of an existing problem. It is in its nature flexible and adaptable which should not be confused with the absence of a direction (Saunders et al 2009: 140). In addition, it seeks to create new insight and examine a phenomenon from a different perspective. As the purpose of the present study is to explore new insights to understand the phenomenon of stakeholders' influence on the transition towards CE-based operations, it can be described as exploratory.

Furthermore, this leads to the qualitative **research method** of this study. When research is explorative- and process-oriented aiming to discover new insights then qualitative methods are typically used (Ghauri & Gronhaug 2005). Further, a qualitative nature seeks to uncover and better understand a phenomenon. Its focus is on getting an insider view to understand respondent's perspective. Research methods describe the choices regarding how to collect data systematically and focused in order to get the correct information to answer the research question (Ghauri & Gronhaug 2005). The main difference between qualitative and quantitative

methods is the techniques on how to get the information. Whether quantitative research findings derive by statistical or other procedures of quantification (Ghauri & Gronhaug 2005), qualitative methods often use non-numerical data (Saunders et al. 2009).

As the scope of this thesis is to focus the research only on one ecosystem, the **research strategy** for conducting this study can be seen as a case study with several embedded cases. Therefore, the Finnish plastic food-packaging ecosystem can be seen as the case to be studied, and the companies representing stakeholders within the ecosystem are the embedded cases. A case study is often used when a particular phenomenon is under empirical investigation within its real-life context by using multiple sources (Robson 2002; in: Saunders et al. 2009, p. 145). If the aim is to achieve a rich understanding of a phenomenon, answer how or why questions and the context under investigation cannot easily be quantified, a case study may demonstrate the preferred approach. Moreover, Ghauri and Gronhaug (2005) connect an explorative nature of research with a case study approach.

3.2. Selection of cases

Independent from the research design, the most suitable sample selection method for answering the research question has to be defined (Saunders et al 2009). Sampling describes the cases and amount of cases from which the data will be collected. According to Saunders et al. (2009), it can be beneficial to choose a smaller number of cases as it is easier to structure, and it gives the possibility to extract more detailed information on each case. In order to select the appropriate samples and find a suitable sampling size, a frame can be obtained by fulfilling certain criteria. Clustering is one form of sampling which selects the frame according to certain groups of data point e.g. through naturally occurring grouping. This could be, for example, based on types of firms or even the geographical area (Saunders et al. 2009). For this study, clustering sampling offers the right technique to answer the research question appropriately.

The different criteria to frame the sample size were pre-defined before contacting the companies. As this thesis aims to conduct its analysis within a single country, Finland, the first criterion for the sampling is affiliation to the Finnish market. Furthermore, the thesis purely focuses on the plastic food-packaging ecosystem. Hence, offering a second criterion for the sampling of the cases is to be a member of the ecosystem and possibly influencing CE-based operations. In the theory part, a plastic packaging lifecycle has been illustrated and the sample

companies ideally are directly involved within this lifecycle. Moreover, to get a high variety of data and examine the ecosystem in multiple contexts, the sampling is multi-industry based. This approach has been successfully implemented by Parida et a. (2019) in their ecosystem study, thus it is a profound base for this research. However, due to time limitation, the consumer point of view was neglected in the case selections. To get an appropriate set of data, a quantitative and longitude research method may be the better choice, which is not aligned with the strategy of this research. The criteria then provided a list of 18 different case companies as possible samples. The researcher approached all case companies directly via phone or, if representatives were not reachable, via e-mail.

In order to collect the data from the representatives of the case companies, they have been interviewed. However, to gain the best insights from the interview results, it specified as an important characteristic for the representatives of each company to have a higher hierarchical position and if possible, even belong to the executive team of the company. Additionally, to ensure that they have sufficient information, knowledge and experiences about their stakeholders and their companies' operations concerning plastic packaging an initial short phone call was arranged. Here the researcher asked about their role within the company, explained the purpose of the thesis and pre-matched the two attributes. In case of not matching, the initial contact person was asked to forward the request to the correct person within the company.

From the initial sample size of 18 companies, six companies agreed to participate in the study. Table 7 shows the six cases and explains its position on the plastic lifecycle, short description, position of interviewee within the company, length and channel. Furthermore, each company and its activities are introduced shortly.

Company A is a small business existing since 1949 which is producing plastic bags for bakeries, for farmers and some plastic packaging also for industrial purposes. They used to make their own plastic, but nowadays their suppliers provide them with polyethylene (PET) and polypropylene (PP) plastic film, which they then use to make plastic bags for different kind of foods e.g. bread or salads.

Company B is a non-profit organization mainly focused on extending producer responsibility for packaging in Finland by inter alia collecting and further distributing plastic waste. Their

customers are producer companies with a turnover of over 1 Mill € from products or imported products packed in plastic which hand over their responsibility to them.

Company C is a plastic compounder with the focus on providing polyethylene plastic films which they sell either directly to producer companies which they refer to as brand owners, or to converters which process the film into further packaging.

Company D is a marketing agency doing inter alia packaging design for producer companies. Thus, their direct clients are the brand owners or producer companies purchasing services from them to support their packaging design.

Company E is acting as a non-profit service company in the end-of-life of plastic section by providing collections points all around Finland. Their organizations' activities also include research activities and advisory tasks. Their main stakeholders are brand owners and federations. Producer companies also pay them for statistics and analyses.

Company F is a producer of polypropylene (PP) films and also a plastic converter to food trays via a thermoforming process. Their customers are ready-meal producers, big brand owners, but also supermarket chains and restaurants. They get their raw materials from plastic polymer suppliers but are not yet using recycled raw materials.

Table 6: Case company list, position, description, interviewee profile, duration and channel of interviews.

Case Company	**Position in Plastic Lifecycle**	**Company Description**	**Interviewee Profile**	**Lengths**	**Channel**
Company A	Plastic conversion	Producer of plastic bags for food producers and farmers.	Product Manager	01:10:42	Videocall - Skype
Company B	Plastic end-of-life	Coordinating between plastic collection, recycling, and producer responsibility	Director	01:05:46	Videocall - Skype

Company C	Plastic Compounders	Produces plastic films for food & product packaging	Sales Director	01:08:01	Videocall - Skype
Company D	Food Product Producers' Stakeholder	Company designing packaging for various companies	Creative Director	00:45:14	Face-to-Face
Company E	Plastic end-of-life	Organizing the collection of plastic waste in order to be recycled	CEO	00:56:09	Face-to-Face
Company F	Plastic conversion Plastic Compounders	Making plastic films and ready-made food trays and food-packaging	Product Manager – Food Packaging	00:53:13	Videocall - Skype

3.3. Data collection and analysis techniques

For the collection of data and analysis in the right format fitting to the research question and design, different techniques can be applied. Data can be collected from secondary to primary sources, through interviews, surveys or observations, and the interviews can be structured, semi-structured or in-depth (Saunders et al 2009). Under techniques, scientists understand the "*step-by-step procedure that researchers follow to gather data and analyse them for finding the answers to [their] research question*" (Ghauri & Gronhaug 2002, p. 109). In short, the techniques explain how the data is captured and analysed.

For this thesis, the data was collected through semi-structured interviews. Often, when the research is of exploratory nature or including exploratory elements, a non-standardised interview is the preferred choice, which included semi-structured and in-depth interview styles (Cooper & Schindler 2008: in: Saunders 2009: 323). Furthermore, when examining a phenomenon which is yet fairly unknown and seeks to be understood better, a qualitative research method may provide valid and reliable results (Ghauri & Gronhaug 2002, p. 111). Thus, semi-structured interviews fit the purpose of this thesis as it is aiming to examine a phenomenon which is not yet clearly structured. A set of questions was prepared but did not have to be asked in chronological order, oriented towards the main topic of this thesis, the identification of the key stakeholders and their influence on CE-based operations. To provide

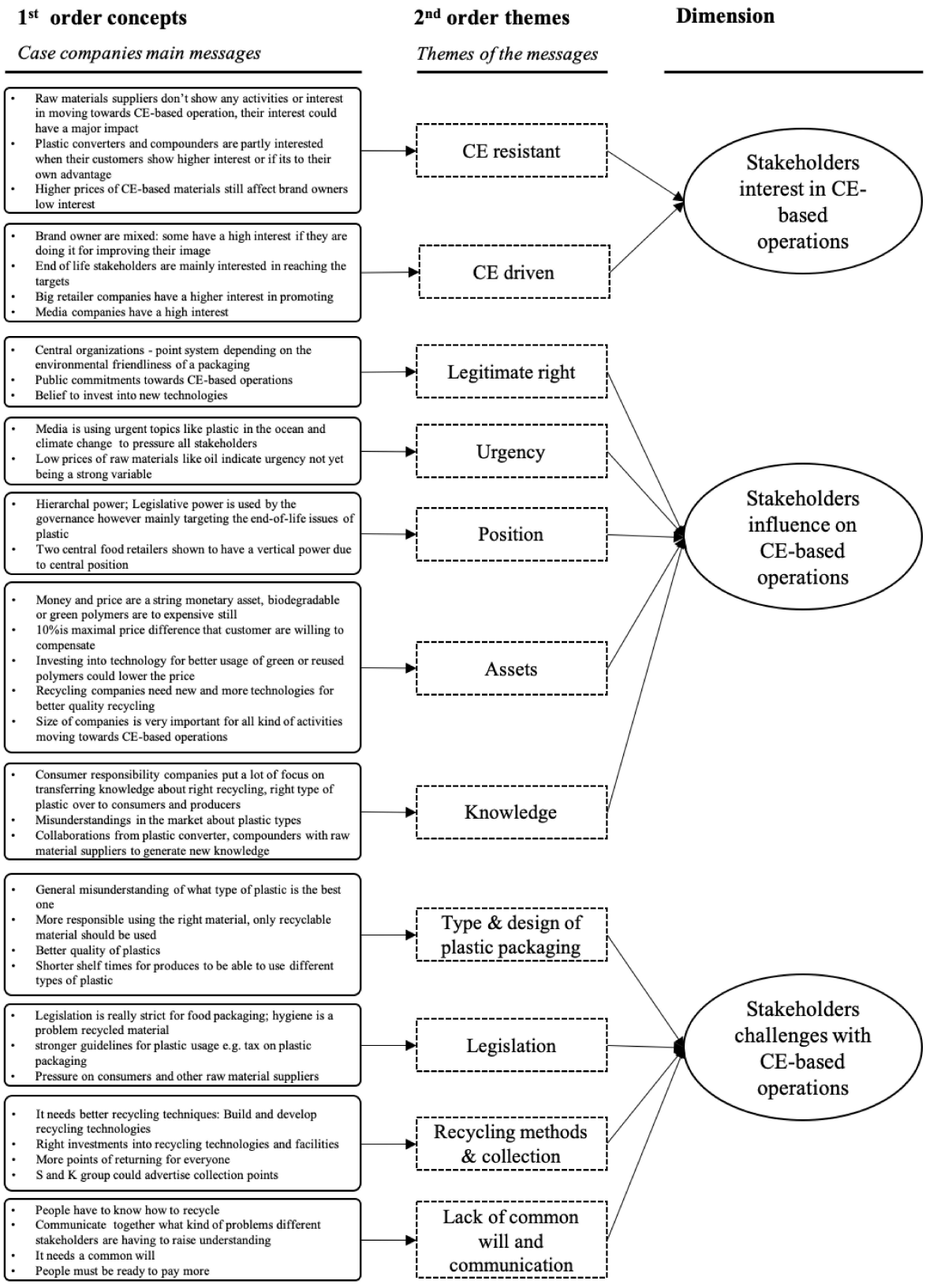
trust between the interviewer and participant, the conversation was held on a one to one basis and anonymity was proposed by the researcher. Even though the researcher provided a pre-planned interview guideline, the most questions were formulated open-ended and held flexible, so that unexpected topics could be covered as well.

The benefit of a semi-structured interview is that it gives the researcher the possibility to vary the structure of the interview depending on the conversation or to dive deeper into interesting themes, hence, getting the most accurate insights for the research (Saunders et al. 2009).

Face-to-face would have been the preferred option for all interviews', however, due to time limitation and geographical location, this was not always possible. Four interviews were held via Skype and two face-to-face. Even though the case companies were all Finnish, the interviews were conducted in English. The duration of each interviewee was between 45 minutes and 70 minutes. To keep a calm and positive conversation atmosphere, the participants were asked if the one hour could be exceeded for a couple more minutes when the researcher had unanswered questions or wanted more insights on an unexpected theme. Furthermore, for reasons of accurate and reliable analysis, additional to taking notes during the interviews, the conversations were recorded. Saunders et al (2009) emphasize this method of audio-recording especially when the data collection technique is of qualitative, non-standardised interviews and point out the further benefit of transcribing. Hence, after all the interviews were conducted, the conversations were carefully transcribed, and the written format represents the primary data. For reasons of confidentiality, the sample companies are labelled from A-E.

The data analysis process was started through a content analysis frame based on the interviews and notes taken during the interview. A content analysis aims to break down quantitative data to identify patterns. Therefore, it follows the idea of coding the set of data following a rule such as the presence of words, themes or concepts. This allows the research to analyse the content and meaning of the coded messages. The further analysis process was done by the Gioia et al. (2013) methodology. This was done by using the coded messages from the dataset and in order to understand commonalities and differences between the data the first order codes were categorized into second-order themes. Finally, those were matched with the dimensions of the framework for this study (Figure 9).

Figure 9. Data coding based on the Gioia methodology.



3.4. Trustworthiness of the Study

It is of relevance when conducting a research to ensure the quality of the data and credibility of the study by being aware of reliability or validity issues (Saunders et al 2009). Whilst the reliability of a study is concerned with the consistency of the results, the validity explains whether the outcome is what it appears to be.

Research Bias

When the research collection method is in the form of a non-standardised interview, which is the case for this thesis, the threats to reliability are often related to the different types of bias. Saunders et al. (2009) suggested two types of bias causing issues in semi-structured interviews, which is the interviewer bias and the response bias. In this case, the interviewer is the researcher, therefore the researcher bias should be under discussion. It is normal to have own ideas and feelings that guide communication - verbally and non-verbally - with others. Thus, the behaviour or tone of how questions are asked might influence on the respondent. To minimize this threat, the researcher discussed the questions for the interview with outside parties seeking their advice on the neutrality of the questions. Furthermore, during the interviews, the researcher paid increased attention on the neutrality of tone and comments, thus making sure that the interview is not unconsciously steered into one direction but takes its natural course.

Interviewees Bias

Another risk is the interviewee's bias. "*Taking part in an interview is an intrusive process*" (Saunders et al. 2009: 327). There is a risk that the interviewee might feel that due to social and compliant pressure, he cannot openly discuss everything. Thus, questions that probe for sensitive information such as for example about the company or personal details should be avoided. However, as this study seeks to understand the phenomenon on an ecosystem level, it was easy to ensure that the question was not intruding some inappropriate information. Moreover, bias can also be simply just influenced due to the pressure by ethnical aspects (Saunders et al. 2009). This means the participants' honesty may be jeopardized by the general opinion pressuring on what he thinks he should say. The main topic in this thesis is related to plastic packaging and plastic received rising negative press over the last year. The general opinion is to communicate that plastic is "bad". This might make the respondent feel like he has to be against plastic as well. To counterbalance this risk, the researcher ensured not to have

any provocative question. Also, at the beginning of each interview, the aim of this study, the neutrality of the researcher's opinion and the guarantee of interest in their honest and personal opinion was made clear by the researcher. Furthermore, to ensure the interviewee felt comfortable and relaxed, the interviewee times were arranged to the preferred time and place of the respondent and the research made sure to give enough time between the question, not pressuring on time limitations.

Validity claims

Another aspect of ensuring the quality of a qualitative study is the tests related to the validity of the outcome (Ghauri & Gronhaug 2002: 216). One risk to the validity named with non-standardised qualitative interviews is due to the language chosen for the interview. The interviews were held entirely in English, but the respondents were comfortable with the language, hence the language barriers were relatively small. The researcher tried to ensure the clarity of the questions by observing the participants understanding and if necessary, the meaning was explained. Due to a variety of case companies within different positions of the ecosystem the trustworthiness of the results was strengthened as well. Furthermore, to counteract on the generalisation topics which is often the problems with case studies, the research design in form of exploratory research is explaining that the results do not represent the entire population but aim to examine the phenomena on a deeper level.

4. EMPIRICAL FINDINGS

Within this chapter, the results of the data analysis will be presented according to the research question and through the coding of the dataset (Figure 9, p. 60). Before analysing stakeholders, it is important to identify the ecosystem members. To carry forward with a stakeholder analysis, the interest and variables of influence in the ecosystem have been explained and discussed in regard to the messages from the respondents. Before the key findings are discussed in the next chapter, the challenges stakeholders face with moving towards CE-based operation are presented. The findings are concluded in an ecosystem transition model.

4.1. Identification of ecosystem stakeholders

Before being able to analyse the key stakeholders, all stakeholders involved in the plastic food-packaging ecosystem have to be detected. Naming stakeholders when just conducting a SA to support the executives of one company with their managerial decisions is relatively easy. But when the analysis has to be reflected across various industries to achieve ecosystem management, it might be harder. Ecosystem management means the stakeholders involved are not just within one industry but can belong to various different industries and still be ecosystem members. For this thesis, the stakeholders of the whole ecosystem of plastic food-packaging in Finland have been analysed. In order to identify all stakeholder, the company's business activities have been evaluated and the response of each of the interviewees has been scanned on naming those stakeholders they are involved with.

The companies A and company F are within the plastic packaging lifecycle. They are both producing plastic packaging in form of plastic bags or trays for baked goods, fruits, salads or convenient food. Their customers vary between farmers, bakeries, ready-meal producers which then sell their products to retail stores. In the case of company F, they also supply directly to supermarket chains and restaurants. The interviewee of company A especially pointed out that the central food retailers in Finland are important stakeholders to them. Further mentioned are the end-consumers of the food packed in their plastic packaging. Another direct stakeholder group for both companies are suppliers of plastic rolls or plastic raw materials. Company C as a plastic compounder who produces plastic films might be one of those suppliers as they sell either directly to food producer companies which they refer to as brand owners, or to converters which process the film into further food-packaging. Their direct stakeholders are raw material

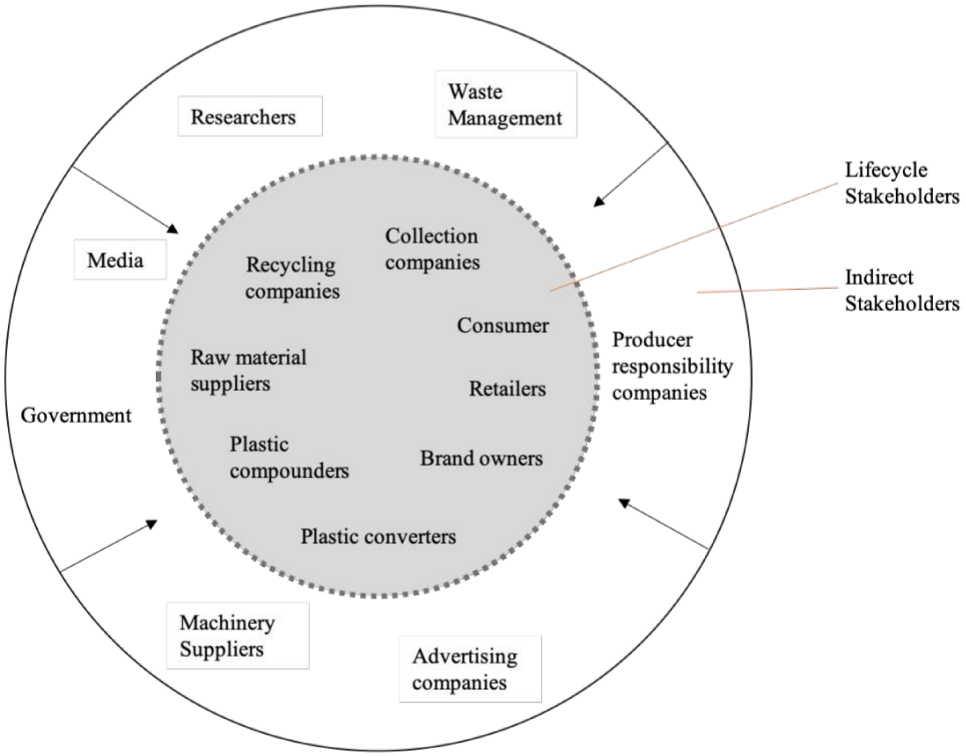
suppliers for oil-based polymers and additives. Further, they are purchasing recycled materials from industrial or consumer waste recycling companies.

Both company B and company E are non-profit organizations offering collection and distribution services of plastic waste. Their customers are the producer companies (brand owners) from food products or imported food products packed in plastic which hand over their responsibility to manage plastic waste to them. After the plastic has been collected by them, they work hand in hand with the recycling companies. In their function as waste collectors, they operate directly in the lifecycle of a plastic food-packaging. However, in their second function as producer responsibility companies, they offer additional services, such as advisory tasks and research activities. For example, brand owners and federations also pay company E for providing them with statistics and analyses. In one way they are acting as a long arm of the government. They are not only obligated to reach the recycling targets set by the legislation but are in direct contact to the city authorities or ministries to reach those. Moreover, additional stakeholder they mentioned is waste management companies as their subcontractors.

In addition, most interviewees named the media as only indirectly involved with them. They communicated or discuss the current problems and topics around plastic in general. Company C also associated the media with the general opinion. Furthermore, the interviewee of company B states that they are actively involved, not only with the media, but also with advertising firms, voluntary organizations, and universities to increase the awareness of plastic recycling within Finland. Also, important but only indirect stakeholder for company F are the machinery suppliers who help them develop machines capable of converting recycled plastic polymers. Additionally, company D can be seen as an indirect stakeholder, as they provide packaging design as a service to brand owners, producer companies of food products.

However, not all of those stakeholders are equally involved. Some of those might be only involved indirectly with plastic food-packaging. The two-tier stakeholder mapping method by Freeman et al. (2007, p. 8) as a base to illustrate the stakeholder of the ecosystem being directly and indirectly involved. Therefore, a stakeholder for this ecosystem can be described as any organization which activities either directly touch the lifecycle of a plastic food-packaging like production, distribution or collection, or those indirectly involved via communication, legislation or observation.

Figure 10. Stakeholder identification model of the plastic food-packaging ecosystem.



4.2. Differentiation of stakeholders

4.2.1. Stakeholders interest in CE-based operations

One of the measurements in the stakeholder theory used to differentiate stakeholder's role is to look at their interest. In relation to circular economy, interest would then be determined by the motivation to participate in necessary CE-based operations. Actions towards CE-based operations concerning plastic packaging are those that help to solve the current problems with plastic packaging and plastic waste. For the plastic ecosystem this means stakeholders who are driven towards overcoming the current challenges of CE, are interested in a transition to CE. To recap, the four main challenges identified in the theoretical part of this study (Table 5, p. 50) are the short usage periods, the low ratio and value loss of plastic recycling, the high leakage and the use of fossil feedstocks for the production of plastic. The members can be divided into driven towards CE-based operations or resistant against CE-based operations. This chapter analyses statements done by the interviewee to map whether their own companies' interest as well as other stakeholders' interest in CE-based operations is low or high.

Starting with those stakeholders which show resistance, the interviewee of company A stated that: "*If raw material suppliers would be widely interested in biodegradability [..] then it would have a major impact*". This statement implies that the interest of raw material suppliers is currently rather low. The interviewee of company F, who beliefs that the research and development work of these big oil companies should include higher environmental solutions, gives a similar point of view. The biggest raw material suppliers are still focused on oil-based and new polymers. But, as explained by the representative of company C, new suppliers are deriving which provide the market with recycled granulates (cleaned and shuddered second use plastic polymers). However, the use of recycled resins is more complex for the machinery to process. Thus, current raw material suppliers seem to have rather little to no interest in CE-based operations.

A second stakeholder with rather low interest is the raw material suppliers who are providing their materials to companies which use or mix polymers and additives to plastic films. Company C has its business activities focused around this area and also Company F is doing this process partly in-house. Regarding CE, those companies should strive to use recycled plastic resins or so-called green polymers. However, they showed little to no interest in using green polymers. They even go so far as to believe that green polymers are not the right track to go to. The interviewee of company C believes that instead of those green polymers recycled granulates will be the right way forward. Even though according to him, recycled raw materials are cheaper, in purchasing price there is little price advantage due to complexity in the process. This is why they would need to invest in new technologies. Furthermore, recycled granulates cannot be used for every end-product as they have limited quality. Whether they use recycled or virgin raw materials depends entirely on what the customers are asking for, thus, their willingness and motivation is limited.

Next, looking at the big brand owners' interest towards CE-based operations, those stakeholders who produce fresh or convenient food such as salads, fruits, bread, milk, pasta, yoghurt, meat, ready meals. Without their product, there would be no need for plastic bags, trays or bottles. But how driven are they to move towards CE-based operations? The results of the interview indicate that there is a huge variety of interest depending on the company's beliefs and values. Thus, company A gives the example of a farmer who chose bio-based materials because of the marketing and communication benefits that supported their organic image. The main driver for choosing a certain material is the cost, and many times bio-based plastics or even switching to

cardboards is much more expensive. Most interviewees believe that if a company decides to carry the higher costs it is due to commercial reason and the belief that it will keep its market position guaranteed in the long term. "*In the end, they know that if they are not going to be sustainable, customers are not going to buy as much as before*" (Company B). "*All companies are founded for making money*" (Company E). "*Budget is always the important one*" (Company D). However, the interviewee of company D suggested a very interesting aspect. According to their observations, if there is an interest in sustainability the customer is ready to pay 10% more compared to the normal price.

Seemingly a very high motivation comes from the big food retailers which have been pointed out by company A and D (both plastic converters). They have invented a system that gives points to brand owners who pack their products in environmental packaging. In addition, retailers tell brand owners what materials can be used and what cannot be used. "*[They] are the once actually telling us what we can use and what we can't use*" (Company A).

Furthermore, case companies B and E, which can be both identified within the plastic end-of-life position, centralize their whole business purpose on solving one or more of the issues. They are either focused on providing possibilities for consumers to dispose the plastic or organize the collection and further processing. Thus, they are closely working with recycling companies. The main motivation to them is that they "*meet the targets of the regulations*" (Company E) to recycle at least 50% of all plastic packaging waste. Even though they have noticed a rising interest from other participants, still the representative from company E believes that "*everyone, every single company and every single person could do more"*. It is clear to see that also outside of those necessary functions, they have a strong willingness and drive to move towards CE-based operations. Besides the fact that they are a non-profit company, therefore certainly not interested in monetary benefits, their advisory (Company E) and marketing related activities (Company B) are showing extra efforts towards CE-based operations.

Especially the media can be deducted to have a higher interest. The media has been reporting on news about plastic packaging more regularly. Company C states the media and general opinion is basically the same thing: "*Media usually writes what you and I, what we are thinking*". Furthermore, the government has put money and efforts in initiating different legislation and guidelines for the plastic ecosystem. This implies that their interest in CE-based activities is fairly high. One the one side, the media is representing the general opinion, hence,

the consumer's interest. This leads to the assumption that some consumers have interest in an environmental friendlier plastic consumption. But on the other hand, it is also often mentioned that the consumers are a bottleneck not only in the collection of plastic waste but also due to their lack of motivation to pay the higher price for packaging types that are aligned with CE principles. Thus, their interest is divided.

In summary, the interest across the ecosystem is very different depending on the position and purpose of the company. It seems that especially those companies that are coming in the middle or end in the value chain of a plastic packaging have an increased interest in CE-based operations within the plastic food-packaging ecosystem.

The objective of this thesis is to identify key stakeholders and understand their influence on one another when moving towards CE-based operations in the ecosystem. In general, a company who is having a higher interest is more supportive of the cause towards a certain outcome. However, according to the interest and influence classification model, it is not enough to only look at the interest to identify key stakeholders. Firstly, those groups who have interest and power are important stakeholders. Secondly, the group of stakeholders, who have low interest but high influence, are as well relevant for the ecosystem transition. Their interest can and should be raised via incentives or similar actions like laws or regulations.

4.2.2. Stakeholders influence on CE-based operations

Another indicator used in a stakeholder analysis to differentiate stakeholders is the level of influence they have over one another, often compared to the power stakeholders possess. This case will occur, when one person or alliance of persons, such as an organization, consciously affects the thoughts, behaviour or feelings of another individual or set of individuals. Influence can emerge in different forms and levels as identified in the theoretical part of this thesis (Figure 6, p. 44). Those variables found in the theory are legitimate right, urgency, knowledge, position in a system, and assets. Therefore, the empirical study conducted via the interviews set a focus on figuring out how those different variables are currently applied by the ecosystem members to influence one another or the whole ecosystem towards CE-based operations. Furthermore, it has been looked at what the most influential variables for this ecosystem are and who of the stakeholders are using those attributes, hence, making them more influential.

Legitimate right

Legitimacy is widely discussed within the ST theory, which makes it nearly impossible to have one common understanding of its definition. However, the general assumption is that there is a strong connection between power and legitimacy. Having a legitimate right to be there gives a stakeholder power but those who do not use their power legitimate will eventually lose it (Mitchel et al. 1997; Davis 1973). Also, as pointed out in the theory part of this thesis, legitimate right means that stakeholders' actions are socially accepted, thus, following certain norms, values and beliefs. To translate this to an ecosystem following CE-based operations, this idea would mean each stakeholder who has an influence on driving towards CE-based operations should have some belief, value or norm towards those. In order for the plastic packaging ecosystem to be aligned with CE, it would need values that are not anymore based on single-use logic, on non-recyclable or fossil-based plastic types, or on unreasonable disposal.

Especially the central food retailer organizations in Finland seem to concentrate their beliefs on those values. They created a point system related to multiple categorizes of environmental friendliness, and if they are followed by the brand owners, they get an advantage over the other. With the confidence in doing the appropriate thing, they have an influence on other stakeholders in the ecosystem to move towards CE-based operations. According to interviewee of company B, making official commitments also leads the ecosystem members on the right way forward, "*Those commitments have become really important for companies so that they can show that they are really taking part in the actions and those will lead companies also forward because they have made commitments and they need to follow up on the commitment.*"

Further, it seems that companies who are interested in adding value to their products are sometimes choosing an environmentally friendly material choice over a cheap plastic packaging. Some brand owners might be ready to pay more for the packaging when the customer thinks it is environmentally friendly, in the hope that it will increase their customer base in the long run (Company F). The interviewee of company E also believes that choosing to invest into something which might not be profitable yet due to higher costs will eventually pay off in the future: "*Some companies, and I also believe that in the future, services and things and products which are not profitable they will be in the future and it might be wise to invest to those ideas now, to get some extra money in the future*".

In short, the results of the interviews show that legitimate right might not per se give a high influential power on other stakeholders, but they should be the base for any implementation of power. In addition, those stakeholders whose legitimacy towards CE-based operations is higher they should be aiming to influence the ecosystem members by using their legitimacy as a base for their influence.

Urgency

Another variable is the urgency of a claim, which can mean that there is a certain time sensitivity or criticality for the claim or success of an undertaking. For example, this can be if the supplier has the pressure to deliver within a certain amount of time as otherwise, they bear a high risk to lose their important clients. This gives a limited view of what urgency might be in the case of this thesis as the scope goes beyond simple interaction between two stakeholders but looks at the whole ecosystem. The necessary changes the plastic food-packaging ecosystem needs to implement to drive towards CE-based operations have been pointed out in the theory. It is necessary to improve collection and recycling rates and to move away from using fossil feedstocks. Especially regarding CE and the topics which are driving it, one could assume that urgency could be a driving attribute.

In media, urgency is a means to establish a certain discourse and influence the general opinion. As the interviewee from case company E understood, there are several critical topics heavily discussed within the media. Thus, discussions like the rising plastic and microplastic problems in the oceans, or the climate changes in relation to CO2 emission had an influence on the consumers (Company E). "*Those discussions have affected people a lot and their motivation to sort has increased*" (Company E). In his eyes, urgent topics are making an impact. The product manager of company A has declared that their focus on moving towards biodegradable plastic packaging has been mostly driven by the negative press and debates about plastic in general. Furthermore, the representative from company C believes that "*today it is still the general opinion which is, in the end, affecting us the most*".

Contrary to this opinion, the analysis of the data suggests that urgency is not yet strongly influential on the members' activities within the ecosystem. CEO of company B assumes that in order for all the stakeholders to feel the urgency of a necessary change, fossil feedstock would need to get scarce, which will ultimately lead to rising prices. Looking at the stock market price of oil this is currently not the case (Macrotrends LLC): "*If resources are getting scarce*

then obviously the price of those will go up and they would be more expensive. So, then it would make sense to use less expensive secondary or recycled raw materials". Likewise, the representative of company C expects urgency to be an influential attribute which could become rather strong in the future when some of the problems associated with plastic become alive.

However, the results of the interview give no evidence for any other stakeholder expect the media using urgency as an attribute to influence the other ecosystems members opinion and behaviour.

Position

A powerful position which can be either in a network or within a process can give one stakeholder influence over another. It can derive through coercive or through vertical power. As the plastic packaging ecosystem is big and includes members across certain industries, it is to clarify in the following paragraphs what a powerful position means in the ecosystems and whether stakeholders are using their position to influence.

According to the interviewees of company A, E, and F, especially the biggest retailer companies have a good position in the ecosystem. They are giving rules and regulations on what kind of packaging a product must have, so that they are promoting it in their stores. "..., *they are giving so-called points to you for example if you have environmental packaging*" (Company F). This could be seen as a form of coercive power, which Mitchell et al. (1997: p. 865) explain as force, violence or restrain. They are centrally located organizations as they are the nexus between the producers- and consumers-side. Their position gives them the chance to put a lot of pressure on the food producer's decision of what plastic type they choose.

However, power through a position is not only measured via coercive power but could also due to a strong hierarchical position. This is the case when a stakeholder has a vertical power over another (Beritelli & Laesser 2011). The government has the responsibility to monitor not only executive and judicative, but also the legislative power over a state or country with the aim to ensure order and structure. The tools and instruments they use to do their job are laws, regulations, legislations or incentive systems. The results of the interviews show that some stakeholders can feel this power. Company B orients their strategy on the EU legislation, which indicates they have a high influence on them: "*[...] the ministry and parliament are strong in the way that they make the legislation*". The CEO of company E also underlines this statement

by pointing out that laws are absolutely needed to move on with CE. It seems though, the current legislation for plastic packaging is targeting only the plastic waste, but not the plastic production. "*Because in 2025, according to the EU legislation, we need in Europe every country to recycle 50% of the plastic packaging waste*" (Company B). Even though the EU communicates some plastic strategy, which includes the target to have only recyclable packaging until 2030, it is not supported by legislation. Thus, most of the pressure is on those stakeholders which are located in the end-of-life phase of a plastic packaging value chain as they are responsible for the recycling. This argument can be strengthened due to the fact that other interviewees not located in the end-of-life phase clearly state that the government is not having any influence on their current stage. "*There has not been set up any target for us, that we should us 40% recycled granulate by 2025 or something*" (Company C). On the question, if the government is influencing their business company A responded, "*I don't think we have had any authorities, their role has been quite low*" (Company A), and the representative of company F clearly expressed, "*Not yet!*".

Therefore, the results show that even though influence due to a beneficial position, such as vertical or horizontal power is used to some degree, there is potential to expand this dimension of power.

Assets

An organization can be in possession of different kind of assets. They can be monetary, such as money or non-monetary such as lands, technologies, equipment, materials. Building on the exchange theory, one stakeholder gains asset-based power over another who requires those assets for its business (Beritelli & Laesser 2011).

Seeing only money as a monetary asset, however, is a narrow view. The interviewees state that especially the price of the plastic types still seems to rule most stakeholder's business decision related to moving towards CE-based operations. The big brand owners, for example, still decide for the lower-priced plastic packaging, even though other options such as reused, biodegradable or green polymers are available nowadays. Hence, representatives of nearly all case companies can support this trend. The product manager of company A believes that the situation might change in the future but currently is still like that. "*Maybe the situation is different after 10 years, but at the moment the biggest issues that our customers see is the prize of biodegradable products*". The willingness to pay extra for environmental friendliness is clearly not yet

common. As interviewee from company F states that there are a lot of solutions, but the price is double and nobody in the industry is ready to pay the price. Of course, as well in company A and in company F, one can find some evidence which proves that, in rare cases, their clients choose the environmentally friendly solutions over the cost-efficiency ones with the argumentation that it brings extra value. The interviewee D supports this claim when he observed that someone who deeply cares about the environment could be ready to pay 10% more on average. "*We will pay 10% more expensive product, but environmentally friendly. But that's the limit I would say*" (Company D). Furthermore, especially someone who is wealthier should have a better possibility to choose the right solutions. "*Wealthy people, it is easier for them to pay more for environmentally friendly solutions […]*" (Company E). This leads to the assumption that if a company would be possible to offer the packaging based on CE principles with a lower price, they could positively influence the transition towards CE-based operations.

The same applies to the other side of the value chain. The collection and recycling companies have problems to keep up the value collected plastic packaging waste. *"[…] if a material as waste doesn't have a positive value, the question is who wants to pay for it*" (Company B). An example calculation by CEO of company E shows the negative value of the collected waste, *"[…] after when you have collected it which takes maybe 400€ per tons. When you have sorted it and cleaned it which take maybe 200€ per tons [...] you have paid 600€ or something [...] Then somebody might buy it from you with 100€ per tons*". This should lead to the assumption that recycled polymer should be cheaper than virgin raw materials. Company C confirms that recycled polymers are lower priced. However, even though the raw material is cheaper, the process is more complex and therefore adds extra costs on it. Thus, they do not give any cost-benefit to their customer for plastic films based on recycled granulates. *"[…] there is no price advantage, it can be even more expensive even though the raw material itself is cheaper […]"* (Company C). This is interesting as it might lead to the assumption that if they would invent technologies which decrease complexity, they could use a low price as a very strong influential variable towards a transition of the ecosystem.

The incentive of generating savings through process development is also something at least company E has been pointing out. Doing activities that move towards CE-based operations are often associated with savings as due to the increasing efficiency of resources the costs go down. And cost saving is indirectly also a positive financial asset. This shows that there is a correlation between price and savings which can be used as an incentive for stakeholders to move towards

CE-based operations. This way of using assets as a means to influence their stakeholders towards CE-based operations is targeted by company C. They are convinced that investing and collaborating with technology vendors may lead to the invention of new technologies which could make the use of recycled polymers more cost-efficiency and then would eventually give them a competitive advantage over their competitors.

The results of the interviews also show that the size of a company may have a positive or negative influence on the transition to CE-based operations. The size can be seen as a non-monetary asset, as it usually defines the number of employees or amount of money they make. Due to their smaller size, company A encounters problems in collaborations with suppliers. They would like to work together with suppliers to develop a biodegradable solution, but as they are a small company with limited resources to test materials, they are dependent on suppliers. The interest from them to cooperate is little because the volumes they buy "*are a little bit too small that they would be interested to make a cooperation with biodegradable products*" (Company A). The same issues seem to apply to case company F, *"[...] if you have enough volume then you are always interesting also in regard to the stakeholders"*. According to company C "*10 huge companies dominating the world as suppliers of polyethene*" which, if they would be interested in changing towards CE-based operation, they could have a strong influence on the whole ecosystem. The size also might give a better possibility to gain new knowledge, which would then support the knowledge-based variable of influence (company C).

Knowledge

Knowledge is a valuable resource reflected in certain experiences or skills. Using knowledge to influence would mean that one stakeholder has knowledge another stakeholder might need, to make a better decision, thus giving the first stakeholder a power over the other. Knowledge that would support a transition towards CE-based operations in the plastic food-packaging industry could be especially about the right type of plastic polymers, recycling mechanism, or similar new technological inventions.

Especially the consumer responsibility companies used knowledge as an attribute to influence the other stakeholders' operations. Company B is organized in a way that they hired a recycling coach giving advisory services to brand owners. These direct exchanges give them the chance not only to motivate other stakeholders to change their operations but also to better understand what drives them. "*By having a face to face communication, we obviously learn much more*

about the market and the behaviour and thinking of companies". They also offer packaging design guidelines for companies and consumer guidebooks on how to distribute their plastic packaging in the best way. Another of their business activities is to collaborate closely with the media, by giving them first-hand news about plastic packaging in Finland. Likewise, company E is targeting consumers directly by providing them with statistics and user guidelines on their websites, thus, creating knowledge themselves. Furthermore, they provide a customer service hotline and arrange TV or radio commercials targeted to raise awareness of their consumer collection points.

The need for those two companies to heavily invest in communication indicates that there is currently still a lack of knowledge within the whole ecosystem. This assumption is supported by other interviewees. The statement by the director of company C targets especially brand owners' knowledge, those who produce the good which is packed in plastic, "*there is still a lack of knowledge, but probably also a lack of understanding what is doable.*" Also, the consumers' knowledge is critically scrutinized: "*People must be more informed*" (Company F). In order for consumers to align their activities with CE-based operations, they have to be informed about who is using what kind of packaging and what they can do with the plastic waste. According to the product manager of company A, the knowledge consumers have is a lot of times based on misunderstanding, such as that biodegradable plastic always derives from biological raw materials. The issue of misunderstanding is supported, also due to the huge amount of knowledge out there. "*There are as many opinions as there are suppliers*" (Company A). "*Information is coming every day from everywhere*" (Company F).

The three case companies – A, C, and F – representing either plastic compounder or converter companies, are also using knowledge successfully in some cases to inform their clients – brand owners – about certain types of plastics. Even though the price of green or recycled polymers is more expensive, some of their clients are then choosing environmental friendliness. "*We have one major customer […] they decided to use only biodegradable films which was a surprise for us as it is a private owned company*" (Company A).

Some of those companies also work together with their direct stakeholders in order to generate new knowledge which would help ecosystem members. Thus, company F puts a lot of focus on working together with machinery companies to invent better technology as recycled plastic resins add complexity to the process. Being able to compensate for the added complexity

through better machines adds a competitive advantage. Also, raw material suppliers have a rising interest in sharing their information with their direct buyers. Such as in case company C, where they put a lot of pressure on their suppliers to mix reused polymers with virgin materials. According to them "*there are some companies already doing that, but in smaller case still*." The same applies to company A which have also started to cooperate with their raw material suppliers. Their hope is that, by giving this generated knowledge to their customers, the brand owners will create extra value for the ecosystem.

In short, the results of the interviews indicate that knowledge is a very important attribute, which is already widely used, but efforts are needed to reconcile the correct knowledge.

To conclude, the analysis of the different variables of influence identifies those stakeholders which have more power one another and how they are using the attributes to influence other ecosystem members. Above, the interest of the stakeholders in the ecosystem have been investigated. Both information combined then helps to classify the stakeholders according to the interest and influence model into different categorize. Ecosystem members who have a high interest, as well as influential power, are important for a successful transition of the ecosystem to a CE. It is also beneficial to identify those stakeholders which have high influence, but no interest as they might hinder or block the success. Furthermore, the analysis of the variables of influence exposes as well how stakeholders influence one another when moving towards CE-based operations in practice. This information can help to understand what actions can be taken to push for example those stakeholders forward which are necessary for the transition but have low interest. Thus, it may be identified how some stakeholders can be changed.

4.3. Stakeholders challenges with CE-based operations

It is important to understand what the stakeholder see challenging when moving towards CE-based operations in the ecosystem. In the theory part of this thesis, the definition of CE and its principles leading to CE-based operations have been discussed. Furthermore, they have been benchmarked to the current situation with plastic food-packaging to identify possible challenges. However, the interviewees were asked about their opinion on those challenges. This showed that the stakeholders have more practical ideas on the current challenges and necessary changes in order for the ecosystem and its members to be aligned with the principles of CE-based operations.

One of the main challenges they see is concerning the types of plastic chosen for the design of a packaging, consequently leading to problems about the plastic packaging design. Looking at the statements of the interviewees already shows that there is no consistency between the stakeholders' opinions on the best type of plastic for CE. Whilst some companies believe that biodegradable polymers will become more important in the future, others do not even count biodegradability as circular. "*I think the emphasize is on biodegradable plastics, but that's quite a new area*" (Company A), On the other hand, representative of company B gave this comment regarding biodegradable plastic packaging: "*Is it a circular thing if it only last one use?*". Furthermore, the interviewees state that many stakeholders and especially consumers have a misunderstanding about biodegradable and bio-based plastics. Biodegradable does not necessarily mean it does not use oil anymore as a base, and bio-based "*doesn't necessarily mean its biodegradable*" (Company A). Furthermore, biodegradable plastics are actually currently removed from the composting process as they do not compose within the 2-3 weeks' time frame of plant-based waste composting (Company B). And whilst bio-based plastics are using raw materials like sugar grain or fibre deriving from wood, they are not biodegradable. "*Bio-based can be recycled, but biodegradable cannot*" (Company B). Even though they are still recyclable, some respondents also believe that the raw materials should rather be used for food. "*Looking at the population now growing rapidly, we will need those feeds very fast for food and not for plastic*" (Company C). The focus for the right type of plastic should be on the recyclability, but also reaching higher quality of recycled plastics. It is important to only produce recyclable packaging. Moreover, improving the quality of the plastic so it can be recycled multiple times without losing value should be the goal. "*So that is basically where it starts if you can increase the value of waste*" (Company C). The representative of company B believes that "*companies have a really big responsibility in using the right packaging*", but also that "*it needs packaging producers who need to make packaging that is recyclable*".

The realization that recyclable plastic is the right track forward is good. However, another problem with the reused polymers is the regulations and legislations according to the interviewee's statements. "*Most of our products that we make go to food industry and the legislation is really strict when it comes to hygiene, so that is one reason why we cannot use recycled plastic raw materials*" (Company A). In line with this statement, the usage of recycled polymers is hardly possible with the current design of a packaging. Thus, company F suggest if customers could accept reduced shelf times it could be one way towards solving this issue. "*If they accept that there is no long shelf time and they are ready to pay more for the packaged*

food, that is the main point". Furthermore, other interviewees believe that higher taxes and guidelines for plastic packaging could drive the value of waste up. On the question of how waste could be made more valuable, the representative of company E answered, "*yes, of course, for example by taxes!*". And according to the respondent of company C, "*we would need to do that by stimulating laws, that would be the easiest thing*" towards getting better sorting results.

This leads to the next main challenge the interviewees see, the need to have better collection and recycling methods. In order to have a better quality of recycled materials, better sorting processes are needed. "*The problem is that recycled materials available on the market today, they tend to be a quite big variation in quality from the same supplier and so on because it depends on what kind of waste they have been getting*", *"[…] the sorting process is where they need to invest still to get better*" (Company C). However, not only the sorting processes should be developed, but also the number of facilities which can recycle has to be increased. Otherwise, the waste has to be exported and a long and huge amount of transportation is also not environmentally friendly. According to the respondent from company B, it needs investment in sorting and recycling facilities, "*but that requires then professional companies to make investments in facilities. […] if you make the investment into sorting facility then you need to sort waste*".

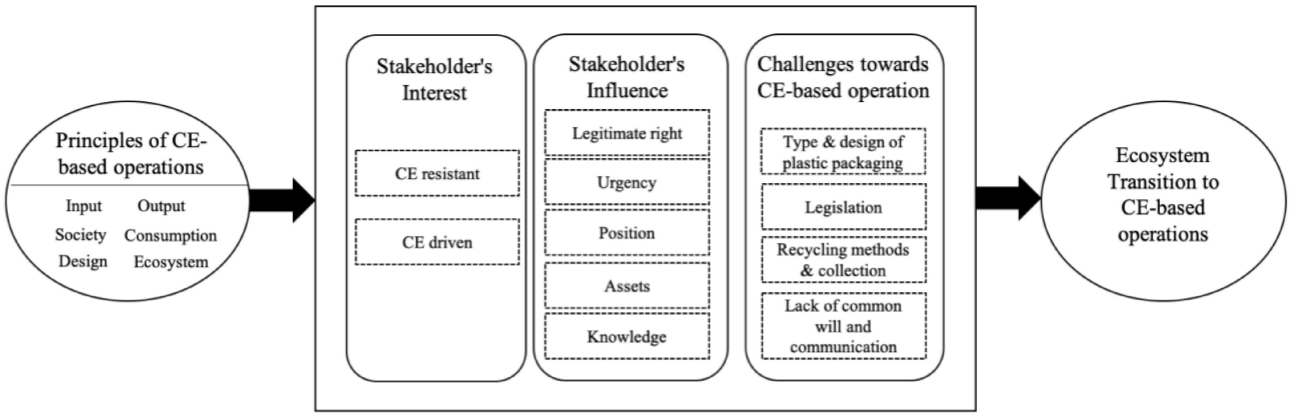
Consequently, to have enough materials to sort and recycle, it also needs collection points and people that not only know how to recycle but have a common willingness to support the process. Thus, the last challenge the interviewees see for the ecosystem transition towards CE-based operations is the lack of a common willingness and communication. First of all, instead of discussing who will pay for the collection points, the industry players and especially central retailer companies could work together. "*S and K group would have an influence […] if they would advertise [collection points] it would have a huge impact*" (Company A). It is also important to even still improve the information for consumers on how to recycle. "*The main point, in my opinion, is that people must know how to recycle it*" (Company F). A common strategy might also increase the general willingness to pay more for CE-based solutions because someone needs to be ready to pay for improved recycling methods and higher utilization rate of recycled polymers. "*There are environmental solutions […] but the price is double and nobody in the industry is ready to pay the price*" (Company F). Therefore, problems every stakeholder is facing should be discussed together and made public to each other. "*We should communicate what kind of problems we have in using recycled materials because that would*

make people understand better" (Company C). This is why the interviewee of company D believes that "*we could kind of make a perfect plan if everyone would be in the same place*".

This shows the practical problems stakeholders are facing with the transition to CE-based operations, but also some possible solution. Some of those might apply that a certain stakeholder group has to change their operations to be able to overcome the challenge. One example here would be the consumers who would need to change their consumption behaviour. However, the results also apply that for some issue's ecosystem members can influence each other's behaviour towards CE-based operations. The government could, for example, via new legislation push the brand owner to invest in collection points. Thus, those challenges show where, when and for what purpose stakeholders should use their influence on one another.

The empirical findings enhance the conceptual framework and lead to an analysis model which does not only identifies the stakeholders that really count, but also the measurements that are needed for an ecosystem transition to CE. Figure 11 shows the model. The next chapter will discuss the new findings of the empirical analysis with the theoretical findings of the literature review to answer the research question.

Figure 11. Ecosystem transition model.



5. DISCUSSION

This chapter aims to summarize and discuss the key findings regarding the research question. To answer the research question, the findings of the literature review and the empirical study are compared and combined. The research question guiding this study is as follows:

RQ: How can key stakeholders influence the transition towards CE-based operations in the plastic food-packaging ecosystem in Finland?

However, to be able to comprehensively answer to the question, two research objectives have been defined. In the following, each research objective will be answered separately to then summarize the key findings answering the research question at the end.

RO1: Who are the key stakeholders in the plastic food-packaging ecosystem?

According to Freemann (1984, p. 46), a stakeholder is "*any group or individual who is affected by or can affect the achievement of an organization's objectives*". However, this definition might be suitable under the assumption that the goal is to analyse stakeholders from one company's perspective to support the strategy formulation of this firm. This was indeed the initial purpose deriving within the strategic management field, but during the last decade, the ST has been expanded to various other fields and purposes. Thus, for this study *stakeholders have been defined as any organization which business activities are either directly touching the lifecycle of a plastic food-packaging like production, distribution or collection, or indirectly involved with plastic packaging via communication, legislation or observation.* However, even though they might be identified as stakeholders, this does not mean that each of them is equally important for the success of an organization, or in the case of this study, for the success of the ecosystem transition to a CE. Therefore, once after identifying all stakeholders, they can be differentiated to find - saying it in Mitchell et al. (1997) words - *those that really count*. To differentiate stakeholders, the ST suggests various different methods. One of them is a classification model using the influence and interest of stakeholders to differentiate (Eden & Ackermann, 1998; De Lopez 2001, Reed et al. 2009). Thus, this study has investigated the stakeholders' interest and influence on CE-based operations to differentiate those who are key stakeholders for the successful transition.

Starting with the interest of the stakeholders, according to the interview's raw materials suppliers, plastic converters/compounders, brand owners and consumers seem to be resistant towards CE-based operations at the current stage. This is due to the fact that their current actions show no to little interest in changing their behaviours and strategic choices towards CE-based operations. The consumers and brand owners, however, are hard to put entirely into one category as there are, of course, exceptions, but the results of the interviews indicate that many are still showing lack of interest. On the other side are those stakeholders which are driven towards CE-based operations and those are food retailers, recycling companies, the media, and government. The central food retailer companies show higher interest as they are giving an advantage to those products which are more environmentally friendly. The recycling companies' interest is self-explanatory as their business purpose is based on recycling, which can be considered as supporting CE-based operations even though the value that can be extracted through recycling is currently still low. The media due to public discussion and shift in opinion can also be seen as a stakeholder with higher interest. Then lastly the government shows a high interest in CE-based operations due to the number of legislations and strategies they published related to CE and plastic.

Table 7. Interest of stakeholders.

Interest	Raw material suppliers	Plastic Converters/ Compounder	Brand owners	Food retailer	Consumer	Recycling companies	Media	Government
Low	X	X	X		X			
High			x	X	x	X	X	X

Further, the ST widely discusses the influence one stakeholder can have over another and its connection to power deriving when in possession of certain resources. The literature review suggests five variables of influence. They have been tested through the empirical analysis and show that all of the variables of influence are used within the ecosystem from different stakeholders, however, some seem to be stronger than others. The first variable, legitimate right, is hard to define and has been discussed as meaning stakeholders' actions are socially accepted, thus following certain norms, values and beliefs. Therefore, this corresponds with the interest of stakeholders. The other variables of influence, however, are more seen to be used by stakeholders to influence.

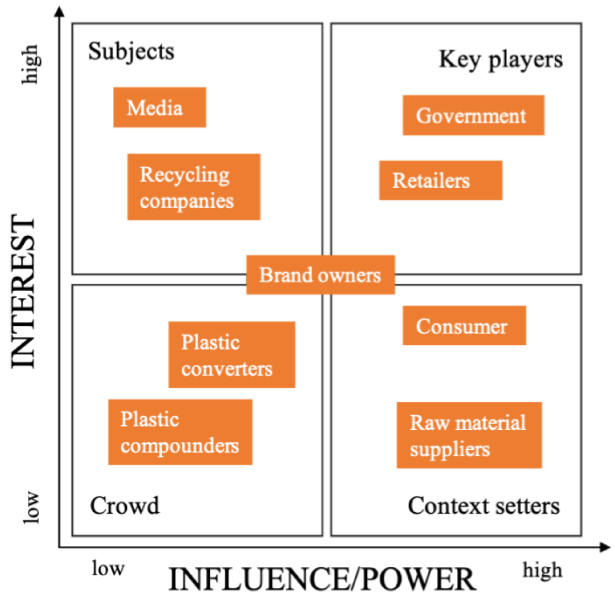
Thus, the media is using the urgency and criticality of the problems created through plastic waste such as microplastic in oceans or climate change to influence consumer opinions and pressure brand owners, plastic converter, the government or recycling companies. The government, due to their position in the system, can use their legislative power to pressure other members in the ecosystems. A powerful position has also been achieved by the S and K group, which is very interesting. Even though the S and K group do not exactly have anything to do with the production of plastic packaging, their connection between brand owners and consumers allow them to influence both of those stakeholders' groups. Further, their size seems to strengthen their influential power. Size and price have been examined to be two attributes deriving from the variable of assets. Size can also be connected to a better financial asset and means, the bigger a company is the more influential they become. On the other side, the price means that environmentally friendly solutions still seem to be higher priced and therefore hindering the transition towards CE-based operations. Another stakeholder being pointed out as of big size are the raw material suppliers. There are not that many suppliers of plastic resins European-wide. However, they are not using their influence currently to drive towards CE-based operations, but rather they are blocking the transition. The last variable - knowledge - has been used by multiple stakeholders to influence each other. The recycling companies, which can be seen as represented by company B and E, are seeking to give advice and knowledge to brand owner, consumers and anyone else in the industry in the form of statistics. With those actions, they aim to increase recycling and collection rates. Furthermore, other stakeholders, such as plastic converters or compounders, are interested in gaining new knowledge about recycled or green polymers and the possibilities to move towards them. The misunderstanding about types of plastic and the different opinions throughout the ecosystem show that there is still a lack of knowledge that can be filled. This emphasizes the roles of researchers from universities or other institution like the EMAF, which would become more important in the future.

Table 8. Influence of stakeholders.

Influence	Raw material suppliers	Plastic Converters/ Compounder	Brand owners	Food retailer	Consumer	Recycling companies	Media	Government
Low		X	X			X	X	
High	X		X	X	X			X

After analysing the stakeholder's interest and influence, the differentiation was conducted according to the classification model of interest and influence (Figure 11). As discussed in the theory, depending on the classification of the stakeholders, they can be either barriers or drivers towards the desired outcome. Relevant stakeholders for the transition to CE-based operations are key players, but also context setters and subjects are important (Reed et al. 2009).

Figure 12. Stakeholders classification of the ecosystem due to interest and influence.



After the key stakeholders have been identified, the next step is to understand what strategic actions are required for a successful transition towards CE-based operations from those stakeholders. Thus, the research objective two will answer this question by connecting the results from the literature review with the empirical analysis.

> ***RO2: What are the necessary changes needed to transition towards CE-based operations in the plastic food-packaging ecosystem?***

The literature analysis of CE shows that CE is not just a simple expression to describe more environmentally friendly products or company operations, but rather a complex undertaking involving a complete shift in the way our system works (Figure 2, p. 26). This shift goes beyond simply changing the material input or business models of firms. It includes that everyone within a CE looks at what kind and amount of resources they put into their operations and what waste comes out of the system, with the aim to close the circle and reuse everything. It requires all

members of an ecosystem to collaborate, communicate and work together towards reaching this system shift, because as Gupta et al. (2019, p. 3) state, "*There is a need of collective action on the part of all major stakeholders falling in the ambit of a complete business cycle".* Thus, for CE to derive, it involves changes in the way all stakeholders operate with the environment and with each other in one ecosystem. Those attributes can be summarized in the different perspectives of CE, and they give indications for the strategic actions organizations or ecosystem members should take. However, the question to be answered is what this means exactly for the plastic food-packaging ecosystem. When analysing a plastic food-packaging it shows a lot of challenges with CE-based operations. The theory on this is rather slim, but some institutions like the EMAF, SITRA or Plastic Europe have been looking at them from a conceptual and theoretical perspective. According to them, four challenges have to be addressed and call out for changes in the way companies operate. Those can be supported and expand by the practical challenges seen in the empirical analysis.

The first challenge to address is the design of packaging, which should be for multiple usages, instead of **single usage**, as it is currently. However, the interviewees clearly state that this might be a problem which is hard to overcome with the current strict legislation. The hygiene requirements make it hard to reuse packaging or even to use recycled polymers for food-packaging. Thus, stakeholders claim that, on the one side, the strict regulations are hindering the reusability for the food industry, but on the other side missing legislation like taxes on new plastic packaging could help increase the value of waste. Furthermore, one respondent suggests, if consumers would accept a shorter shelf time of food, it would increase the possibility to use recycled polymer.

The next problem identified in the theory is the challenge of recycling plastic whilst not **losing value** through the recycling process. This has also been a problem recognized by analysing the results of the interview. At the moment, not all plastic packaging can be recycled as it first needs to be sorted and cleaned which is expensive. To increase the quality and also the number of recycled polymers, it needs investments into sorting processes and facilities. However, it also needs better quality plastic.

The third issue classified was the **high leakage** of the plastic. This includes not only the leakage into the ocean which is not a Finnish problem according to the interviewees but also includes the general problem of not being able to collect all plastic which would be recyclable. The

results of the interviewees show that there is still a need to increase the collection points in Finland, but the problem lies more within the common willingness of people to return waste properly.

This might also be caused by a lack of knowledge and misunderstanding of the right type of plastic which brings up the last challenge demonstrated in the theory part of the thesis, the material choice of **oil-based plastic**. It seems, between the stakeholders in the Finnish market, there is no consensus on whether it really is the right move to go away from oil-based polymers. Especially, one common misbelief is that biodegradability means that the packaging is based on renewable raw materials, which clearly is not the case. Furthermore, the question of biodegradability being a circular material choice is unclear. And whilst some stakeholders support a move towards bio-based plastic types, others believe that those raw materials should be used as nutrition instead. Furthermore, the results of the empirical analysis, show that there is a lack of communication and collaboration between all members of the ecosystem when it comes to the problems everyone is facing regarding plastic recycling or using recycled materials. This shows that there is still a need to close this gap of knowledge between all stakeholders and work together on finding the right solutions. After all, one agreement could be found within the stakeholders' opinion and that is that non-recyclable plastic types are not acceptable.

Once, there is knowledge about the role of the stakeholder in the ecosystem and the necessary changes which should be taken, the research question can be answered. Thus, it can be evaluated how the key stakeholders can influence one another towards CE-based operations. Furthermore, in ecosystem management, the strategic actions of one member can strengthen or weaken the whole ecosystem and therefore influence each other's performance as well (Zhang & Liang 2011). Therefore, now the research question will be answered in the following.

> ***RQ: How can key stakeholders influence the transition towards CE-based operations in the plastic food-packaging ecosystem in Finland?***

The government and the central food retailers have been identified as **key players**, as they are shown to have high interest and power towards CE-based operation. The retailer companies seem to have a good position in the market not only influencing their direct counterparts, the brand owners and consumers but also influencing other stakeholders. Due to their opinions,

brand owners are pushed to invest into more environmentally friendly plastic materials or even make public commitments such as reaching recyclable packaging until 2025 and they put the pressure on plastic converters. They also could take more influence on the consumer if they, for example, advertise the collection of plastic packaging. Since they are in direct contact with the consumers, they can also observe the consumer behavior and recognize if trends such as fresher food and lower shelf-times become reasonable. Especially the government is an interesting stakeholder, as they have been named as important and powerful for some companies, but for others not yet that relevant. This might show that the government is not pressuring the whole ecosystem yet, but just those involved in the plastic after-life step. Due to regulations and legislation, the government is in the position to determine nearly all stakeholders' actions. Furthermore, many interviewees point out that the government should be even more active towards CE-based operations. New regulations and taxes pressuring other stakeholders then just the end-of-lifecycle members might help the ecosystem transition to speed up. Moreover, the government would need to review their current laws and regulations to push instead of to interfere with this development. Furthermore, according to the ecosystem theory, their position allows them to connect with other stakeholders and push for collaborations. Key players are very important for the outcome of CE and they should actively use their power to increase the health of the whole ecosystems and strengthen their role further.

Further, the stakeholders with a **subject's** role are media and recycling companies, as their interest is high, but their influence is limited. The media has discussed many urgent topics in the last years and those have affected consumers a lot. Thus, they have affected the ecosystems general opinion, however, due to lack of knowledge as some interviewees believe their actions were not necessarily constructive. To counterbalance this, they could investigate and communicate more about the current problem's stakeholders are facing with recycled polymers. They could unfold the misunderstanding of the different types of plastic and call out for a need to clarify, thus influencing other stakeholders such as raw material suppliers, plastic compounders or recycling companies, to act upon. Furthermore, even though they influence others, those actions generally show slower changes. To drive towards higher recycling rates, not only the participation of recycling companies is needed, but also investments into more facilities and better technologies. Those end-of-life stakeholders should keep going with their actions, but to have faster success, they would need support from the key players. For example, recycling companies could seek collaboration with other stakeholders to solve recycling issues and the government could push other stakeholders to invest in recycling facilities.

The most critical class are the **context setters,** as they have a high influence, but little interest. The raw material suppliers have been identified within this class. According to the statements of the interviewees, the raw materials suppliers are at least in line with a transition to CE. However, there is a belief that if they would put more time and effort into researching and inventing new ways of using green or reused polymers, it would be beneficial for the whole ecosystem efforts. If they would be widely interested in offering other types of plastics, the price could go down and eventually lead to higher utilization by the stakeholders coming after them in the value chain. However, as their interest is low, key or subject stakeholders would need to use their influential power to increase their interest or push them towards CE-based operations. For example, the government could raise taxes, give subventions or set new legislations. Furthermore, consumers are acknowledged as an important factor for the current ecosystem efforts. Not only are they the ones who have the power to collect, separate and return the plastic packaging after use, but also make the purchasing decision and could decide for a product with recycled plastic packaging. Their influence is low, but their interest is torn also if the majority still shows little interest according to the study. Therefore, those consumers who have higher interest can use their influential power by consuming the right products, recycling and returning plastic waste. Furthermore, the less interested consumers would need to be influenced in that way that they increase their interest, because if the customers are not favoring plastic, then that has a negative influence on the brand owners packaging decision.

Lastly, the brand owners are rather hard to put into a certain class. Depending on the size of their company and the assets they are owning, they can have strong or weak influence on others. Also, the results of the interviews show that their interest is quite divided. As some of the interviewees mentioned, for those brand owners who have an interest in CE-based operations, they are already investing into the right material choices and take their responsibility seriously. They believe that once the majority of the consumers gains higher interest, they will eventually gain a strong competitive advantage. And those who did not invest will eventually drop out of the competition. Furthermore, those brand owners who can be sorted to the category of key players may influence others, for example, by investing in collection points or informing the consumers about the right materials.

Table 9 illustrates the changes based on the theoretical and empirical findings, for the ecosystem to transition to CE-based operations and connects them to the influence the different ecosystem stakeholders can have with their actions.

Table 9. Changes towards CE-based operations and key stakeholders influence.

Challenges with plastic packaging	**Changes towards CE-based operations**	**Stakeholders influence**
Short usage period	• Find solutions to use recycled polymer for food packaging and ease legislations • Increase the value of plastic packaging waste by adding taxes on packaging • Accept lower shelf times of foods • Use only recyclable plastic packaging	Brand owner: • observe consumer behavior and recognize trends such as fresher food and lower shelf-times become reasonable Government: • give new regulations and taxes • review their current laws and regulations for food packaging Key or subject stakeholders: • push raw material suppliers towards producing recycled polymers
Low ratio and value loss of recycling	• Invest in plastic recycling facilities • Develop plastic sorting and recycling methods	Key stakeholders: • support investment into facilities and better technologies Recycling companies: • seek collaboration with other stakeholders to solve recycling issues Government: • push other stakeholders to invest in recycling facilities
High leakage	• Increase willingness to recycle and return plastic waste • Increase collection points for plastic waste	Retailer companies: • advertise the collection of plastic packaging Brand owner with higher interest: • invest in collection points or inform the consumers about the right materials
Use of fossil feedstock	• Communicate and collaborate about issues with recycling or reusing plastic • Fill the gap of knowledge and clarify misunderstandings about types of plastic	Government: • connect with other stakeholders and push for collaborations Media: • investigate and communicate more about the current problem's stakeholders are facing with recycled polymers • unfold the misunderstanding of the different types of plastic

6. CONCLUSION

6.1. Theoretical implications

This study was conducted with the aim to investigate key stakeholders influence on the transition towards CE-based operations. A body of literature from different research fields has been summarized and therefore this study contributes by enriching the circular economy as well as the stakeholder theory literature.

The first theoretical implication is the contribution to expanding the literature of circular economy by further conceptualizing the concept. CE has been commonly studied from the practical point of view from various important institutions in the field. Whilst previous studies in circular economy related to strategic management studies have been focusing more on business model transformation and innovations, this study aims to focus on the necessary change's companies should align their operations with. Therefore, it suggests CE as a complex concept based on different perspectives and points out the need for ecosystem efforts in order to transition to a CE.

Secondly, it connects the stakeholder theory with an ecosystem level. Stakeholder analysis targets the managerial level of one company to manage a firm more effectively by understanding the relationship and affects they have towards their stakeholders. An ecosystem level, however, proposes that the performance of the whole ecosystem depends on its members' actions. Therefore, all stakeholders' interests and roles within one ecosystem are important for the ecosystem efforts and its health. Thus, whilst focusing only on one case company's perspective when implementing a stakeholder analysis, this study proposed an implementation which goes across industries and conducts a stakeholder analysis from the whole ecosystem point of view.

Thirdly, this study offers an attempt to utilize stakeholder theory to understand how to drive circular economy. It explores the benefits of stakeholder analysis deriving from the stakeholder theory literature when seeking to transition an ecosystem including all its stakeholders into a circular economy. Hence, it fills the gap between the recognition within circular economy literature that an ecosystem perspective is essential, and for the implementation of CE all key stakeholders need to be involved.

And lastly, the study is conducted with the focus on plastic packaging and therefore it aims to tackle an issue which has been communicated by the politics and government to be of high priority. It offers new insights to plastic food-packaging with the benefit of having a broad ecosystem perspective as it includes various stakeholders' opinions and beliefs within Finland and across industries.

6.2. Managerial and political implications

The managerial and political implications aim to propose suggestions to the different stakeholders in the ecosystem and what is needed from them to successfully transition to a CE.

The findings underline the need for stakeholders to work together to overcome problems keeping them from implementing entirely CE-based operations. Unfortunately, only one single company's effort is not enough for a successful transition to CE-based operations. Rather it requires all stakeholders to commit and change their way of doing business. However, the study shows that one single stakeholder action can have an influence on the other ecosystem members in the long run. Thus, they should initiate a stronger relationship with direct stakeholders aiming to communicate about each other's specific issues for example with recycled polymers or packaging design and generating more knowledge in regard to those problems.

Furthermore, those stakeholders identified as key players might have a special role in the transition of the ecosystem. Their position allows a certain power to influence the whole ecosystem performance. Their role should further promote efforts towards CE-based operations. In Finland, especially the central food retailer companies seem to have an influential position to pressure the brand owners and raise awareness in the consumers. Once the consumers have a higher interest and common willingness, they will require better packaging solutions. In addition, raw material suppliers interest needs to be shifted, which would make them move to the key player area as well. They should add the investigation of chemical recycling as well as increasing their actions around producing recycled polymer to their goals.

Moreover, this study proposes not only managerial but also political implications as one of the key stakeholders identified is the government. It is shown that the government's influence is currently mainly focused on the end-of-life of a plastic packaging. The targets set by the government such as a certain amount of collection points and recycle rates by 2025 are pressuring on waste management, collection and recycling companies. Raw material suppliers,

as well as plastic converts, or brand owners, do not necessarily feel any pressure coming from the government, hence, they are not influenced to increase the usage of recycled polymers for their products. Furthermore, the current legislation regarding food hygiene is causing general problems for the reusability of recycled plastic. The interviewees point out, to tackle this it would need new technologies making the recycling process of higher quality. This leads to the question if and how the government could support investments into those kinds of technologies, for example, by subventions or new legislations. Furthermore, they could take an influence on increasing the value of waste by using their power to influence.

6.3. Suggestion for future research and limitations

As the scope of this study was limited to plastic food-packaging as well as geographically focused on the Finnish market, it may give some restrictions to the findings and the managerial, theoretical and political implications of this study. Hence, the results should be considered mainly for the plastic food-packaging area. The author believes, since plastic food-packaging is a priority issue to overcome, it is more value-adding to keep the scope limited to a certain material and not to generalize CE for the whole economy.

Moreover, the author presumes, if the aim is to find solutions for widely implementing CE, different issues might require different actions to be solved. A suggestion for future research is to conduct similar studies for the other priority areas named by the European Commission, such as food waste, critical raw materials, biomass or construction. Furthermore, it might be useful to investigate stakeholders' roles, interest and influences across various countries or European-wide in regard to plastic or any of the other material choices.

In addition, the main limitation of this study is the difficulty to generalize the findings. Due to the scope explained above as well as the limited amount of companies interviewed and other selection-based settings, the insights offered throughout the discussion are based only on a small part of stakeholders within the ecosystem. Especially, the consumer who is identified as key stakeholder has been neglected in the case selection criteria. Thus, in order to grasp the consumers perspective as well and strengthen the findings of this research, further studies could concentrate on consumers' willingness. In this case a quantitative method as a research strategy might be more valuable.

Furthermore, the key findings show that there is a gap in knowledge concerning the right type of plastic. To fully understand this issue, the benefits of the plastic types in connection to the principles of circular economy should be studied more thoroughly. This leads to a still-existing gap of CE being a fairly new research stream and missing concrete theoretical frameworks to strategy formulation and implementation.

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APPENDIX 1. Interview guideline

Introduction question: (Find out their role in the value chain and objectives)

1. What does your company have to do with plastic packaging? What role does plastic packaging take in your business activities? → (to find out what part they take in the value chain?)

Stakeholders identification: (find out stakeholders in the ecosystem)

2. With whom are you directly involved regarding plastic packaging? Who are your Stakeholders? (customers or suppliers)

3. Is there a stakeholder you are especially depended on regarding your business activities? (Who influences your actions the most? Whose opinion is the most important?)

4. Is there a stakeholder who is depended on you for their activities? (Whom do you influence?)

Interest regarding CE: (stakeholders' interest towards CE)
First explain shortly CE operations within plastic (related to the company set focus on certain aspects) Aim is to close the loop:

- Design should be recyclable, depends on type of plastic and quality of plastics, don't mix
- Use of biodegradable plastic instead of oil-based
- Lack of responsibility for collection. Leakage is a problem...
- Cross-sector communication between different actors to ensure reuse

5. What is the main issue with plastic packaging in regards of circularity from your perspective at the moment? Where it comes from? Who is causing the main problems at the moment?

6. How could your companies' activities ensure that there is possibility of closing loop (name examples such as recycling, reuse, collection depend on companies' background)?

   Deeper related to answer above and company:

   a. How does the design process of a packaging within your company work and who influences you during this process?
   b. When it comes to the type of plastic the packaging has, how do you make those decision (e.g. biodegradable?) Or do you even have a power over this decision? If not, who has?
   c. Whose responsibility do you believe is it to increase recycling rates?

7. What would you see as an incentive to make your company become more oriented towards CE operations?

8. What kind of stakeholder do you see are involved in improving plastic packaging ecosystem functioning?

Influence on CE:

Knowledge (skills or experiences with CE practices)

9. What knowledge does your company have over CE practices (Type of plastic, responsibility matter depended on type of company?)
10. Do you think that knowledge is an important variable of a successful implementation?

Urgency (time sensitivity and criticality)

11. How urgent is the need for CE operations for your company?
12. Do you think if we were closer to resource scarcity would force you to change your operations? Who would be forced?

Position (directly involved with plastic, strong position on the ecosystem)

13. Do you have a strong relationship with your stakeholder?
14. Do you work together on sustainable related issues? And how do you work together?

Assets (superior financial situation, resource dependency)

15. Can you use your power over resources or financial matters to influence a stakeholder that would help CE to happen?

Legitimacy (right/stake/belief for circular ecosystem)

16. Does your company belief CE practices/sustainability matters should be implemented?

17. Would there be other factors that you could use to influence actors in the ecosystem?
18. Are there other factors your stakeholder put on your company?