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MULTIPLE CASE ANALYSIS OF BUSINESS MODELS IN CIRCULAR ECONOMY INITIATIVES: CASES FROM EU, CHINA, THE US AND FINLAND

Master of Science Thesis

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## ABSTRACT

**VALTTERI RANTA:** Multiple case analysis of business models in circular economy initiatives: cases from EU, China, the US and Finland

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Growing rate of consumption coupled with a growing total population is leading to increasing burden on the consumption of non-renewable resources on our planet. The concept of circular economy has been introduced as a potential way of decoupling consumption from the use of natural resources. However, knowledge of how to implement circular economy through business models is limited, together with the knowledge of whether different geographical areas favor different business models due to the institutional landscape in place. To address these issues, this study aims to answer the following research questions: *With what kind of business models do circular economy driven business ventures operate with regards to value proposition, value creation and delivery, and value capture? How can business models advance the circular economy? How does the institutional landscape affect the business model in question?*

To answer these questions, a multiple case study of four cases from a variety of different business model types from multiple industries from Finland, EU, China, and The United States was conducted. The data was a combination of primary data through interviews, and secondary data through news articles and company releases. Interviews were conducted as theme interviews, and were recorded and transcribed. The news articles used were collected from reliable sources combined with the use of LexisNexis as a database. The data was analyzed in within case studies by systematically identifying aspects of the cases with the analysis framework created based on a review of literature of business models, circular economy, and institutional theory. In cross-case analysis, the same framework was used to identify patterns across cases.

Results indicate that circular economy business models share similarities in their components across industries. A co-existence of a service and a product offering is usual for implementing multiple value capture mechanisms and providing a mean to acquire suitable waste. Recycled materials communicate lower price compared to virgin materials as the primary value proposition, while for products made from recycled materials the value proposition is sustainability combined with equal or higher performance compared to virgin materials. In advancing circular economy, the results indicate a significant emphasis on recycling. Extending the scope beyond recycling is identified as an underutilized area for circular economy business models. The results indicate that regulative processes in the geographical areas are not alone effective to support circular economy business, and the creation of normative and cultural-cognitive support is equally important.

## TIIVISTELMÄ

**VALTTERI RANTA:** Monitapaustutkimus liiketoimintamalleista kiertotaloudessa: tapaukset EU:sta, Kiinasta, Yhdysvalloista ja Suomesta.

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**Avainsanat:** liiketoimintamalli, kiertotalous, kestävä kehitys, kestävät liiketoimintamallit, instituutionaalinen teoria

Jatkuva kulutuksen kasvu yhdistettynä kasvavaan populaatioon on johtamassa yhä suurempiin ongelmiin luonnonvarojemme käytössä. Kiertotaloutta on esitetty mahdollisena ratkaisuna tuotteiden kulutuksen ja luonnonvarojen käytön toisistaan erottamiseen. Tietoa siitä, kuinka yritykset voisivat yhdistää kiertotalouden periaatteita liiketoimintamalleihinsa, on kuitenkin saatavilla hyvin rajoitetusti. Samalla on epäselvää, vaikuttavatko eri markkinoilla vallitsevat instituutiota kiertotaloutta hyödyntäviin liiketoimintamalleihin ja miten. Näiden ongelmien johdosta tämä tutkimus pyrkii vastaamaan seuraaviin tutkimuskysymyksiin: Millaisia liiketoimintamalleja kiertotaloudessa toimivat yritykset käyttävät arvolupauksen, arvonluonnin ja toimituksen sekä arvon kiinniottamisen suhteen? Miten liiketoimintamallit voivat edistää kiertotaloutta? Miten markkinoiden instituutiot vaikuttavat kyseisiin liiketoimintamalleihin?

Jotta kysymyksiin pystyttäisiin vastaamaan, toteutettiin neljän tapauksen tapaustutkimus. Tapaukset käsittelivät useita erilaisia liiketoimintamalleja eri toimialoilta Suomen, EU:n, Kiinan ja Yhdysvaltain markkinoilla. Tutkimuksen data oli yhdistelmä haastatteluilla kerättyä primääristä sekä uutisartikkeleista ja yrityslähteistä kerättyä sekundääristä dataa. Haastattelut toteutettiin teemahaastatteluina, ja äänitettiin sekä litteroitiin. Uutisartikkelit kerättiin luotettavista lähteistä hyödyntäen LexisNexis –tietokantaa. Analyysissa yksittäisten tapausten datasta tunnistettiin kirjallisuuskatsauksen pohjalta luotujen viitekehysten sisältämiä yksityiskohtia liiketoimintamallien, kiertotalouden ja instituutionaalisen teorian alueilta. Tämän jälkeen tapausten välisiä eroavaisuuksia ja yhteneväisyyksiä tarkasteltiin hyödyntämällä samoja viitekehysjä.

Tulosten perusteella kiertotalouden liiketoimintamalleissa on yhteneväisyyksiä yli toimialarajojen. Sekä palvelu- että tuotekomponentin olemassaolo on yleistä mahdollistaen liikevaihdon keruun useammalta suunnalta ja samalla tarjoten mekanismin hyödyntämiseen soveltuvan jätteen hankkimiseen. Kierrätysmateriaalien arvolupaukseen sisältyy neitsytmateriaaleja halvempi hinta, samalla kun kierrätysmateriaaleista valmistetuilla tuotteilla arvolupaus keskittyy usein ympäristöystävällisyyteen edullisuuden sijaan. Kiertotalouden edistäminen tapahtuu tulosten perusteella hallitsevissa määrin kierrätyksen kautta ja muiden menetelmien kuten uusiokäytön havaitaan olevan alihyödynnettyjä odotuksiin nähden. Näyttää myös siltä, että markkinoiden regulaatio ei yksin selitä markkinoiden eroavaisuuksia eikä ole riittävä tukemaan kiertotalouden edistämistä, vaan normatiivisen ja kulttuuri-kognitiivisen tuen olemassaolo ja luominen on yhtäläisen tärkeää.

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## LIST OF SYMBOLS AND ABBREVIATIONS

3R	Reduce, Reuse, Recycle
ARVI	Material Value Chains -research program
CE	Circular Economy
CE100	A pre-competitive innovation program managed by the Ellen MacArthur Foundation
CEO	Chief Executive Officer
CPM	cost per thousand
DRR	Domestic Recycling Resources
EU-28	The 28 countries in the European Union
IE	Industrial Ecology
IT	Information Technology
NDRC	China's National Development and Reform Commission
OECD	Organization for Economic Co-operation and Development
PC	Personal Computer
PE	Polyethylene
PET	Polyethylene terephthalate
PP	Polypropylene
R&D	Research & Development
REF	Recovered fuel
UL	Underwriters Laboratories, a global safety science company
the US	the United States
WP	Work Package in the ARVI program
WPC	Wood-plastic composite

# 1. INTRODUCTION

## 1.1 Background of the study

Our current linear economic development model is becoming challenged, unable to sustainably provide economic growth and prosperity as it relies on the consumption of scarce and diminishing natural resources. Turning to more sustainable methods of consuming and managing materials and natural resources is an increasingly important topic both on a regional and global scale. World population breached 7 billion in 2011, and is projected to breach 8,4 billion by 2030. At the same time, consumers in countries such as China and India are having more opportunities to consume products and services, and economies in developed countries are also expecting and hoping to continue on a track of continuous economic growth. (UN 2015) Altogether this leads exponential growth of consumption.

The economic development model dominant today, the so called “take, make, and dispose” –model, is unsustainable from multiple perspectives if we are to maintain continuous economic growth. From the perspective of resource intake, the current model creates a direct link between economic activities and consumption of natural resources, as products are in overwhelming majority made from virgin material resources (Ness 2008). With many natural resources being limited in quantity, the use of natural resources will inevitably lead to needs to create new methods of harnessing resources from increasingly difficult places (Andersen 2007, p.139). These new methods are potentially costlier and increase the environmental risks of resource extraction.

Although the continuous overconsumption of natural resources is unsustainable in the long run, the current economic development model is already causing problems elsewhere. The amount of waste generated is increasing exponentially and the disposal of the waste through landfills or incineration has led to pollution issues that themselves pose a threat to human well-being, and thus the society and the economy (Su et al. 2013; Yuan et al. 2006). Alternative ways to dispose the waste generated by our economic model are needed if the sustainable and continuous growth is to be maintained.

The concept of Circular Economy (CE) has been proposed to help solve these issues by offering an alternative to the model of extracting natural resources for new products and disposing of them at the end of their life-cycle. In CE, products and materials are to be kept in circulation for as long as they can provide value in so called “closed-loops”, while simultaneously promoting activities that reduce the need for material per unit of value produced. These activities could for example include service-based offerings such as



rental services, better durability of products, creating leaner products, and increasing the use of recycled materials. (Feng & Yan 2007; Zhu et al. 2010; Tukker 2015) In an ideal state, these have the potential to de-link economic growth from consumption of natural resources by substituting virgin materials with recycled ones, and substituting the economic growth from new products with activities that provide a better ratio between economic value and material usage.

There are benefits other than environmental sustainability that CE can introduce. In the linear model where the majority of products are created from virgin materials, the geographical areas that lack the natural resources to provide those materials are in a disadvantage. If products were created from recycled materials, the geographical areas of consumption and material resources could be better aligned. This could reduce material availability risks, especially when compared to going forwards with the current model going while natural resources diminish. (European Commission 2015, p.2) Reducing material needs and using recycled materials with more predictable prices could thus lead to more stable business.

However, for the concept of CE to truly be viable as an alternative growth model, it needs to be able to deliver on its promises of providing sustainable economic growth. If increasing the circulation of materials by closing material loops is unable to compete economically with the current linear model of “take, make, and dispose”, then the implementation of CE while retaining continuous economic growth will be a difficult goal to achieve. (Charonis 2012; Preston 2012) This is why studying business models in circular economy becomes crucial.

The Business Model as a term can be used in multiple contexts and its specific details can vary. For example, a business model can be defined as a way to commercialize a technology (Chesbrough & Rosenbloom 2002), or as a way to execute strategy in business (Richardson 2008). The underlying theme of a business model however is to guide a business venture to successful implementation based on the resources and activities it employs, answering the questions, what do we offer, to who, how we deliver our offering, and how do we make money (Magretta 2002). Thus in the case of CE, it is crucial that there are successful business models for business ventures that strive towards closing material loops, using recycled materials, or employing other activities that help to decouple economic growth from consumption of natural resources.

Surprisingly there is a gap in scholarly literature when discussing circular business models. The majority of studies in the area of CE have focused on the material flows in circular economy, while leaving the business model of these potentially viable ventures unexplored (e.g. Jacobsen 2006; Mathews & Tan 2011; Park et al. 2010). Without proven business models in the area, it is difficult for companies entering the field to make informed decisions on whether implementing activities that increase circularity would make sense to them, and especially how those activities could be organized and what effects or

benefits those activities could have to the overall business operations of the company. In this study, research is provided for this gap by presenting and analyzing cases that are creating economic value and are aligned with the practices needed to increase circularity of materials and reduce the need for using natural resources, thus eligible to be discussed as circular business models.

While studying business models that implement activities helping the economy move towards a circular model, a market perspective is taken. This is to increase the understanding of basic challenges for circular economy, many of which might change depending on the geographical market area under analysis. For example, in Western and Northern Europe, recycling has been high on the agenda for some time already, and e.g. Germany, Sweden and the Netherlands are able to achieve recycling rates of over 20 percent for plastics, rising to recovery rates of over 80 percent when including energy recovery. (Hopewell et al. 2009, pp.2117–2118) In emerging countries however, recycling is a much newer phenomenon and its implementation can greatly differ from developed countries. The lack of infrastructure for recycling is both an issue and an opportunity, as while the current situation needs to be addressed to decrease issues such as pollution, these areas can learn from more developed countries and are not tied to existing infrastructure to the same extent, and thus can potentially acquire late-comer advantage to more efficient circular economy (Yuan et al. 2006).

While the developmental state of waste management infrastructure is one specific example of how the geographical market influences the methods and potential for implementing circular economy business models, there are many other aspects to take into consideration as well. For example, the way waste is treated is ingrained into legal and regulatory practices as well as business practices based on how waste has been perceived and treated previously. It can be said that the state of the infrastructure is one reflection of these perceptions, as in emerging countries these norms are only starting to materialize, while in developed countries the norms are more established and recycling practices are required to an extent (Lazarevic et al. 2010).

Said otherwise, the way waste is perceived is an institution that differs between geographical markets (Tolbert & Zucker 1996). The research field of institutional theory provides a fruitful way to approach these geographical differences through institutional landscapes. The institutional landscape of a market describes how the actors in the market perceive certain concepts or activities through regulative, normative and cultural-cognitive aspects. Coercive measures such as laws showcase the regulative aspects of the institutional landscape, normative aspects can be seen in things actors in the area see as valuable or virtuous, and cultural-cognitive aspects in things actors in the area take for granted. (Scott 2008a) This institutional landscape creates boundaries for the behavior of actors in a given geographical area. Circular Economy is creating a change into the way waste is perceived by making businesses and other institutional actors look at waste as a resource and an opportunity, rather than something that needs to be disposed of (Ness 2008; Mathews &

Tan 2011; Feng & Yan 2007). Due to the different institutional landscapes in different market, the regulative, normative and cultural-cognitive drivers and barriers for the diffusion of circular economy can be expected to be different.

Thus it is important to include the perspective of geographical markets as an institutional landscape into the study as a level of analysis for the business cases. Not only does this help understand the business models, it might also be an integral part of them, and the reason one business model is seen in one market but not in another. The inclusion of the institutional landscape in a given market can also help identify other important market-based aspects in circular economy business models. This is important since, while in general the move to perceiving waste as a resource is happening all around as can be seen from the emerging popularity of the concept in e.g. China (Yuan et al. 2006), Europe (Lazarevic et al. 2010), and the US (MacArthur 2013), the understanding and implementation of the concept can be different.

This study has been conducted as a part of the ARVI research program. The ARVI consortium behind the program comprises of 19 industrial partners, most of which are waste management technology and/or service providers, and 13 research partners. The driver behind the project, as presented in the ARVI Factsheet December 2015, is stated as follows: *“As a result of diminishing natural resources and the related social demands and the needs of business operations, it is necessary to adopt radically more efficient means of recycling materials.”* (ARVI 2015)

## 1.2 Objective of the study

The main research gap that this study aims to fill is the perspective of analyzing business models of circular economy driven business ventures. While circular economy (MacArthur 2013; Yuan et al. 2006) itself and circular economy initiatives such as industrial symbioses (Mathews & Tan 2011) and increased waste recycling activities (Haas et al. 2015) have received increasing attention in literature, the focus has primarily been on the analysis of material flows in circular systems. However, since a key element of the circular economy is that it should create economic benefits and new business opportunities (European Commission 2015), approaching the concept without taking into account how business ventures in the emerging circular economy operate can be considered inadequate.

Studying the business models of circular economy initiatives is helpful in filling this gap. The business model concept illustrates the details of how a business is designed to operate and achieve its goals, and can be used as a managerial tool to analyze current business models (Chesbrough & Rosenbloom 2002) and create new ones (Osterwalder et al. 2005). Additionally, the business model itself, with its ability to combine multiple aspects of a business venture, from the value proposition of the business venture to customers and to the company, to how that value is created, delivered and captured, into one concept, can

show the alignment of the objective, means, and the environment of a business venture (Chesbrough & Rosenbloom 2002; Morris et al. 2005). Thus it can be versatile in the types of cases it can be applied to, and provide a business driven look at different types of circular economy initiatives.

Another area that this study aims to analyze more in depth is the influence of the institutional landscape in selected geographical markets on the business models. While the main objective is to fill the gap of business model thinking in academic circular economy literature, the way these business models are applicable in different markets is an important aspect to research as well. Circular economy initiatives in different geographical markets is a subject that has been studied before by providing exemplary cases of circular economy initiatives such as industrial symbiosis and recycling that could be implemented elsewhere (e.g. Mathews & Tan 2011). However, issues why certain initiatives are in operation in one place but are difficult to implement in others have mainly been approached through policy suggestions (eg. Mathews & Tan 2011; Someno & Miao 2016; Costa et al. 2010; Feng & Yan 2007).

In this research, to gain a better view of the reasons why certain business models in circular economy function in one geographical area but struggle in another, a different approach is taken. The objective of this study is not to provide policy suggestions that could help the diffusion of circular economy. Rather, to provide reasoning for hypothesized variation in business models in different geographical markets, the institutional landscape, as in the regulative, normative, and cultural-cognitive context (Scott 2008a), in which those business models operate is analyzed as is.

To address the main research gap identified of business model perspective to the circular economy, the main research question of this study is:

- *With what kind of business models do circular economy driven business ventures operate with regards to value proposition, value creation and delivery, and value capture?*

To increase understanding in how the business models advance the circular economy the second research question is:

- *How can business models advance the circular economy?*

To increase the managerial applicability and academic contribution of the study in a global world, the third research question of the study is:

- *How does the institutional landscape affect the business model in question?*

To answer these questions a multiple case study is conducted. The research questions are oriented towards how and why, and thus a case study is an appropriate research design

(Yin 2003, p.5). The analysis of multiple cases is important due to multiple ways in which the subjects under research can appear. Firstly, the circular economy can be advanced by multiple types of initiatives, for example industrial symbiosis (Mathews & Tan 2011) and increased recycling efforts (Haas et al. 2015), and thus only conducting a single case study would be inadequate when the phenomena of circular economy is under research. Secondly, to gain a view of how institutional landscapes affect the business models in different geographical markets, it is necessary to analyze cases from multiple geographical markets to provide any kind of comparison.

With this approach, in addition to providing research from the perspective of the business model to the circular economy literature, the study is to give valuable insight into actual cases revolving around the much discussed circular economy concept. From the sheer interest and scale of the companies that have recently adopted the circular economy as a development model (Ellen MacArthur Foundation 2016), there are certainly companies that will find the cases useful. In addition, any company or business practitioner regardless of them having adopted circular economy or not, will get to have a glimpse of what challenges there are to be addressed in this area, and how their venture might be able to benefit itself and others from moving towards the circular economy. Also, business models in the circular economy can be very systemic due to their nature of turning one actor's waste into another actor's resource, requiring the collaboration of businesses that have traditionally operated separately or with a very different type of relationship. Through the analysis of existing business models, this multi-case study can help identify opportunities and limitations for new systemic business models in the circular economy.

To focus the research agenda, limitations on the scope of the study have been made. The first limitation addresses the scope of analysis in the case studies. As the business model, circular economy, and the geographical market through institutional theory already offer a wide perspective into each case, analysis will be strictly limited to these theories and their connections.

Another area that has been narrowed in scope are the geographical markets of the study. To ensure that different types of geographical markets are analyzed, the most important objective for the cases is that they include both markets that are considered as developed, and markets that are considered as developing. As only existing cases are analyzed, undeveloped markets where circular economy does not appear to be embraced are left out of the scope.

The level of detail in economic and financial figures in this case is limited to generic and quantitative details are left out. Reasons for this are two-fold. The study aims to provide information to a wide audience in the fields of business models and the circular economy. A high-level perspective of the economic and financial details in the findings can lead to the information being valuable to a wider audience. Also as the financial details of the cases are of competitive importance to the companies, access to them can be limited.

However, since the financial details are omitted, the level of economic success of the cases will also be less tangible, and perhaps impossible to prove.

Also while the study is conducted as a multiple case study, not all circular economy initiatives can be researched and thus this study is still not an all-encompassing “business models in the circular economy” -study. Also as a result of choosing a multiple case study instead of a single case study, the level of detail will be more general rather than very specific. The general level detail can still be useful for many companies especially when combined with the institutional landscape aspects, and provide guidelines through answering the research questions. However, from a perspective of a single company, this study should be used as an initial platform for understanding what aspects to look for in more detail, rather than a guide providing the answers for a circular economy driven business model.

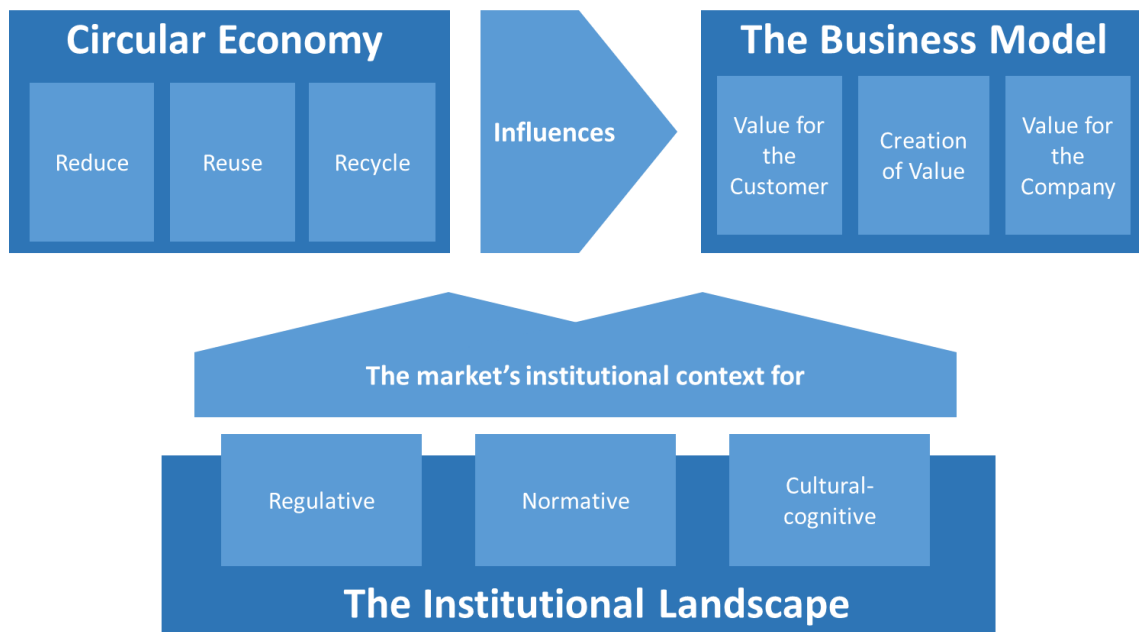
### **1.3 Structure of the study**

This thesis integrates the contemporary fields of research of circular economy and business models. Circular economy is viewed through the lens of business models by conducting a multiple case study of business models that are in effect improving on the 3R-principles of the circular economy: reuse, reduce, and recycle (Ghisellini et al. 2014). As an objective of the study is also to look at the effect different geographical markets may have on these business models, institutional theory is included in to the theoretical framework of the study. While institutional theory is not the main focus area, it is hypothesized to influence both how circular economy is perceived and how business models that comply with 3R-principles of the circular economy function in a given geographical market. An illustration of how the research areas are related to each other is shown in figure 1.1.

The main analytical tool and the focus area of research and analysis of the thesis is the business model. To gain an understanding of what constitutes as a business model, and why business models are a valuable tool for analyzing a business venture, the second chapter of this thesis conducts a review of the academic literature about business models. During the chapter, the components of a business model are reviewed. In the end of the chapter, based on the literature review conducted, business model framework is created to provide a tool for conducting a structured multiple case analysis of business models.

The circular economy, which is the other main focus area of this study, acts as an influence in the studied business models. As the cases that are analyzed in this study will be related to the circular economy concept, those companies are taking in the ideas of the concept and implementing them in their business models. In the third chapter of the study, a literature review of the concept is done. Through the literature review an understanding of what circular economy as a concept means, and what concrete actions it suggests could advance circular economy and could be taken into account in the business case analysis.

For studying the differences between markets, institutional theory is studied in the thesis, and a literature review of the area is presented in chapter 4. Institutional theory is well suited for analyzing differences between geographical markets and the diffusion of phenomena such as circular economy, as it discusses the influence the institutional landscape in a given market has on the market actors and dynamics. For example, institutional theory has previously been used to analyze the diffusion of social corporate responsibility in different geographical markets (Brammer et al. 2012). Social corporate responsibility and circular economy have many unifying aspects, as both touch on the sustainability aspects of a company and are argued to also have economic benefits for the firms embracing them (Campbell 2007; Dyllick & Hockerts 2002; MacArthur 2013).



**Figure 1.1:** *An illustration of the relations between research areas of the study*

In chapter 5, the analysis framework for the case study is created. To align the case analysis with the perceived relations between the three theoretical areas of this thesis, the business model, the circular economy, and institutional theory, the analytical framework for the cases is created based on the literature of each of the research areas. As a result, each of the areas can be analyzed systematically starting from the business model and finishing with the institutional factors, while maintaining the understanding of their relational interplay. This relational interplay becomes especially important in the cross-case analysis, where the effects between the layers become clearer as they are compared between cases.

The research methodology of the thesis will be presented in chapter 6. In the chapter, the reasoning for the selection of multiple case study research design is discussed, together with the criteria and reasoning for case selection. Also the data collection and analysis methods are presented in chapter 6. In chapter 7, the cases are analyzed as within-case

analyses by systematically using the analysis framework created based on the literature of business model, circular economy, and institutional theory. Following the within-case studies, a cross-case analysis is conducted in chapter 8 to identify recurring themes and differences between cases, and as a way to sum up the results of the cases. In chapter 9, conclusions on whether the study was able to meet its objectives are given, followed by the implications of the results to the academic and managerial communities. Following this, the limitations of the study are discussed, and potentially fruitful future research areas identified during the research process are presented.



## 2. THE BUSINESS MODEL IN LITERATURE

Business Model as a concept can be generally said to illustrate how a business venture is designed to create economic value for the company (Amit & Zott 2001; Chesbrough & Rosenbloom 2002; Magretta 2002). While this definition is very general and does not reveal all the nuances of the concept, it communicates the important role of a good business model. Without a functioning business model, the business venture is not creating economic value for the company, a trait which in many situations would be deemed as a failure. However, while a functioning business model is crucial in a business venture, as a research field the business model concept has been still developing quite recently, and thus its background and definition are worthwhile to discuss.

The business model first appeared as a term in the title of an academic article already in 1960 (Jones 1960), but its popularity had its first peak in academic literature as recently as in the end of 1990's and beginning of the 2000's. During that time, the Internet hype was at its height, and the business model as a term was used very leniently by journalists, executives, investors, and also academics (Osterwalder et al. 2005; Morris et al. 2005). It could be said that those that were using the term at the time did not have a clear idea of what the term meant, as it was used to describe multiple subjects from how the firm earned revenues to how it structured its organization (Linder & Cantrell 2000). As writer Michael Lewis had put it, the business model was a buzzword of the Internet boom "to glorify all manner of half-baked plans" (Magretta, 2002, p. 3)

Although the popularity of the business model had its birth in the Internet hype, the crash of the early 2000's did not mean an end to the concept. In fact, its appearance in academic journals continued to rise, albeit at a slower pace than in the initial explosion from 1998 to 2000 (Osterwalder et al. 2005, pp.3–4). Initially the link between internet business and business models was evident, and articles focused on explaining how to create and deliver value in e-business (Timmers 1998; Amit & Zott 2001; Gordijn & Akkermans 2001). Very soon however, the concept was identified as a way to generate new business through new business models, regardless of the industry (e.g. Linder & Cantrell 2000; Magretta 2002).

### 2.1 Business Model Definition

While extending the usefulness of the business model concept to other industries, it is apparent that academics researching the subject at the time recognized the need for a clear definition of what a business model is. Multiple authors (e.g. Magretta 2002; Amit & Zott 2001; Chesbrough & Rosenbloom 2002; Gordijn & Akkermans 2001) created definitions

for the business model. While there appears to be a consensus on the thinking that business model is a conceptual tool that is more holistic than just the revenue model, operational model or the business process model of the firm, the definitions do have variance.

To make the variety of business model definitions visible and to combine them into a unifying definition for this study, prominent business model definitions from original studies (Timmers 1998; Linder & Cantrell 2000; Amit & Zott 2001; Chesbrough & Rosenbloom 2002; Magretta 2002; Johnson et al. 2008; Casadesus-Masanell & Ricart 2010; Teece 2010) and definitions based on reviews of previous business model literature (Morris et al. 2005; Osterwalder et al. 2005; Richardson 2008; Boons & Lüdeke-Freund 2013) have been combined to Table 2.1. From the definitions, the general view appears to be that business models bridge company strategy to its concrete operations by describing the logic with which it creates value.

<i>Authors, Year</i>	<i>Research Type</i>	<i>Business Model Definition</i>
Timmers, 1998	Framework for business model classification based on commercial Internet business	“An architecture of the product, service and information flows, including a description of the various business actors and their roles; a description of the potential benefits for the various business actors; and a description of the sources of revenue” (p. 2)
Linder & Cantrell, 2000	Typology of business models based on a practitioner survey	“A business model, strictly speaking, is the organization’s core logic for creating value” (p. 1)
Amit & Zott, 2001	Analysis of business models in 29 European publicly traded e-businesses	“A business model depicts the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities” (p. 511)
Chesbrough & Rosenbloom, 2002	Case study of business models of innovations at Xerox’s R&D	“A successful business model creates a heuristic logic that connects technical potential with the realization of economic value” (p. 529)
Magretta, 2002	Analysis of the relation between strategy and the business model through case examples	“Business models are, at heart, stories – stories that explain how enterprises work. A good business model answers Peter Drucker’s age old questions: Who is the customer? And what does the customer value? It also answers the fundamental questions every manager must ask: How do we make money in this business? What is the underlying economic logic that explains how we can deliver value to customers at an appropriate cost?” (p. 4)
Morris et al., 2005	Review of business model literature from an entrepreneurial perspective	“A business model is a concise representation of how an interrelated set of decision variables in the areas of venture strategy, architecture, and economics are addressed to create sustainable competitive advantage in defined markets.” (p. 727)
Osterwalder et al., 2005	Review of business model literature leading to a component-based framework	“A business model is a conceptual tool containing a set of objects, concepts and their relationships with the objective to express the business logic of a specific firm. Therefore, we must consider which concepts and relationships allow a simplified description and representation of what value is provided to customers, how

Johnson et al., 2008	Business models in accelerating business renewal	this is done and with which financial consequences.” (p.3)  A business model is defined as consisting of four interlocking elements: customer value proposition, profit formula, key resources, and key processes. “These four elements form the building blocks of any business. The customer value proposition and the profit formula define value for the customer and the company, respectively; key resources and key processes describe how that value will be delivered to both the customer and the company.” (pp. 60-61)
Richardson, 2008	Review of business model literature from the perspective of strategy	“A well-designed business model defines and organizes the activities of the firm to execute the strategy. The activities are chosen and organized to create and deliver the value proposition, i.e., to implement the firm’s theory of how to compete.” (p. 141)
Casadesus-Masanell & Ricart, 2010	Analysis of business models as tools for strategy execution through case examples	A business model is “a reflection of the firm’s realized strategy.” (p. 195)
Teece, 2010	Exploring the business models concept’s connections with strategy, innovation, and economic theory	“A business model articulates the logic, the data, and other evidence that support a value proposition for the customer, and a viable structure of revenues and costs for the enterprise delivering that value.” (p. 179)
Boons & Lüdeke-Freund, 2013	Review of business model literature from the perspective of sustainable innovation	“Business model is used as a plan which specifies how a new venture can become profitable.” (p. 10)

**Table 2.1** *Selected studies building on previous knowledge of business model literature, and their definitions for a business model.*

In addition to converging on the business model being a link between strategy and holistic organization of operations, these definitions also show that business model is seen as a conceptual tool, or a model, of the business logic of the firm, and is made of multiple components that are linked. This approach of thinking about business models as a set of components is very prevalent in literature, to the point of it being the aspect of a business model that most of the literature consistently agrees upon.

The most often occurring commonality across the definitions however is the link with value. This is especially visible with the value to the company itself, being present in each of the definitions in one way or another. This link to value is also not only with regards to the value to the company, but also for the value to the customer. Based on the definitions, it appears as the carrying force of the business model concept is in fact the capability to create a bridge between value proposition towards the customer and the value capture methods for the company in a concise way.

In this study, the definition of the business model is *The set of components in a firm’s business venture that connects the venture’s value to the customer to the firm’s ability to generate profit*. This definition combines areas that are prevalent in the business model definitions identified from previous literature. First, the business model is not only something that can be analyzed as an afterthought, but also a managerial tool for planning a

business venture (Osterwalder et al. 2005), that combines multiple components of the firm's activities, capabilities and resources into a single concept (Timmers 1998, Amit & Zott 2001, Magretta 2002, Osterwalder et al. 2005, Johnson et al. 2008). This is illustrated by the depiction of a business model *a set of components in a firm's business venture*. This also reflects the view that the business model depicts a single business venture or offering, and not necessarily the entire firm (Chesbrough & Rosenbloom 2002). The second important aspect of the business model illustrated by this definition is the need to view at the venture's value from two perspectives. The venture needs to create value to the customer, while also generating profit to the firm through some mechanism (Linder & Cantrell 2000, Amit & Zott 2001, Magretta 2002, Osterwalder et al. 2005, Johnson et al. 2008, Teece 2010, Boons & Lüdeke-Freund 2013). The business model serves the important role of bridging these two needs of value creation to a single concept.

## 2.2 Business Model Structure

In this chapter, the structure, otherwise said the components that comprise the business model are discussed. The taxonomy approach to business models, popular during the initial emergence of the concept (Timmers 1998; Linder & Cantrell 2000), offered a way of explaining what a business model is by giving a large body of examples that could be identified being used in business already, which then could be used as a reference. However, this does little to help managers build new business models or analyze their current business models in depth. To address this issue and to increase the business model concepts usefulness as a managerial tool that can explain the business logic of a firm, authors began to include the component approach in their articles. (Osterwalder 2004, p.30)

Furthermore, many authors extend this line of thinking by dividing the components into sub-components. The way components and subcomponents are presented varies with some authors defining categories for components (Osterwalder et al. 2005), and some defining more detailed questions to define aspects of the components (Morris et al. 2005). Both approaches move business models towards the objective of being a managerial tool to analyze and communicate their business model. Detailed questions help unravel the business model into its components, while component categories allow clearer representation of the business model.

A list of selected authors and their view of the components and potential sub-components of a business model are shown in table 2.2. The level of detail in how the authors describe the components of the business model varies heavily, depending on the objective of the article, but the content of components is very similar on a general level. The most popular component of the business model in the reviewed literature is the value proposition, with all but Morris (2005) specifically mentioning it as one, and also Morris heavily implying towards it with his "Factors related to offering" -component.

After value proposition, the included components start to vary. The overarching theme over all of them however is defining components that either discuss the organization of creating and delivering the value proposition, or discuss how the business should make money. Richardson (2008) conducted a literature synthesis of business models with a focus on creating an integrative framework, and as a result the components defined by him, value proposition, value creation & delivery, and value capture reflect the general components of a business model across business model literature quite well.

For example, Johnson et al. (2008) define customer value proposition, profit formula, key resources, and key processes as the components of a business model. They then elaborate that key resources are “needed to deliver the customer value proposition profitably” and that key processes “make the profitable delivery of the customer value proposition repeatable and scalable”, essentially matching the value creation and delivery system of Richardson (2008). The profit formula of Johnson et al. (2008, p. 62) depicts the revenue model, cost structure, margin model, and resource velocity, and is more detailed than the value capture of Richardson (2008, p. 138), that retains to defining the revenue sources and the economic logic of the venture.

<i>Authors, Year</i>	<i>Components</i>	<i>Sub-components</i>
Linder & Cantrell, 2000	Value proposition, value delivery, financial structure	<b>Value proposition:</b> customer, customer needs, products, services and experiences, channels, pricing <b>Value delivery:</b> execution, distinctive capabilities <b>Financial Structure:</b> how is our financial structure distinctive?
Chesbrough & Rosenbloom, 2002	Value proposition, market segment, revenue generation mechanisms, value chain structure, position within the value network, cost structure and profit potential, competitive strategy	
Magretta, 2002	Customer, customer value proposition, revenue logic, economic logic	
Morris et al., 2005	Offering, market, internal capabilities, competitive strategy, economic factors, personal/investor factors	<b>Offering:</b> product/service type, value creation and deliver <b>Market:</b> type of organization, geographical market size, customer position in the value chain, market segment, transactional/relational market <b>Internal capabilities (select on or more):</b> Production/operating systems, selling/marketing, information management/mining/packaging, technology/R&D/creative or innovative capability/intellectual, financial transactions/arbitrage, supply chain management, networking/resource leveraging <b>Competitive strategy (select one or more):</b> Image of operations, product or service quality/selection/features/availability/innovation leadership

Osterwalder et al., 2005	Product, customer interface, infrastructure management, financial aspects	<b>Product:</b> value proposition <b>Customer interface:</b> target customer, distribution channel, relationship <b>Infrastructure management:</b> value configuration, core competency, partner network <b>Financial aspects:</b> cost structure, revenue model
Johnson et al., 2008	Customer value proposition, profit formula, key resources, key processes	<b>Customer value proposition:</b> A way to help customers get an important job done <b>Profit formula:</b> Revenue model, cost structure, margin model, resource velocity <b>Key resources:</b> Key assets that create value for the customer and the company <b>Key processes:</b> Operational and managerial processes that allow the delivery of value in a repeatable and scalable way, company rules, metrics and norms.
Richardson, 2008	Value proposition, value creation & delivery system, value capture	<b>Value proposition:</b> Offering, target customer, basic strategy to win customers and gain competitive advantage <b>Value creation &amp; delivery system:</b> Resources and capabilities, the value chain, activity system, business processes, links to suppliers, partners and customers <b>Value capture:</b> Revenue sources, economics of the business
Teece et al., 2010	Product/service specifications, customer value proposition, market segments, revenue streams, isolation mechanisms	
Bocken et al., 2013	Value proposition, value creation & delivery, value capture	<b>Value proposition:</b> Offering, customer segments and relationships <b>Value creation and delivery:</b> Key activities, resources and capabilities, channels, partners, technology <b>Value capture:</b> cost structure, revenue streams
Boons & Lüdke-Freund, 2013	Value proposition, supply chain, customer interface, financial model	

**Table 2.2** *Business Model Components and Subcomponents in Business Model literature*

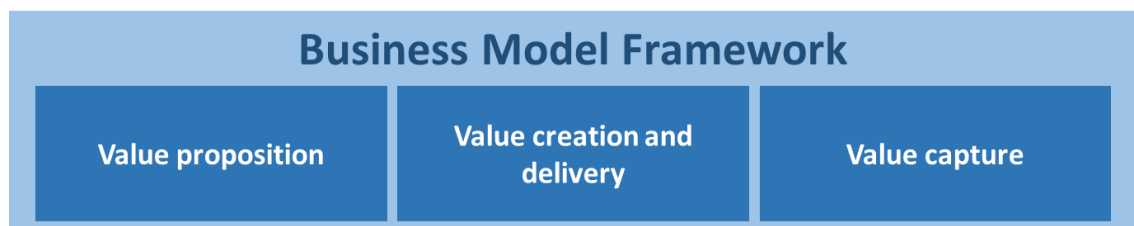
In table 2.2 we can see that most of the authors that divide the business model in to both components and further sub-components have used 3 or 4 components as the basis of what is included in a business model, all of which closely resemble Richardson's (2008) components of value proposition, value creation and delivery, and value capture. The exception is Morris et al. (2005), who includes 6 components and a comprehensive set of very detailed sub-components.

While the framework by Morris et al. (2005) offers a very structured and detailed formula of creating a business model, it requires very detailed information to complete fulfil. The

amount of information needed might reduce the usability of the framework as an analytical tool in academic research. This is illustrated by a relative lack of later academic articles fully adopting the framework. As a comparison, Bocken et al. (2013) and Boons & Lüdeke-Freund (2013) both adapt the general business model framework of Richardson. Thus moving forward, the value proposition, value creation and delivery and value capture perspective is adopted in this study to determine the components of the business model framework.

## 2.3 Business Model Components

Value proposition, value creation and delivery, and value capture were identified as the most common components linked to the business model in the business model literature in section 2.2. The inclusion of these components also communicates the role of a business model as a link between strategy and operations (Amit & Zott 2001) and especially as the construct between technology development and economic value creation by describing how inputs used by the firm and turned into economic outputs (Osterwalder et al. 2005; Chesbrough & Rosenbloom 2002). A broad framework for the business model based on literature is shown in table 2.3.



**Table 2.3:** *A broad business model framework based on the literature review*

However, only including these components as a robust way of presenting a business model leaves the framework open for a lot of ambiguity and potential for misinformed conclusions. The business model concept has received criticism for its ambiguity and lack of clear definition (Magretta 2002; Chesbrough & Rosenbloom 2002; Zott et al. 2011). Including hierarchical structuring has been argued to increase the detail and coherence while conceptualizing a business model framework (Mäkinen & Seppänen 2007, p.745). Thus in this section, the selected components are reviewed more thoroughly to address at what level of detail they should be analyzed, so that the business model analysis as a whole is valuable. At the end of this section this study's analysis framework for the business model is created.

The aspect of strategy and whether it should be a part of the business model or something completely separate raised most of the differences in the components. The argument for including strategic components is that business models are the unit of analysis that links strategy to operations and should include the aspect of uniqueness that makes the business successful (Richardson 2008, p.141). The argument against the inclusion of strategic

components into business models is that the business model explains how the business operates and does not detail how the firm handles competition, which should be left to strategy (Magretta 2002, p.6). The latter argument is somewhat supported by the findings of Linder and Cantrell (2000, p. 6) who, after conducting 70 interviews with CEOs analyzed their business models and categorized the firms based on their performance, found that each performance quartile hosted a wide range of business models, and that no business model could guarantee financial success.

The nature of this study also supports the exclusion of strategic aspects from the business model. An objective of identifying and analyzing business models in the circular economy in different markets is first to increase knowledge about circular business models and second to present ideas and concepts for firms to explore if they want their business models to support circular economy. Including strategic components to the business model could potentially lock the business model to be applicable to the firm analyzed and to that firm only, since in the case of any other firm, various aspects in their strategy would be different, assuming firms have distinctive and difficult to replicate strategies. Based on strategy literature, difficult to replicate strategies are major source of competitiveness especially in the resource-based theory of competitive advantage (e.g. Grant 1991).

### 2.3.1 Value proposition

The value proposition (or a similar concept such as value offering) is the component most often appearing in the literature as one of the components of a business model (Morris et al. 2005, p.727). The value proposition refers generally to the reasons for which a customer values a firm's offering. Strategy literature and its central concept of value creation (Porter & Millar 1985) can be seen as the roots of the value proposition. (Richardson 2008). However, the exact definition for what the value proposition as a component of a business model varies.

Linder and Cantrell (2000) address value proposition in their showcasing of the operating model framework, which as a whole is designed to answer the question of "why we are one organization?" Around the value proposition, the model asks how the organization gets and keeps its customers, and what is their distinctive value proposition. To answer these, the framework includes the organizations customers and their needs, the offering of the organization, the method of how the customers are reached, and pricing. (Linder & Cantrell 2001, p.5) Their value proposition offers more detail and guidance than average, while the inclusion of the method of reaching customers makes the value proposition slightly less focused.

Chesbrough and Rosenbloom (2002) are technology focused in their business model approach. By analyzing technologies developed at Xerox Research & Development (from here on referred to as R&D) that later left the company due to a lack of business model



alignment, they have a view of business models as the method of commercializing new technologies. This is reflected in their definition of a value proposition, which is “the value created for user by the offering based on the technology.” Components that are defined separately by Chesbrough & Rosenbloom that are often included in the value proposition by other authors are market segment, which in addition to customers includes the revenue generation mechanism, and value network, which in addition to customer channel includes suppliers, complementary actors and competitors. (Chesbrough & Rosenbloom 2002, pp.533–534) As is, their value proposition is one of the narrowest in the literature. They also provide little assistance in detailing the value proposition, opting instead to stay as a high level framework.

In their assessment of value proposition related components, Morris et al (2005) offer very detailed information. The parts that most closely resemble value proposition as it is defined in other articles are their components of market factors and parts of the offering related factors and competitive strategy factors. They argue that without a defined value proposition, there is no business, thus making the value proposition very central to the business model. Inclusion of the market factors is explained with the argument that defining the market is important to success, and failure to do so is a key factor associated with venture failure. To offering and market factors they offer multiple sets from where the organization, manager or researcher constructing or analyzing a business model is to choose from. (Morris et al. 2005, pp.729–730) The sets are shown in table 2.4.

<i>Component 1 (factors related to the offering): How do we create value? (select from each set)</i>	<i>Component 2 (market factors): Who do we create value for? (select from each set)</i>
<ul style="list-style-type: none"> <li>• offering: primarily products/primarily services/heavy mix</li> <li>• offering: standardized/some customization/high customization</li> <li>• offering: broad line/medium breadth/narrow line</li> <li>• offering: access to product/ product itself/ product bundled with other firm's product</li> <li>• offering: internal manufacturing or service delivery/ outsourcing/ licensing/ reselling/ value added reselling</li> <li>• offering: direct distribution/indirect distribution (if indirect: single or multichannel)</li> </ul>	<ul style="list-style-type: none"> <li>• type of organization: b-to-b/b-to-c/ both</li> <li>• local/regional/national/international</li> <li>• where customer is in value chain: upstream supplier/ downstream supplier/ government/ institutional/ wholesaler/ retailer/ service provider/ final consumer</li> <li>• broad or general market/multiple segment/niche market</li> <li>• transactional/relational</li> </ul>

**Table 2.4:** *Offering related factors and market factors by Morris et al. (2005, p. 730)*

Johnson et al. (2008) include customer value proposition in their business model framework and see it as the central piece of it, without which it is impossible to invent a business model. As sub-components of the value proposition, they list the target customer, a job to be done (i.e. there needs to be an important problem or need for the target customer to solve), and the offering. (Johnson et al. 2008, pp.61–62) An interesting aspect of how they see the value proposition is that while generally in the literature the value proposition is tightly integrated to the other components, Johnson et al. identify the customer value proposition as a separate unit from the other parts of the business model. They argue that by systematically identifying all the parts of their business model, executives can judge

how well that same model could be used to fulfill a radically different customer value proposition, implying that business models and value propositions could be interchangeable (Johnson et al. 2008, p.62). However, as the focus of their article is on the need to reinvent business models, the purpose of this argument could be to note that old business models can be ill suited to capture new opportunities and offer motivation to create new business models with different value proposition.

Richardson (2008), similarly to Linder and Cantrell, emphasizes uniqueness in his definition of the value proposition. He does this by including the firm's generic strategy to winning customers and gaining competitive advantage in the value proposition in addition to the offering and the target customer or market. The argument is that, while the offering and the target market might sufficiently give an answer to what the proposed value proposition is to the customer, that value proposition is not solid as there is nothing in the value proposition that implies why it would be more valuable to the customer than that of any other competitor. (Richardson 2008, p.139) By including the generic strategy, Richardson makes a valid point of arguing for uniqueness, while making it concrete how business models and strategy are in his framework interlinked.

Magretta (2002) takes a different approach than Linder and Cantrell (2000) and Richardson (2008) in his view of business models and value propositions. She argues that business models are not strategy, and that business models are descriptions of how the pieces of business fit together and should not factor in competition. Compared to other authors, Magretta only lightly touches on the components of the business model, merely mentioning that the business model should be able to answer e.g. who are the customer and what do they value. (Magretta 2002) The customer and the customer value closely relate to the subcomponents of the value proposition as it is detailed in other reviewed articles.

Osterwalder et al. (2005) include the value proposition in their framework as the sole component of their product pillar. Following Magretta's (2002) argument about the separation of strategy and business models they exclude all components related to competition. They describe the value proposition as an overall view of a company's bundle of products and services (Osterwalder et al. 2005, p.10). While probably having the most systematic method of picking business model components (components mentioned by at least two authors, excluding ones related to competition and business model implementation) (Osterwalder et al. 2005, p.10), the description of the value proposition is very technology focused. However their customer interface pillar includes target customer, distribution channel, and customer relationship as components (Osterwalder et al. 2005, p.10). Put together, their product and customer interface are very similar to what Linder and Cantrell (2000) offer as the value proposition.

### 2.3.2 Value creation and delivery

While value proposition is mostly about the details of the offering and the needs of the customer, value creation and delivery fleshes out how that value is created and delivered to the customer. While value proposition is implied in strategic literature, the value creation and delivery system are directly addressed (e.g Porter & Millar 1985). As can be seen in table 2.2 on page 13, value creation and delivery as such are not listed as business model components as often as value proposition is. However, all of the articles reviewed have components in them that could be categorized as being a part of the value creation and delivery system.

Linder and Cantrell's (2000) definition of a business model has no separate value creation component listed, but their value delivery component, in the article called delivery model, seems to overlap this role. In their description of value delivery they list the questions how do we execute and what are our distinctive capabilities as the important parts of the value delivery part (Linder & Cantrell 2000, p.5). They flesh out the delivery model by providing a large sample of business model choices they have identified on the field, including e.g. outsourcing non-core functions, fostering long-term trading partner alliances, and standardizing processes (Linder & Cantrell 2000, p.6). This provides the audience high-level understanding of what is to be addressed in the delivery model, without giving further guidance.

Chesbrough and Rosenbloom (2002) components that reflect the concept of value creation and delivery the best are the value chain and the value network. The value chain is the component that describes the organization within the firm that creates and distributes the offering, and also identifies the complementary assets that are needed to support the firm's position in the value chain. The value network discusses position of the firm relative to suppliers and customers, and identifies also the complementary actors and competitors that are relevant to the business. (Chesbrough & Rosenbloom 2002, pp.533–534)

In Magretta's (2002) description of a business model the value creation and delivery system is discussed only briefly. The author mentions that a business model needs to answer the question of how we can deliver value to customers at an appropriate cost. While discussing the business model of Walmart, she points out that the business model of Walmart was borrowed from earlier discount stores and raises examples that could be identified as parts of the execution of the business models value creation and delivery system, such as "configure the stores to handle large numbers of shoppers efficiently" and "put fewer salespeople on the floor and rely on customers to serve themselves." She then points out that it was not the business model that Walmart employed that made it successful, but the strategy of setting up shop in smaller towns that the earlier discount shops had ignored, and because of low population could only support one retailer. (Magretta 2002) This approach further illustrates the separation of strategy and business models.

The components of the business model proposed by Morris et al. (2005) that are in the area of value creation and delivery are the internal capability factors and parts of the competitive strategy factors and also the offering factors, first two presented in table 2.5 and the last presented in table 2.4 in the value proposition chapter. For example, offering factor that discusses how the manufacturing or service provision is organized can clearly be categorized as a part of the value creation and delivery system. Differently from for example Magretta's (2002) approach, Morris et al. (2005) include competitive strategy factors in the mix, and the nature of choices in that component could fit into the value proposition part as well.

*Component 3 (internal capability factors): What is our source of competence? (select one or more)*

- production/operating systems
- selling/marketing
- information management/mining/packaging
- technology/R&D/creative or innovative capability/intellectual
- financial transactions/arbitrage
- supply chain management
- networking/resource leveraging

*Component 4 (competitive strategy factors): How do we competitively position ourselves? (select one or more)*

- image of operational excellence/consistency/dependability/speed
- product or service quality/selection/features/availability
- innovation leadership
- low cost/efficiency
- intimate customer relationship/experience

**Table 2.5** *internal capability and competitive strategy factors of the business model by Morris et al. (2005, p. 730)*

Osterwalder et al. (2005) discuss creating and delivering value in their business model pillar infrastructure management that includes the subcomponents of value configuration, core competency, and partner network. In their customer interface pillar they include the component of distribution channel, which describes the means of how the company gets in touch with its customers and relationship, which explains the links the company establishes between itself and its customers. These together strongly imply the creation and delivery of value as their objective.

Johnson et al. (2008) bundle together the value creation and delivery system into key processes and key resources. Key resources, that might include people, technology, equipment, information, channels, partnerships or brand for example, are resources needed to deliver the customer value proposition profitably. Key processes together with rules, metrics and norms are responsible for making the profitable delivery of customer value proposition repeatable and scalable. For example, processes might include design, product development, sourcing, manufacturing, marketing, hiring and training, and IT. Rules and metrics, for example margin and lead times, define the limits in which the business should operate to retain profitability and scalability.

In the business model of Richardson (2008) value creation and delivery system defines how the firm creates and delivers value to its customers and the source of the firm's competitive advantage. The components in his description of the value creation and delivery system are resources and capabilities, organization including the value chain, activity system, and business processes, and position in the value network. Richardson has a strong strategic focus in his definition of a business model, and describes the purpose of the

value creation and delivery system is partially to show how the firm's structure and organization is consistent with the firm's basic strategy.

### 2.3.3 Value capture

Value capture is the component that discusses how the firm employing the business model receives its revenues and profits. Especially in the early discussions of business models, the value capture mechanisms of a firm and its business model were interchangeably discussed (Linder & Cantrell 2000). The functionality of the value capture mechanisms of the firm are crucial in determining the level of success the business model will achieve from the perspective of the firm (Richardson 2008). Thus it has received a great deal of attention in the business model literature, with varying levels of detail and slightly varying descriptions.

As is with all of the business model components, value capture is tightly linked with the value proposition and value creation and delivery. The value proposition defines largely what the customer could be willing to pay for the offering. The value creation and delivery model while defining the organization and operations that are to be taken delivering the value proposition also determines what the costs of creating and delivering the value are to be. The value capture component needs to be aligned with the other business model components to make the business model solid.

Linder and Cantrell (2000) discuss the financial structure as a part of a business model. Their financial structure component mostly describes the pricing model and the revenue model of the business. As examples of pricing models, they give out cost plus pricing and CPM (cost per thousand) pricing. Advertising/broadcast model, subscription model and fee-for-service model are described as revenue models. (Linder & Cantrell 2000, p.3) The distinction between pricing model and revenue model is one that brings clarity to the value capture part, establishing that while pricing should be linked with the other parts of the business model, revenue model always isn't.

Chesbrough and Rosenbloom (2002) note that while creating value is necessary, it is not sufficient for a business to succeed. In addition, the firm needs to be able to appropriate some of the value it creates back to itself. The business model components in their framework that are assigned to this activity of capturing value are cost structure, profit potential and, while already discussed in value creation and delivery, value networks. The cost structure and profit potential are according to their description derived directly from the chosen value proposition and value structure, and they reflect similar thinking as Linder and Cantrell (2000) have with their pricing model component. Chesbrough and Rosenbloom note that the cost structure, and thus profit potential, are areas that, while deriving from the value proposition, can be affected with knowledge of market needs and focusing of operational efforts, for example R&D.

The definition and description of the business model and its components is at a very general level in Magretta's (2002) work. This extends to the value capture as well, with the author mentioning it as one of the key things in a business model, as the model needs to answer the question "how do we make money from this." Her example of the American Express traveler's check serves also as an example of the revenue model: American Express sold traveler's check and got revenue beforehand, turning the normal cycle of costs preceding revenues on its head, and also giving the firm extra windfall when some of the checks were left uncashed.

As has been the case regarding value proposition and value creation and delivery, Morris et al. (2005) have the business model components that would contribute to value capture spread between multiple components that at the same time discuss issues of value proposition and value creation and delivery. The component that aligns with value capture the best is their economic factors component, which maps out the economic logic of the business model, presented in table 2.6. Aspects of capturing value are also discussed in their factors related to offering, presented in table 2.4 where the user of the framework is to choose from different ways of selling the offering.

*Component 5 (economic factors) How we make money? (select from each set)*

- pricing and revenue sources: fixed/mixed/flexible
- operating leverage: high/medium/low
- volumes: high/medium/low
- margins: high/medium/low

*Component 6 (personal/investor factors): What are our time, scope, and size ambitions? (select one)*

- subsistence model
- income model
- growth model
- speculative model

**Table 2.6:** *Economic and personal or investor factors of the business model by Morris et al. (2005, p. 730)*

Osterwalder et al. (2005) describe value capture with their pillar of financial aspects. The pillar includes the cost structure and the revenue model components. Cost structure has the role of summing up the monetary consequences of the means employed in the business model. Revenue model describes the way the company makes money through a variety of revenue flows. Thus the financial aspects pillar of Osterwalder et al. (2005) matches the financial structure described by Linder and Cantrell (2000).

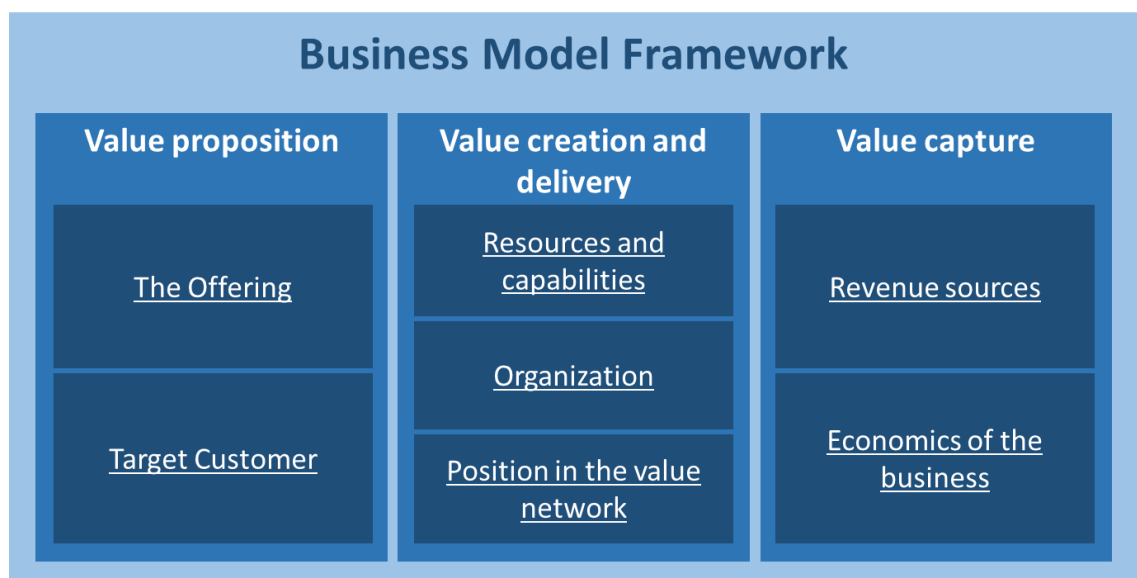
The profit formula component is the third key component in the business model of Johnson et al. (2008) and discusses the issue of value capture and includes the revenue model, cost structure, margin model and resource velocity of the firm. Here the revenue model refers to how much money can be made with the equation price x volume. It is notable that in other business model descriptions, revenue model defines where the revenue is acquired from. Cost structure however is similar to the definition elsewhere in business model literature and discusses cost of key assets, direct cost and economies of scale. The margin model is what for example Linder and Cantrell (2000) would refer to as the pricing model, describing how much each transaction should net to achieve desired profit levels. Resource velocity is an addition that does not appear in other reviewed business model

literature, describing how quickly resources need to be used to support target volume, an issue most other authors would include in the area of value creation and delivery.

Richardson et al. (2008) define the value capture component as consisting of the revenue sources and the economics of the business. Like most of the reviewed literature, Richardson's revenue model describes the sources of revenue and his economic model covers the costs, margins, and various financial aspects of the firm. He states that the economic model of the firm is reflected in the operating cash flow statement of the firm. Richardson also argues that in a good business model, the value proposition and value capture mechanisms are the key elements, and that the value creation and delivery system must be designed with these two aspects in mind, providing the link and reflecting in successful value capture.

### 2.3.4 Component-based Business Model Framework

The literature review about the business model and its components is a good basis for building a general framework, and the approach has been previously used for establishing a basis for business model analysis by multiple authors (Chesbrough & Rosenbloom 2002; Boons & Lüdeke-Freund 2013; Park et al. 2010). The business model framework is structured similarly to the literature and has components and sub-components. As was discussed in sections 2.2 and 2.3, the business model components are value proposition, value creation and delivery, and value capture. To increase the usability of the business model as an analytical tool, more detail was needed on the business model framework in addition to these components. Sub-components of each component were discussed through literature in sections 2.3.1, 2.3.2, and 2.3.3. The resulting component-based business model framework is illustrated in table 2.7.



**Table 2.7:** *Business Model Components based on the literature review on business models*

The sub-components were chosen based on their popularity of use in the literature of business models, in other words their acceptability as components of the chosen pillars, and through discussion on the suitability of the sub-components in helping to answer the research questions of this study. As a result, under value proposition, the offering and target customer were identified as sub-components. In the pillar of value creation and delivery, the pillar was detailed with the sub-components of resources and capabilities, organization, and the position in the value network. In value capture pillar, revenue sources and economics of the business were chosen as explicit areas of interest.



### 3. CIRCULAR ECONOMY

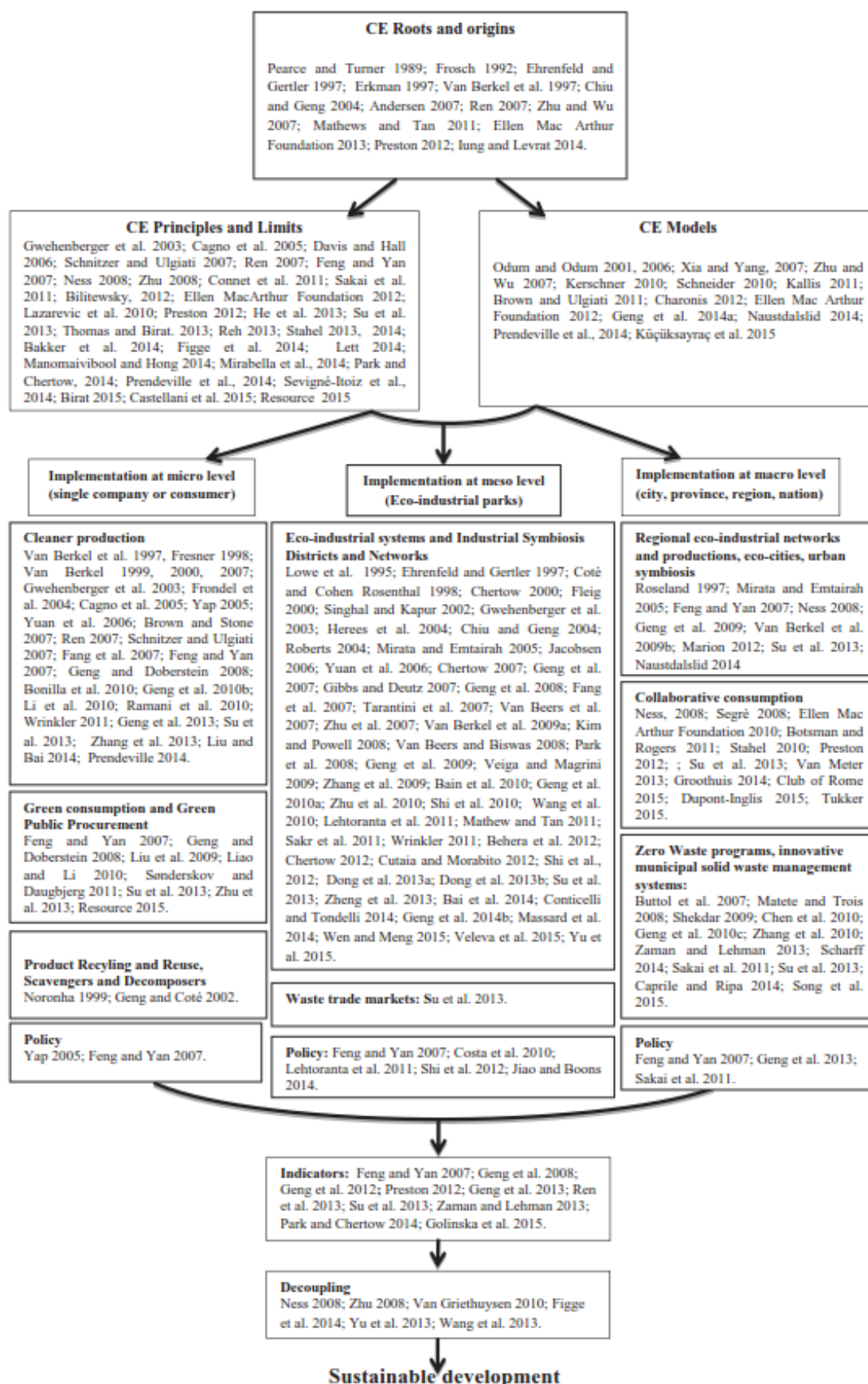
Circular Economy (CE) is a concept that over the last decade has been receiving increasing attention from academia (Ghisellini et al. 2014), governments (e.g. EC Working Package, China's CE Promotion Law), and companies (Ellen MacArthur Foundation 2016). It aims to offer an alternative economic development model to the currently dominant model, so called "linear economy" (Andersen 2007) or "take, make and dispose" -model (Ness 2008). The negative effects of the current model are unsustainable and threaten the stability of the economies and the natural ecosystems essential to humanity (European Commission 2015; Park & Chertow 2014; Su et al. 2013; Geng et al. 2012; Yuan et al. 2006; Yap 2005). The Circular Economy is a very interesting concept when combined with the Business Model concept, as it is proposing new ways for companies to create value to customers and generate profits, ways that can create previously unreachable value to both the customer and the firm (MacArthur 2013). Thus, the Circular Economy should effect the heart of the business model in ventures where it is embraced.

The main motive for the Circular Economy is the potential the concept has to reduce the link between consumption of natural resources and economic growth. In the linear economy, the currently dominating model, natural resources are consumed to create products, which at the end of their life-cycle turn into waste that is disposed. In this model, also by-products in manufacturing that cannot be used by the firm in question are considered waste. (Andersen 2007) In circular economy, the objective is that at the end of their life-cycle, products and materials traditionally considered as waste would be returned to circulation in some form, reducing the need for virgin materials from natural resources. (Yuan et al. 2006) Ideally products and materials would circulate in loops with minimal leakage while creating economic value over and over again, hence the name circular economy.

The concept is rooted in multiple different schools of thought, with environmental economists Pearce & Turner using the term circular economy in the title of a scholarly article for the first time in 1990. Their circular approach built on the idea of a circular system being a prerequisite for the sustainability of human life on Earth (Boulding 1966), which by itself is practically a closed system with no exchange of matter with its environment. Pearce & Turner also define that the environment acts as three economic functions: provision of resources, life support system, and sink for waste and emissions. They note that differently from other economic factors, these basic factors rarely have a price (Pearce & Turner 1990). Regulations, economic instruments such as environmental taxes, and other policies have aimed to alleviate this issue, and at the same time have promoted the transition to circular economy activities (Andersen 2007).

The most affluent school of literature for the circular economy concept is Industrial Ecology. Before the introduction of industrial ecology, industrial systems and the environment were studied as separate systems. In IE however, the approach is to study them as a joint ecosystem characterized by material, information, and energy flows and the provision of services and resources by the Biosphere (Erkman 1997). Industrial Ecology can be used by companies to improve their performance, or by regulators to implement policies for that promote sustainable development. The core for the improvements is considering waste management in an industrial context in a different way, seeking possibilities to use the waste as a material or energy source, thus promoting closed cycles of materials and energy and also reducing the use of virgin materials (Frosch 1992; Erkman 1997; Ehrenfeld & Gertler 1997; Chiu & Yong 2004; Andersen 2007). In Circular Economy, this concept is elevated from the firm's level to the level of the entire economy and from the production to the entire lifecycle of the product including distribution and recovery (MacArthur 2013; European Commission 2015).

The main focus areas in CE literature as of today have been discussed by Ghisellini et al. (2016) in their extensive literature review of circular economy. From their classification of CE studies, shown in figure 3.1, it can be seen that on the implementation level circular economy can be divided to three levels: micro, meso, and macro levels. These are discussed in chapter 2.2.2. Ghisellini et al. (2016) also studied the principles of circular economy appearing in the literature, and concluded that the 3R-principles of reduce, reuse, and recycle were brought up most consistently. The 3R-principles are discussed in chapter 2.2.1. CE Models have received less attention in scholarly literature, and overwhelming majority of articles about implementation are about either cleaner production or eco-industrial systems and industrial symbiosis. Modeling circular economy with closed loops that integrate both the production and consumption side and have potential to bring a more systemic approach to the micro- and meso-levels of CE are presented in chapter 2.2.3.



**Figure 3.1:** Classification of Circular Economy studies reviewed by Ghisellini et al. (2016, p. 13)

### 3.1 The 3R Principles

In literature, the circular economy is often discussed through the 3R principles of reduce, reuse, and recycle (Feng & Yan 2007; Preston 2012; Su et al. 2013; Yong 2007; Sakai et al. 2011; Reh 2013). The reduction principle implies using minimal inputs of energy, raw materials and waste by increasing efficiency in both production and consumption, e.g. implementing better technologies, simplifying packaging and using more power-efficient appliances (Feng & Yan 2007; Su et al. 2013). One example of implementing this strategy is the Zero-Emission Strategy where the approach is to maximize the value produced while having zero environmental impact (Tan et al. 2005; Figge et al. 2014). Companies can also adhere to the reduction principle in their production processes by e.g. using fewer resources per unit of value produced and by replacing more harmful substances in with less harmful ones per unit of value produced (Figge et al. 2014).

The Reuse principle simply states that “products or components that are not waste are used again for the same purpose for which they were conceived” (European Commission 2008). Reusing products requires fewer resources, less energy, and less labor than producing new products from virgin materials or even recycling or disposing the product (Castellani et al. 2015), and as such has clear environmental benefits. To increase reusing and remanufacturing of products, incentives for companies to design and produce products that can endure multiple cycles and to implement take-back programs as well as marketing for remanufactured products is needed (Prendeville et al. 2014). The concept of Extended Producers Responsibility has been implemented in e.g. the EU to provide this incentive by transferring the costs of disposal and recovery to the producers (Bilitewski 2012; Sakai et al. 2011).

The principle of Recycling refers to “any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations”. Recycling is often discussed almost synonymously with circular economy and waste policies have had a strong focus on improving recycling rates. (European Commission 2008) However, in terms of resource efficiency and profitability it may be the least sustainable solution compared to the principles of reduce and reuse as it is limited by the entropy law of nature, material complexity and abuse (Stahel 2013). Often materials can only be recycled to a certain point, for example cellulose fibers can be recycled 4-6 times (Reh 2013), while some materials are seen as being unrecyclable, e.g. plastic waste that is contaminated with ink and metals (Prendeville et al. 2014).

### 3.2 Vertical approach: Micro-, Meso-, and Macro-level

Another way of categorizing how circular economy functions is the division of activities between the micro-, meso- and macro-level (Yuan et al. 2006; Feng & Yan 2007; Yong

2007; Park et al. 2010; Su et al. 2013). The micro-level refers to activities at the firm or consumer level, meso discusses activities such as eco-industrial parks, while macro level is concerned with the activities on the level cities, provinces, and regions (Yuan et al. 2006). While analysis at the micro level is able to detect activities that a firm or consumer can do to promote the circular economy, the trend in literature has lately been moving to the higher levels of meso and macro, as there the systematic nature of the circular economy is better represented (Ghisellini et al. 2014). According to the General System Theory, in which circular economy has roots in, the system as a whole has properties that cannot be known from analyzing its elements in isolation because the whole determines behavior of the parts and not vice versa (Capra 1996). This notion promotes the approach of analyzing the meso and macro levels of circular economy.

The micro level of the circular economy can be roughly categorized to CE activities relating to production, consumption, and waste management. In the case of production, a company adopting a circular economy program is to carry out different strategies that improve circularity in its production system while also collaborating with other companies to increase circularity in its supply chain (Winkler 2011). Inside the firm, circularity in production processes can be improved by implementing cleaner production principles of pollution prevention, toxic use reduction and design for environment (Van Berkel et al. 1997). To avoid part-optimization and situations where improvement in one area causes reduction in others that undermine the efforts, the design phase of the products is especially important (Prendeville et al. 2014). In addition to applying cleaner production principles, taking into account the “disassembly, disposability without negative environmental impacts, ease of distribution and return, durability, reliability and customer success” is relevant for successfully implementing circular economy principles (Winkler 2011; Prendeville et al. 2014).

At the consumption side, there is a need for more consumer responsibility so that consumers would purchase and use more sustainable products and services (Feng & Yan 2007; Su et al. 2013). To date, most of the effort to promote consumption of sustainable products and services have been in the area of labelling systems that increase awareness and make it possible for consumers to choose sustainable products (Ghisellini et al. 2014). Another area that has a major influence on sustainable consumption is sustainable public procurement, as e.g. in EU27 public procurement accounted for about 19,9 % of EU Gross Domestic Product in 2009 (Renda et al. 2012). sustainable or green public procurement is conducted by introducing “green” requirements into public contracts (European Commission 2016)

With the introduction of circular economy into governmental policies, the way to look at waste management has significantly changed. While before waste management was simply about getting rid of waste materials through landfilling or incinerating, today waste is increasingly seen as a resource. Through this new lens the role of waste manage-

ment changes from disposal of waste to recovery of resources, and thus waste management becomes a very important sector of circular economy. In scholarly literature the role of waste management actors is defined to the main types of scavengers and decomposers. Scavengers collect waste resources and redistribute them to companies that can reuse or recycle such materials making their work easier. In cases where other companies cannot reuse or recycle the products, scavengers transport the preprocessed (i.e. dismantled and sorted) waste resources to decomposers. The decomposers then transform or recycle the waste resources so that they can be reintroduced into the same input flows for which they were initially designed. (Geng & Côté 2002)

Meso level extends the scope of analysis from individual firm level to studying groups of companies and other actors collaborating in a system. In practice research on the meso level is focused on initiatives such as eco-industrial parks and other industrial symbiosis networks (Yuan et al. 2006; Su et al. 2013; Chertow 2007; Park et al. 2010; Van Berkel et al. 2009). In these systems companies from industries that typically operate separately engage in collaboration to exchange resource flows, typically of energy or materials (Chertow 2000). The phenomenon has been a central area of research in industrial ecology as a way to capture economic benefits while reducing negative environmental effects from production (Mathews & Tan 2011; Geng et al. 2009; Zhu et al. 2010). In the circular economy context, industrial symbioses have potential to reduce the need for new materials by substituting them with by-products from other companies. Simultaneously these activities divert material flows from being discarded as waste and rather being used to create value, thus increasing the circularity of the system.

At the macro level, circular economy is taken into account in the development of cities, provinces or regions with a focus on four systems: the industrial system, the infrastructure system of delivering services, the cultural framework, and the social system (Mirata & Emtairah 2005; Feng & Yan 2007; Ness 2008) Often macro level initiatives resemble the industrial symbiosis approach of the meso level, while extending the boundaries of the system to involve e.g. consumers and urban waste management. Practically macro level circular economy is most often discussed in terms of eco-cities.

For example, a governmental program to establish eco-towns in Japan started in 1997, and lead to the creation of 26 eco-towns, in which industrial centers and urban areas established symbiotic resource flow exchanges. The eco-towns have led to environmental and economic benefits that stem from e.g. legislative framework's development to better support recycling, diversification of enterprise's activities, reduced risk and capital expenditures for enterprises by the means of subsidies, and improved technological capacities within industry sectors. (Van Berkel et al. 2009)

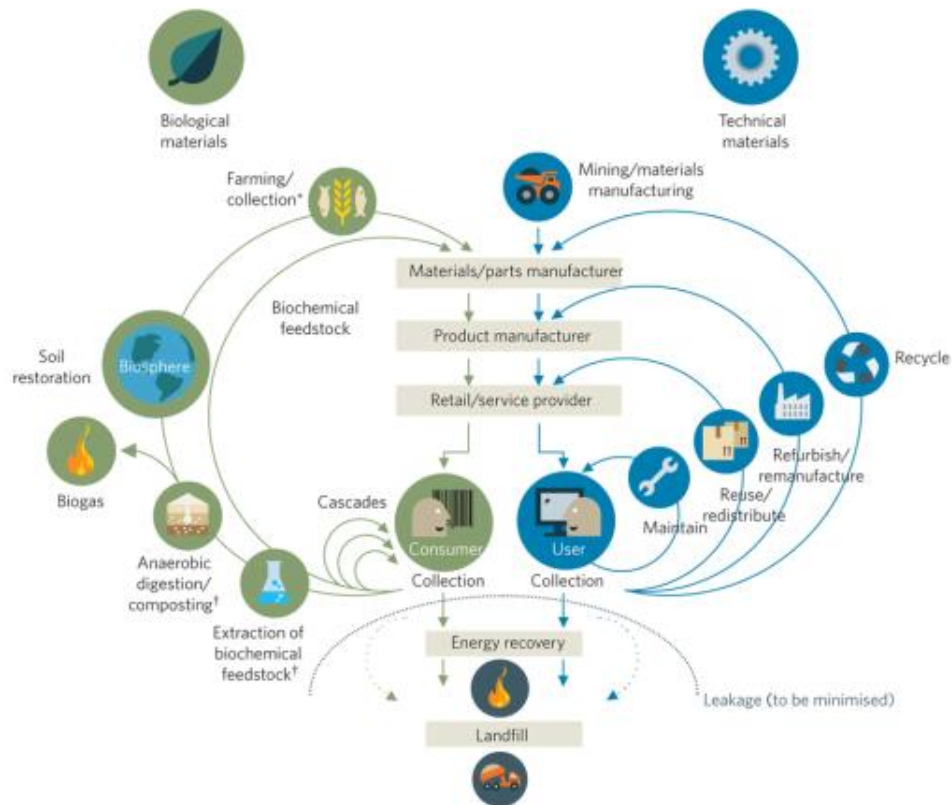
Macro level literature also includes consumption patterns into analysis of circular economy. Especially collaborative consumption is recognized as a model that has potential to help the progress towards circular economy (Ness 2008; Preston 2012). In collaborative

consumption, the ownership of the product is shared between consumers. For example, when renting a product, the consumer pays for the right to use it while the ownership stays with the service provider. This model of consumption is seen as a major driver for circular economy because it has a two-fold effect of breaking major barriers that currently limit the adoption of CE. Firstly, it reduces the need of owning a product, thus potentially reducing the amount of material needed per unit of value produced (citation). Secondly, it incentives to improve the durability of products, since the ownership is retained with the service provider. Thus the more durable the product, the more value from it the provider has to gain, leading to an increased value per product ratio. (Tukker 2015)

### **3.3 Hierarchical Circular Economy Loops**

The circular economy description in scholarly literature mainly discusses the 3R-principles of reduce, reuse and recycle, and the applications of these on the vertical levels of micro, meso, and macro. However while some attention has been given to collaborative consumption models, the focus is most often on the production part of the material circulation (Mathews & Tan 2011; Yuan et al. 2006; Su et al. 2013; Geng et al. 2009). How the materials are to circulate back to production is discussed comparatively less, and analysis of circular economy practices in this sense is mostly focused on either cascading in industrial symbiosis systems from one company to another (Jacobsen 2006) or on municipal waste management (Geng et al. 2010; Van Berkel et al. 2009). This approach has led to scholarly literature mostly discussing recycling as practical implementation of circular economy outside of the industrial network area. Recycling is problematic, as e.g. the way products are assembled and potential material contamination greatly affect the recyclability of a product, while many materials are limited in how many times they can be recycled (Stahel 2013; Prendeville et al. 2014). This calls for an approach that can systematically take into account the production and consumption sides.

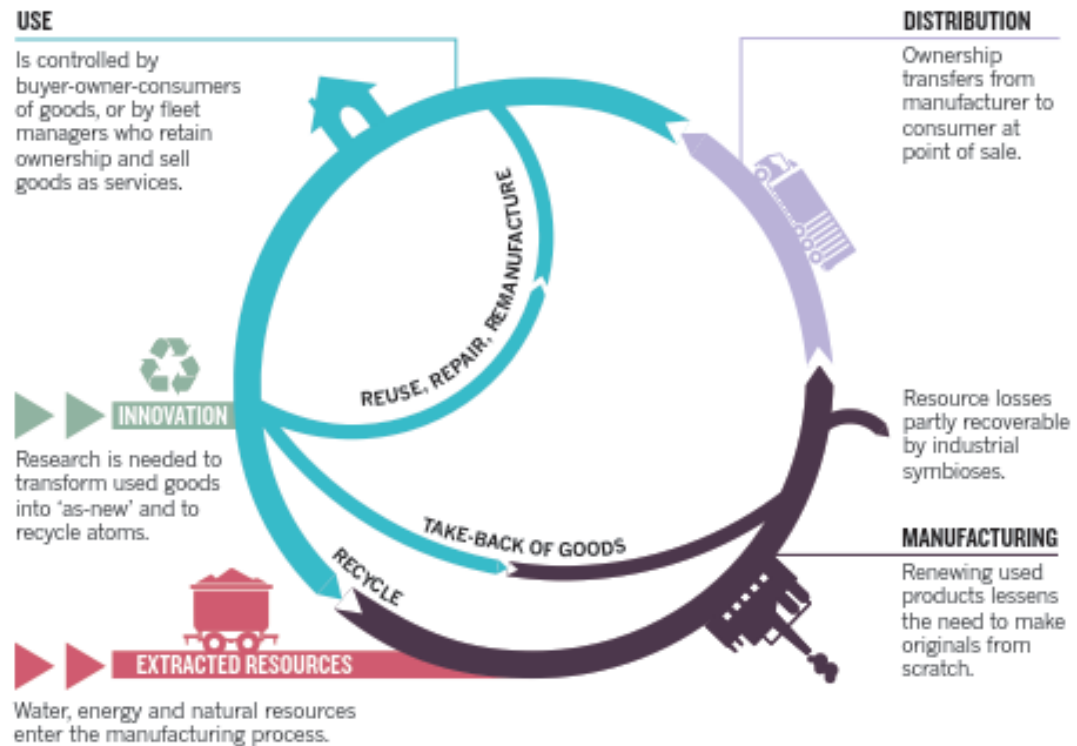
One possible solution that has recently received attention with scholars and especially business practitioners is the way of describing the circular economy as a hierarchy of loops designed to keep products and materials circulating as effectively and economically as possible. In the loop approach, the focus is heavily on the reuse and recycle principles of circular economy, with reuse, in line with the scholarly approach (Stahel 2013), as the preferred method of choice. In figure 3.2, a model for CE is shown as illustrated by MacArthur (2013, p. 24), showing both the biological and technical sides of CE.



**Figure 3.2** *Circular Economy loops illustrated by MacArthur (2013)*

A similar model by Stahel (2016) with emphasis on required future development is shown in figure 3.3. Although there is minor variation in the way loops are illustrated and Stahel's focus is on the technical material, they both include recycling, remanufacturing, repairing and reuse as loops. While Stahel makes an effort to describe where value input to the closed system is achieved, the model by MacArthur is able to conceive more information by including actors at the end-points of each loop, the inclusion of the biological materials side of circular economy, and the acknowledgement of the need to minimize systemic leakage by turning materials that can no longer be circulated into energy.





**Figure 3.3** *Circular Economy loops illustrated by Stahel (2016)*

In MacArthur's illustration the loops are discussed hierarchically from outer to inner loops. Furthest out is the recycling loop, followed by refurbishing/remanufacturing loop, reuse/redistribute loop, and finally the maintain loop. Each of the loops is connected to the focal actor that is seen as being active in that loop. In circular economy, the optimal situation would be that the product goes through the shortest loop possible, where it creates the most value compared to the costs of the loop. The remaining value of the product gets comparatively smaller and the required energy grows the longer the return loop is. (MacArthur 2013)

## 4. INSTITUTIONAL THEORY

Circular economy has benefits from the perspective of the economy and environment especially in the long run. From the literature review of circular economy, it is clear that many of the initiatives that have been put into practice have needed support from the legislative environment and in the way of financial subsidies. Institutional theory offers a theoretic footing for analyzing how institutions, for example governments, can have an effect on the development of new trends and their adoption, and also how this can lead to differences in how certain phenomena, e.g. Corporate Social Responsibility (Campbell 2007; Brammer et al. 2012), are adopted and implemented based on the geographical market. Thus institutional theory offers an interesting scope through which to bring market perspective into business models in circular economy.

Institutional theory has its origins in organizational sociology. While it can be traced back to the mid nineteenth century (Scott 1987), it first appeared in its modern form in an article about formal organizational structures as reflections of rationalized institutional rules, and the institutionalization of organizations, i.e. how those rules come to be (Meyer & Rowan 1977). Since that article institutional theory has been used in a wide variety of contexts, e.g. to explain the spread of specific personnel policies (Tolbert & Zucker 1983), to the redefinition of organizational missions and forms (DiMaggio 1991), to the implementation of Corporate Social Responsibility in different geographical markets (Campbell 2007; Brammer et al. 2012), and to the development of policies by government organizations (Zhou 1993). While showing that institutional theory is seen as a useful tool for analysis of institutions and organizations, the wide variety of use led to the framework being quite ambiguous in its early days (Tolbert & Zucker 1996).

To decrease the ambiguity and increase the systematic usability of the concept, frameworks have been created to facilitate areas of institutional theory. Scott (1987, 2008b) argues that the elements of institutes can be divided to three pillars: regulatory, normative, and culturally cognitive (Scott 2008b, p.222). Elements in these pillars impact social behavior and are thus reflected in activities, relations, and resources. The way institutions function is determined by these pillars, as institutions are inhabited by people (Hallett & Ventresca 2006). These elements are further discussed in chapter 4.1. To gain perspective into how these pillars can influence change in the institutional landscape, the different mechanisms of institutional diffusion that are linked to the three pillars are discussed in chapter 4.2.

## 4.1 The three pillars of institutions

An established framework of institutions is that there are three pillars that institutions stand on. These are the regulative, normative, and cultural-cognitive pillars. (Scott 2008a; DiMaggio & Powell 1983; Suchman 1995) These pillars contain rules, norms, and beliefs that, while primarily symbolic, impact social behavior and are reflected in activities, relations, and resources. (Scott 2008b, p.222) The process of how these institutional rules are generated alternates from agency based to unconscious processes (Strang & Sine 2002), but due to the nature of the pillar they seem to evolve from the regulatory pillar involving mostly conscious decisions to the culturally cognitive pillar being the most unconsciously adopted one. The focus of attention similarly varies in different schools of theorists studying institutions. For example, in economic studies, where actors are usually seen as agents actively influencing the construction of institutions, the regulative pillar is often stressed. Meanwhile, early sociologists stressed the influence of normative systems imposing constraints on social behavior. (Scott 2008a, pp.51–55) Table 4.1 contains the principal dimensions of institutions as described by Scott (2008a, p. 51).

	<i>Regulative</i>	<i>Normative</i>	<i>Cultural-Cognitive</i>
<i>Basis of compliance</i>	Expedience	Social Obligation	Taken-for-grantedness Shared understanding
<i>Basis of order</i>	Regulative rules	Binding expectations	Constitutive schema
<i>Mechanisms</i>	Coercive	Normative	Mimetic
<i>Logic</i>	Instrumentality	Appropriateness	Orthodoxy
<i>Indicators</i>	Rules	Certification	Common beliefs
	Laws	Accreditation	Shared logics of action
	Sanctions		Isomorphism
<i>Affect</i>	Fear Guilt / Innocence	Shame / Honor	Certainty / Confusion
<i>Basis of legitimacy</i>	Legally sanctioned	Morally governed	Comprehensible Recognizable Culturally supported

**Table 4.1:** *Three Pillars of Institutions (Scott 2008a, p. 51)*

### 4.1.1 The Regulative Pillar

The regulative pillar includes both formal and informal rules and is perhaps the most visible pillar of institutions. (Scott 2008b) In this sense, all academics of institutional theory showcase the influence of this pillar. Schools of institutional theory more specifically focused on the regulative pillar focus on the regulative processes underlying the formal and informal rules specifically. These processes include rule-setting, monitoring,

and sanctioning activities. (Scott 2008a, pp.52–53) The regulative pillar has been compared to the rules of a team sport, combining written formal rules with unwritten codes of conduct that supplement the formal ruleset. Through the regulative pillar, institutions set controllable boundaries to activities, and the violation of those boundaries is acted upon through sanctions of some kind. (North 1990, p.4)

The regulative pillar is coercive by nature. It relies heavily on force, sanctions, and expedience in influencing the institutional landscape. The indicators of the regulative pillar are laws, rules, and sanctions. Institutions set laws and rules to guide behavior, and these are backed up by sanctions for not complying with the set laws and rules. (Scott 2008a, pp.52–53) While the regulative pillar's indicators and thus the pillar itself is heavily focused on coercive power, it is most often supported by a normative framework, that cultivates belief in the regulative pillar's legitimacy (Scott 1987)

Laws and rules have a similar role as institutions. Both set stated boundaries and implemented regulatory systems that mandate a group of agents in the institutional landscape. The clearest way to differentiate between laws and rules is through identifying the legislative force. Thus, rulesets mandated by institutions through legislation are laws, and rulesets set through other means are rules. (Scott 2008a) Another difference is that in case of laws, a neutral third party through the involvement of the legal system acts as the implementer of the sanctions, while in the case of rules, no such third party often exists (North 1990, p.64). Thus, laws can be seen as a more effective way of implementing the coercive force. However, as laws need the neutral third party, they also can be costlier to implement (Pratt & Zeckhauser 1985).

Sanctions play an important role in the effectiveness of the regulative pillar. Sanctions in a way act as a reward system for the agents in the institutional landscape. When laws and rules mandate certain behavior, they can be connected to positive or negative sanctions from the perspective of the agent under the mandate. (Scott 2008a) When sanctions are negative, they are tied to behavior not aligned with the mandated behavior, and act as punishments for those that break the rules. For example, a fine for breaking the law is a negative sanction. Positive sanctions again are linked to behavior that is aligned with the mandated behavior, and act as incentives to follow the rules. A discount for customers that have followed a certain ruleset set by a company is an example of a positive sanction. (Milgrom & Roberts 1992)

#### 4.1.2 The Normative Pillar

The normative pillar introduces more abstract subjects into the institutional landscape by introducing a “prescriptive, evaluative, and obligatory dimension into social life”, with the focus on what is seen as the appropriate behavior in context of a situation. (Scott 2008b) Normative systems are based on values and norms. In here, values illustrate the preferred or desirable, together with related standards to which behavior can be compared.

Norms depict how things should be done, and thus define boundaries to how values are to be pursued in a legitimate way. (Suchman 1995, p.579)

While the normative systems are based on values and norms, these directly are not the indicators of the normative pillar. With norms and values as the basis, the normative pillar defines goals for the agents in the landscape to reach, using legitimate means. These goals, that are a direct indicator of the values of the institutional landscape, appear as certifications that are given to actors that reach goals which are normatively valued by in the institutional landscape. The legitimate means lead to accreditation of certain normatively important activities. (DiMaggio & Powell 1983, p.152) For example, recycling and waste management are areas where actors are accredited to operating the activities, as there is a normative meaning to proper waste management.

### 4.1.3 The Cultural-Cognitive Pillar

The cultural-cognitive pillar emphasized the symbolic system of the institution. It includes the use of common schemas and frames that guide behavior. (Scott 2008b) The effects and appearance of the cultural-cognitive pillar is based on the thinking that humans act based on their own cognitive representation of the world, and thus different individuals act differently in similar situations due to different meanings they attribute to, for example, words or gestures (D'Andrade 1984, p.88). As institutions and institutional landscapes are formed by the individual agents of the institutional landscape, the cultural-cognitive pillar has a large influence in the landscape (Scott 2008a, pp.56–57).

The cultural-cognitive pillar shows itself as things that humans under the influence of the institution take as granted (Järvenpää 2009, p.452). Complying with the rules set by the cultural-cognitive pillar is, differently from the normative and regulative pillar, not indicated by external effects such as complying with laws and rules, or through complying with behavior seen as appropriate. Behavior influenced by the cultural-cognitive pillar can be identified in actions that the agents of the institutional landscape see as “the way things are done” (Scott 2008a, p.58)

The indicators of the cultural-cognitive pillar can be divided into three different categories, common beliefs, shared logics of action, and isomorphism. While all of the categories appear as indicators of the institutional landscape and thus across the actors in the landscape, common beliefs can be identified on the most individualistic level. (Scott 2008a, pp.57–58) Common beliefs depict belief systems that are based on things actors in the institutional landscape have gotten used to, thus quite well illustrating the “way things are done” mentality that is prevalent in the cultural-cognitive pillar (Jepperson & Swidler 1994). Shared logics of action are indicated by recurring ways to rationalize behavior among the actors in the institutional landscape. The actors hold these logics of action as true and are unused to different ways of rationalizing behavior, and thus break-

ing the shared logics of action can make the actor to be perceived as clueless or incompetent (Scott 2008a, p.59) Isomorphism is an indicator of the cultural-cognitive pillar that appears on an organizational level, in the structural form of organizations. While much of an organizations form is a result of environmental need and competitive pressure (Hannan & Freeman 1989), much of the reasoning behind organizational form can, in the perspective of the cultural-cognitive pillar, be caused by following the common organizational structures that are preferred in the institutional landscape. This behavior leads to similar organizational structure for organizations of the same field. (DiMaggio & Powell 1983)

## 4.2 Diffusion of institutional change

As the circular economy and business models that embrace it are a relatively new area (Ghisellini et al. 2014), the current institutional landscape most likely is not perfectly aligned with the circular economy concept anywhere. Thus, it is valuable to address how institutional changes take place. Knowledge of the diffusion of institutional change can help address the phase of where the institutional landscape is in regards to supporting the circular economy. Also, as diffusion of institutions through different pillars seems to be efficient in different types of circumstances (DiMaggio & Powell 1983), understanding of the efficiency of different pillars can help to evaluate how effectively the institutional landscape in a market is supporting change towards circular economy business models.

DiMaggio and Powell (1983) present a typology for the ways institutions are diffused. This typology focuses on three different mechanisms, coercive, normative, and mimetic. Different mechanisms in the typology are based on different forces that influence actors in the institutional landscape to adopting new behavior (DiMaggio & Powell 1983). The three mechanisms map very well to the three pillars of institutions, with coercive mechanisms in connection with regulative forces, normative mechanisms with normative forces and mimetic mechanism in connection with cultural-cognitive forces (Scott 2008a, p.133).

In coercive diffusion, the institutional landscapes actors are influenced primarily by regulative forces. For effective diffusion, implementing the regulative force needs to happen through clear demands, effective surveillance and significant sanctions. In addition, the actors implementing the regulative influences need to be viewed as legitimate actors in a position of power and control in order for the regulative processes to be effective. (Scott 2008a, pp.134–135).

Effectiveness of coercive diffusion has been analyzed in multiple studies. For example, Tolbert and Zucker (1983) analyzed how civil service reforms in the United States diffused in two different types of processes: ones where the state mandated cities under their jurisdiction to embrace the reform using legal procedures and official sanctions, and ones where the cities where the reform was lacking regulative mandates and was primarily

driven by a social movement. In the study, reforms in the states that mandated civil service reforms through regulative processes saw higher adoption of the reforms, with 60% of the municipalities adopting the reform within 10-years. When the mandates were not implemented, it took 50 years to approach the same 60% level. (Tolbert & Zucker 1983, pp.28–29) (Tolbert & Zucker 1983 pp. 28-29). In another study, Cole (1989) researched firms in Japan, Sweden, and the United States and how the firms adopted innovative small-group activities, for example quality circles. The level of support from the national infrastructure, including governmental agencies, trade associations, and union organizations, was different in each country. The support was highest in Japan, followed by Sweden, and then the United States. The level of adoption and retention of the small-group activities followed similarly with it being highest in Japan and lowest in the United States. (Cole 1989) Both of these cases illustrate that coercive diffusion through regulative processes is an effective way of institutional diffusion.

In normative diffusion and normative processes, the focus is often on the relations between different actors in the institutional landscape, i.e. the ties and commitments between them. Studies that focus on the normative mechanisms most often emphasize professional networks, individuals that have influence over multiple organizations, and informal ties. Normative diffusion takes place through the spreading of norms and values through these relational structures (Scott 2008a, pp.135–137)

Scholars focusing on the normative diffusion often analyze the normative mechanisms' effectiveness against that of the regulative processes in the same situation. One view is that when regulative forces are weak, groups of actors in the landscape fill the void through collectively crafting a normative landscape that drives institutional change (Dobbin & Sutton 1998, p.443). Another perspective is that for the regulative processes to truly be effective, they need to be supported by simultaneous normative processes that give normative justification for the regulative force (Edelman et al. 1999, p.407). However, it is clear that the regulative and normative processes are connected in their effectiveness.

The mimetic diffusion and cultural-cognitive processes highlight the importance of theorization as a carrier of institutional diffusion. Another area that is important in the diffusion of institutions through cultural-cognitive processes is that actors in the institutional landscape assimilate themselves into certain groups. This feeling of belonging into a certain group is what allows cultural-cognitive mechanisms to change the institutional landscape. Theorization gives causal explanations that rationalize why certain types of actors need to behave in a certain way. Through multiple actors feeling assimilation to the certain group, and through theorization that rationalizes certain type of behavior as the correct type, institutional diffusion occurs. (Strang & Meyer 1993)

The importance of the theorization process in institutional diffusion is illustrated in the research of Cole (1999) about the concept of “total quality management” (TQM) in the

United States. In the mid-1970s American firms were facing significant competitive pressure from Japanese car and electronics manufacturers. As a response, the firms began experimenting with TQM, which included a range of different practices. Although the concept had significant backing from experts, consultants, and professional associations, the core of the concept remained unclear for those that were attempting to implement it. Thus while normative and regulative landscapes were in support of the concept, the underdeveloped theorization of the concept led to fragmented implementations. (Cole 1999; Cole & Scott 2000)

While the different types of diffusion of institutions, the coercive, normative and mimetic diffusion, were all addressed separately and often attract different groups of scholars in the literature, it is important to notice that diffusion of institutions happens through a collaborative effect of each of the types. This is apparent in for example the case of diffusion of civil service reforms in the US, where the combination of regulative and normative processes proved significantly more efficient than normative processes alone (Tolbert & Zucker 1983, pp.28–29). Thus it is valuable to include all of the linked pillars of institutions in to the analytical tools of this study, so that a holistic picture of the institutional landscape can be gained.

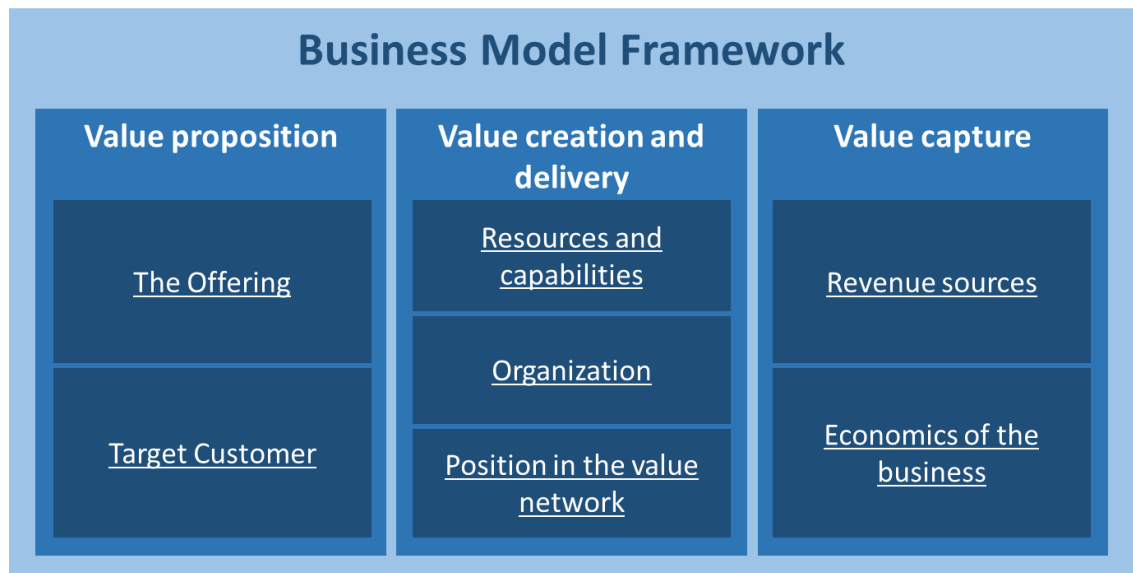


## 5. RESEARCH METHODOLOGY

The research questions this thesis aims to answer are: with what kind of business models do circular economy driven business ventures operate with regards to value proposition, value creation, value delivery and value capture, how does the institutional landscape affect the business model in question, and how can business models advance the circular economy? The research methodology of how this thesis is to answer those questions is discussed in this chapter. First, the analysis framework for the study is created based on the literature reviewed in chapter 2-4. In the second section, the research design for the study is explained. Reasoning for the case selection is given in the third section, together with a brief introduction of the selected cases. The fourth section presents the data gathering methods used, and the section four discusses the methods used in data analysis.

### 5.1 Creating the tools for analysis

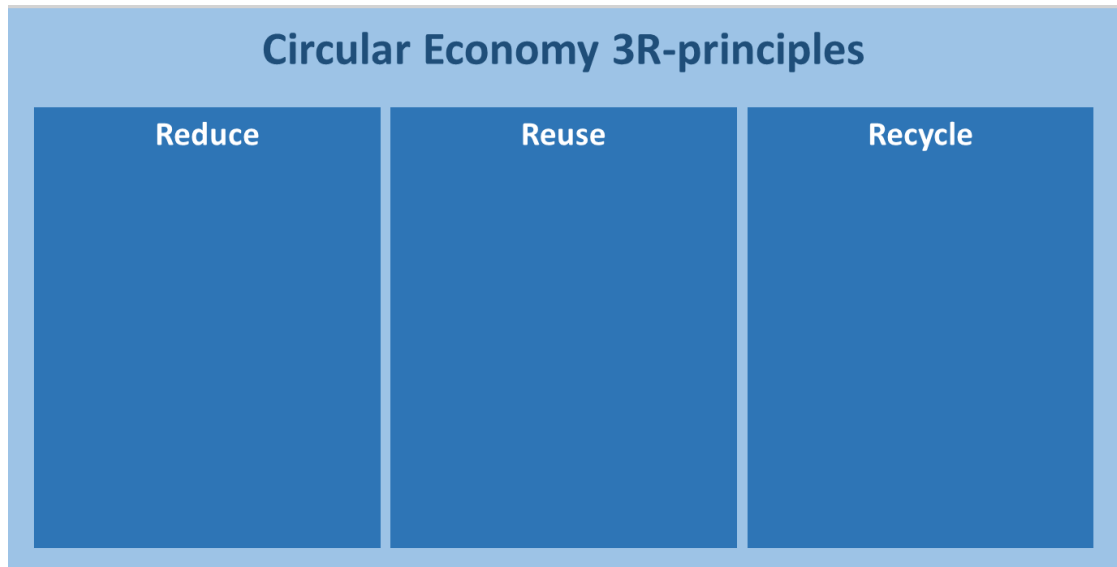
In this chapter, tools for analyzing the business model of the cases, and its aspects from the perspectives of the circular economy and institutional theory are created. The basis for this work has been done in chapters 2, 3, and 4. The tools for analysis are created in a multistep approach. First, the business model framework created in chapter 2 is used as the basis, around which the business model is structured. The framework is illustrated in table 5.1.



**Table 5.1:** *Business Model Components based on the literature review on business models*

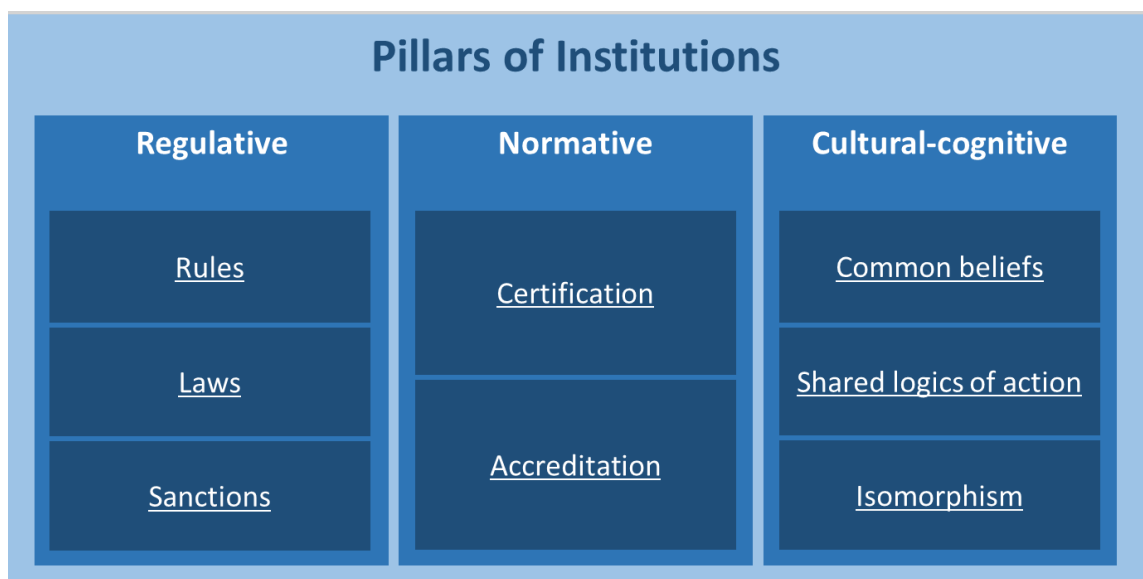
To analyze the circular economy elements, circular economy aspects based on the literature review of the area done in chapter 2 are applied through the 3R-principles of circular

economy that can be seen as the underlying set of principles of the phenomena. The implications of the principles were discussed in chapter 3.1, and their further implications throughout chapter 3 in the form of micro-, meso-, and macro-level as well as a typology of cases that employ the principles. The analysis pane for circular economy is shown in table 5.2.



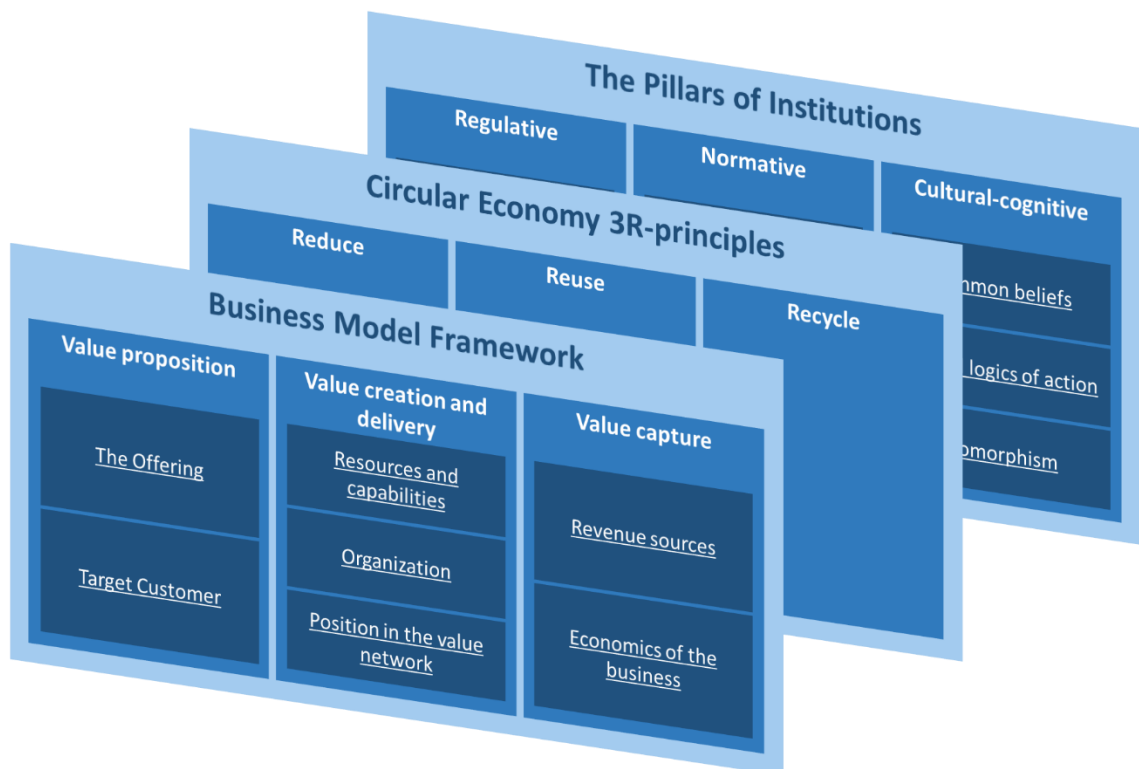
**Table 5.2:** *Circular economy analysis pane: the 3R principles of CE*

To discuss the institutional factors, we apply the knowledge from the literature review of institutional theory in the form of the indicators of the three pillars of institutions, the regulative, normative and cultural-cognitive pillar. By analyzing the appearance of the indicators of each of the pillars of institutions, the effect of institutions in the business model case context can be identified. The pillars of institutions and their indicators were discussed in chapter 4.1. The analysis pane for the institutional effects in the business model cases is shown in table 5.3.



**Table 5.3:** *Institutional theory analysis pane: the indicators of the three pillars of institutions*

These three different analysis frameworks provide a way to systematically approach how the business models are advancing circular economy, how institutions effect these business models in different markets, and how the business model is constructed in a more detailed manner. The three elements are thus very much connected, even if they are analyzed with separate frames. To showcase the connections, an analysis of the causalities between the separate frames is done after the separate analyses, providing a more holistic view of how the business model is advancing circular economy in its specific institutional context. An illustration of this holistic view is shown in table 5.4.



**Table 5.4:** *Illustration of the cross-theoretical case analysis framework.*

## 5.2 Research design

This research aims to create understanding of business models in the circular economy while maintaining a market perspective. To reach this goal, the research design chosen needs to be able to study the aspect holistically in their context, with the boundaries of each phenomena potentially overlapping. This sort of need calls for case study research, which provides a strategy “for doing research through empirical investigation of a particular contemporary phenomenon within its real life context” (Robson 2002, p.178) Yin (2003, p.5) also argues that when the research focuses on contemporary events and while the researcher has no control over the events, a case study is a good fit. Both of these

circumstances occur in this study, making case study a good fit. Furthermore, this study is explorative as the aspect of business models in circular economy has received limited attention in academia based on the literature review conducted. Case studies are a compatible method with explorative research (Saunders et al. 2009, p.146), which further solidifies the choosing of case study as the research design.

Case study as the research method is also an established way of conducting research in both research fields of business models and the circular economy. For example, business model innovation and the fit between company strategy and business model of technological innovations has been studied as a multiple case study of Xerox R&D (Chesbrough & Rosenbloom 2002), and plurality of co-existing business models within an industry has been studied as a multiple-case study of the New Zealand Wine industry (Benson-Rea et al. 2013). In circular economy literature, the case study of the industrial symbiosis in Kalundborg by Jacobsen (2006) and the multiple case study comparing Chinese industrial parks with similar ones from other regions by Mathews & Tan (2011) are good examples of rigorous use of the case study research design. Thus case study is chosen as the research design of this study

After choosing the case study as the research design, the research was conducted as a multiple-case study with 4 cases. Yin (2003, p. 53) argues that selecting a multiple-case design over a single-case design may be preferred due to reducing vulnerability over unexpected circumstances in the chosen cases, and due to the increased analytical benefits of having multiple cases for cross-case analysis. However, the main driver for choosing a multiple-case design was the interest of drawing examples from multiple geographical markets, which made a single-case study an undesirable choice.

A case in a multiple-case study could be analyzed as a holistic, or an embedded case, depending on whether subunits in each case are separately analyzed (Yin 2003, pp.52–53). The business model was identified to have three distinct themes of value proposition, value creation & delivery and value capture that could be used to clarify case analysis. As such, this study is an embedded multiple-case study where the subunits are the three themes of a business model, which are replicated in each of the cases analyzing a specific business model that increases circularity of materials.

This research was conducted as a mixed-model research combining qualitative and quantitative data, while the analysis was conducted with qualitative methods. The main reasoning for selecting a qualitative method was the nature of the research questions, focusing on generating new information about how business models can improve material flow circulation. During the literature review it was apparent that there was limited material from this specific interplay. In these circumstances where the research area and the root research problem are not well understood, a qualitative research design is well suited (Saunders et al. 2009, pp.152–153). However, case studies are not to be confused as purely qualitative and can, and often do have quantitative data, leading to a mixed-model

research (Yin 2003, p.14; Saunders et al. 2009, p.153). Saunders et al. (2009, p.153) give the example of using quantitative data and qualitzing it, as in turning it into a narrative that can be qualitatively analyzed. This method was used in this study across all cases, especially in cases that relied mainly on secondary data.

### 5.3 Case selection

The sampling method used in this thesis was purposive sampling. This is a popular method used in case studies, especially in ones that are designed to illustrate a phenomenon (Saunders et al. 2009, p.237). The sampling of the cases was done based on the literature about circular economy and activities that are identified as advancing circular economy, and about institutional theory. Thus the sampling method used can be furthermore defined as theory-based sampling (Patton 1990, p.177). As the analysis of the study is of qualitative nature, the purpose was not to select cases so that statistically meaningful results could be achieved, but rather that the cases would provide information about the specific case and the connection of circular economy, institutional landscape, and the business model that can be derived.

This study aims to provide a good picture of business models in the circular economy including potential market differences resulting from differences in the institutional landscape. Cases selected should have variance in their business models and their circular economy aspects. This leads for criteria for the case selection to select cases that differ between the type of the case, for example, what are the perceived main drivers behind the business model, which industry is the case from, and how large is the organization in each case. To allow the study of differences between institutional landscapes that lead to market differences, the inclusion of multiple geographical markets is also a significant criterion of case selection.

With these criteria in mind, a preliminary search for suitable cases was conducted. This involved reading circular economy related publications, previous case studies on the subject, and discussions with stakeholders in the ARVI project, in which multiple Finnish organizations active in related field of business and academia were involved. In this preliminary research of business models linked with circular economy, multiple potential cases were identified.

After preliminary case identification, nine cases were further evaluated for case selection. These cases were:

- Alcatel (circular economy business model for networking equipment in China)
- Dell (use of closed-loop plastics)
- Ekokem (Circular Economy Village waste utilization concept)
- H&M (textile recycling)
- Renault (reuse and recycling of materials in the automotive industry)

- Suzhou (recycling from household waste in China)
- UPM (turning company's own waste stream into a new product)
- Veolia (waste management model leaning towards the Circular Economy)
- Enevo (improving waste management efficiency through digitalization)

For each of these cases, an evaluation of their value for the research agenda was conducted based on the circular economy and business model aspects and data availability. Through the use of the criteria of differing type of the business model and the geographical market, a set of four cases was selected. The selected cases together with details of the selection criteria is shown in table 5.5.

The case selection reflects the objectives of the study by including a variety of different types of business models from multiple geographical areas. As the research questions of the study are *with what kind of business models do circular economy driven business ventures operate with regards to value proposition, value creation and delivery and value capture, how can business models advance the circular economy and how does the institutional landscape affect the business model in question*, choosing different kinds of business models that promote circular economy in different ways in different institutional landscapes was the aim for the final case selection.

The UPM case represents a case in which a manufacturer creates end-products from waste from their own and their customers' operations in EU. Especially the signals of industrial symbiosis in terms of using waste of other companies as a resource was a major influence in the selection of the case. The Ekokem and Veolia cases both represent a case of a waste management industry incumbent's circular economy business model. Of these, Ekokem was chosen due to the clear circular economy ambitions of the Circular Economy Village, and also due to the availability of primary data. These two cases covered the geographical areas of Finland and EU, and thus to extend the to further regions, a case from China and US were targets for the remaining cases. For the China case, the case of Suzhou's recycling system was included, with a major reason being the ability to include analysis of the informal sector and the availability of prior studies on the subject, a difference to the other cases from China such as the Alcatel case where available data was scarce. Dell was chosen to represent the US case, while also representing closed-loop systems (Stahel 2013; MacArthur 2013). With these cases, multiple types of business models in variety of institutional landscapes affecting them can be addressed.

<i>Case</i>	<i>Company Description</i>	<i>Company Market Area</i>	<i>Market Area of the Case Business</i>	<i>Company Employees (2015)</i>	<i>Company Revenue (MEUR 2015)</i>	<i>Industry</i>	<i>Drivers behind the business model</i>	<i>Case Description</i>
UPM	Forest and Energy industry incumbent with diversified businesses	Global	EU	19600	10138	Forest industry, Energy	Resource Efficiency	Creating products from waste
Ekokem	Circular Economy focused waste management operator	The Nordics	Finland	680	258	Waste Management	Increasing recycling	Separating recyclables from MSW
Suzhou	City with multiple circular economy leaning pilot programmes	China	China	Thousands in the informal sector*	Not available	Waste Management	Resources for manufacturers	Recycling in the presence of the informal sector
Dell	A leading company producer of personal computers	Global	US	101000	51700	IT	Corporate Responsibility and closed-loop value chain	E-waste recycling managed by the producer

\*Based on Fei et al. (2016 p. 76)

**Table 5.5:** *Cases selected for analysis*

UPM is a Finnish forest industry company, with six diversified business groups with operations in, for example, paper products, wood products, energy, label products and bio-composites. The diversified business operations result in various opportunities for operations that according to CE literature could be defined as industrial symbiosis. In the analyzed case, waste from one of the company's business groups is processed into a consumer product by another business group.

Ekokem is a Finnish company operating in the waste management industry. The case is specifically about the company's new business operation that is focused on increasing recycling rates and reducing landfilling and incineration through an eco-village concept, where the company, together with a partner company, processes municipal waste into plastics, metal, recovered fuel (REF), biogas, and heat/electricity.

Suzhou is a major Chinese city located in East China in the Yangtze River Delta region. The focus of the case is on the system that recycles household waste of Suzhou City Area residents into recycled materials. The system is a combination of formal and informal actors, both scrambling for same suppliers of recyclable material and same customers in an environment where regulative support appears to be underdeveloped.

Dell is a large information technology company based in the United States. In 2015, Dell was ranked as the third largest computer equipment company in terms of global sales of personal computers. The focus of the case is on Dell's closed-loop recycling system, which takes in end-of-life computers and processes recycled plastics from them. The recycled plastics is used in Dell's new computers effectively creating a closed-loop recycling system. The recycling system includes multiple partners all of which are important for its operation.

## 5.4 Data gathering

The study uses a combination of primary data and secondary data, with cases from Finland including primary data and cases from elsewhere building on secondary data. While primary data is often seen as the preferred choice, the use of documentation and archival records is a valid method for case studies as well. However, with the use of secondary data as a primary source, raised awareness must be placed on the validation of the data through critical observation and data triangulation. (Yin 2003, p.88) As an example, Rusko (2011) analyzed strategic moves and coopetition in the Finnish forest industry using published historical accounts of the firms studied, newspapers, public material such as annual reports, and archival documents, for example published research reports, thus using solely secondary data to conduct the study. The subject of the study, discussing strategy and coopetition (Rusko 2011, p.315), is closely related to the hypothesized systemic nature of business models to increase circularity of material flows.

The collection of secondary data in addition to primary data provides further validation to both the primary and secondary data in the form of triangulation and in the form of providing additional context and information to the case analysis (Yin 2003, p.34). An example of using secondary data as main body of data, and supporting it with primary data from focused interviews is the study of the business model of Amazon by Ritala et al. (2014). In their study, the primary material was from annual reports and investor relation presentations from the company, news releases, books published by Amazon insiders, Harvard Business School cases, documented interviews from Amazon CEO Jeff Bezos, and journal articles. They argue that using secondary sources has advantages even as the main source of data, as long as the data quality is sufficiently ensured. (Ritala et al. 2014, pp.240–241)

The primary data of this study was collected between June-August 2016 by conducting semi-structured interviews to Finnish companies that operate business models that are perceived to be aligned with the circular economy 3R-principles and the hierarchical circular economy loops. The interviews were based on the components identified in business model literature and discussing them as the themes of the interview. The interview frame was derived from the business model literature following the method illustrated in table 5.6, and further revised with the help of comments from senior researchers. The themes of the questionnaire were shared beforehand to ensure that the interview themes were



relevant to discuss with the interviewee. To ensure the quality of interview documentation the interviews were recorded and transcribed.

Potential drawbacks of using interviews as a source are caused by them being, in the end, verbal reports that suffer from the common problems of bias, poor recall, and inaccurate articulation (Yin 2003, p.92). The approach of triangulating the data collected from interviews with secondary data was taken to address these issues. However, it must be noted that by triangulating the bias problem cannot be fully addressed, as data from other sources can also be affected by the same bias.

The collection of secondary data was conducted in the same timeframe as the collection of primary data. The method of collection was using the news-search engine LexisNexis and documenting the dates of retrieval and the search terms used. The LexisNexis acquired data was then augmented with corporate annual reports, investor relations presentations, news articles from other established sources and product details by companies themselves, similarly to the approach of Ritala et al. (2014) and Rusko (2011).

The use of LexisNexis was identified as a valid source of data as peer-reviewed articles (Zahra & Nielsen 2002; Adams et al. 2009) use it as a data source. It was selected specifically for global news article searching, as many studies focusing on news coverage (Moynihan et al. 2000; Tankard 2001) have used it as a search engine. As the tool for analysis is the business model framework specifically created for this purpose, the secondary data was collected with the purpose of addressing the same subunits of value proposition, value creation & delivery, and value capture, as in the collection of primary data.

The case data for cases UPM and Ekokem is a mix of primary and secondary data. The primary data was collected in a single interview with a representative of the company, in charge of new business ventures for the company. In the interviews, the business model aspects of this case were discussed following the themes derived from literature. The interview was semi-structured in nature, with a focus on the business model, and was approximately an hour in length

Value Proposition		Value Creation and Delivery System				Value Capture	
Offering	Customer	Key activities	Key resources	Position in the value chain	Partner network	Pricing	Revenue Model
• What do we produce	• Who is our customer (segment, type)	• What activity creates the most value (what is the business paid to do)	• What are the core resources that enable the company to stay in business?	• In what part of the value chain is the customer, where are we situated in the customers value chain?	• Who are our key partners in this business?	• What is the pricing based on (e.g. cost-based pricing, value based pricing)?	• Who contributes to the revenue?
• What are the key components of our offering	• What problem do we solve for our customers	• What activities are done to circulate materials	• Which resources enable the circulation of materials?	• Who are our suppliers, where are we in the suppliers value chain?	• Is the circulation of materials systematic in the partner network?	• How does enabling circulation of materials affect our pricing?	• How is the revenue acquired (e.g. 1-time sales, contracts, subscriptions, fees, subsidies)?
• Are landscape factors (regulation, niche players, major competitors) pressuring us to increase/decrease CE aspects in our offering?	• Do we see that landscape factors (regulation, niche players, major competitors) are raising awareness or creating needs of CE aspects (direct or indirect) for our customers?	• Is circulation of materials creating value to our customers or us (how?)	• Does circulation of materials require significantly different resources than our core resources?	• Who drives the circulation of materials?	• Are our partners using circular business models?		• Does the revenue model take into account possible subsidies to our company or our customer
		• Does circulation of materials require significantly different activities than our core activities		• Are there new niche players in our value chain, or the customers perceived value chain?			

**Table 5.6:** *From the business model framework to an interview guide*

In the cases where primary data was collected, it must be notified that most of the data was from the company in question, and as such might be biased. To counter the bias, a combination of triangulation with news articles from other sources as well as critical reading of the source material was conducted. This approach is similar to the one used by Ritala et al. (2014), who studied the business model of Amazon.

The international cases in this thesis are based on secondary data. This approach has before been used, for example, Rusko (2011), who conducted a case study on forest industry in Finland using secondary data. The data collection method for these cases followed the data collection methodology used in the cases where primary data was collected.

The data sources for each case are shown in table 5.7. Primary data for this study was acquired in the two theme interviews for the European cases. The secondary data in terms of news articles and columns was acquired by using the LexisNexis search engine, and additional information about the cases was then acquired from company sources such as the company website. In cases where recent academic research material was available, the academic papers were also used as a secondary source for the cases.

<i>Case</i>	<i>Interviews</i>	<i>News Articles</i>	<i>Columns</i>	<i>Research Articles</i>	<i>Company Releases</i>	<i>Other company material</i>
UPM	1	12	7		98	27
Ekokem	1	12	3	1	35	20
Suzhou		30	8	8	26	19
Dell		22	12	1	2	12

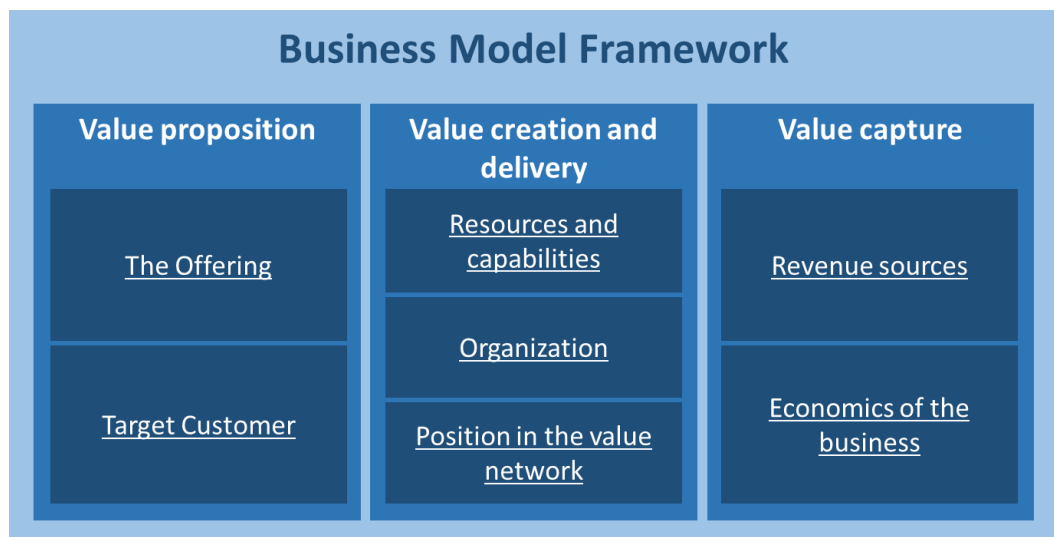
**Table 5.7:** *Number of data sources by type for each case*

## 5.5 Data analysis

The main objective of the thesis is to describe what kinds of business models circular economy driven businesses operates, and how these business models are helping to diffuse the circular economy further. The aim was also to analyze how these business models change based on the institutional landscape of the geographical area in question. The descriptive strategy works well for both of these objectives, as it inherently leads to describing the cases while simultaneously giving an opportunity to identify causal links to further analyze in cross-case analysis (Yin 2003, p.114). Thus for the within-case analysis the strategy of developing case descriptions was chosen. The main tool for illustrating the business model cases to be used was the business model framework generated through a literature review of the business model literature, and modified through reviewing circular economy and institutional theory literature.

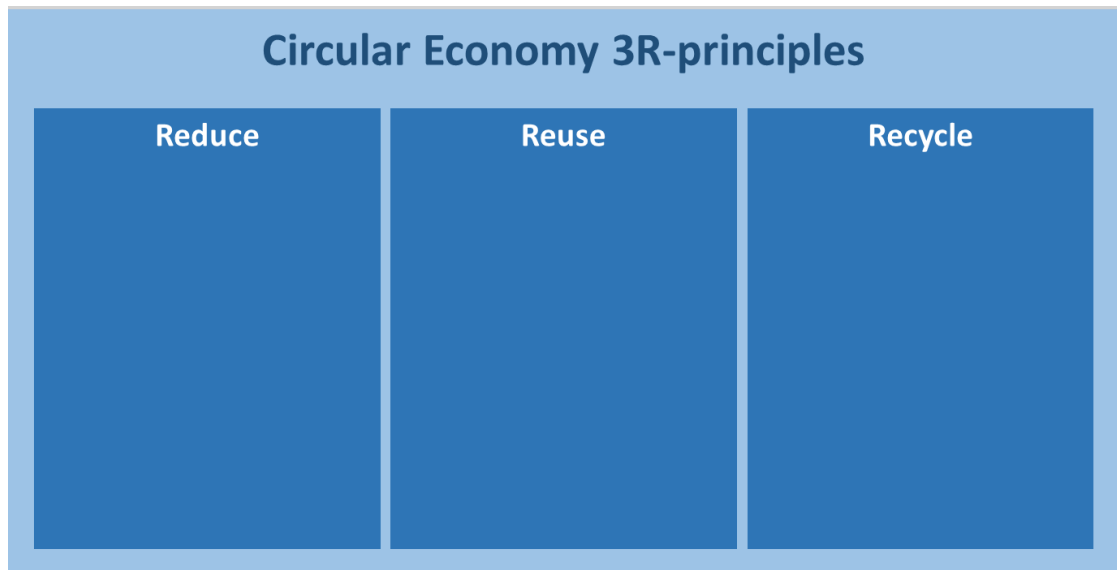
For data management purposes, the secondary data for each separate case was collected into a spreadsheet, which included a link to each piece of secondary data details such as date published, date acquired, search engine used, search terms used, headline, type, and a short summary of the content. The data management spreadsheet was then used to access data and for the creation of the combined data table for the cases. To document how many relevant articles were found per search word documents were used to detail criteria for selection and the ratio of selected pieces of data against those that were not included in to the data.

The framework created from reviewing business model literature functions as the analysis tool for the business model. The framework is shown in table 5.8. In this chapter, the components of the business model and how they appear in the case are discussed. First, the value subcomponents of the value proposition are identified, following with the sub-components of the value creation and delivery system, and finally the value capture sub-components.



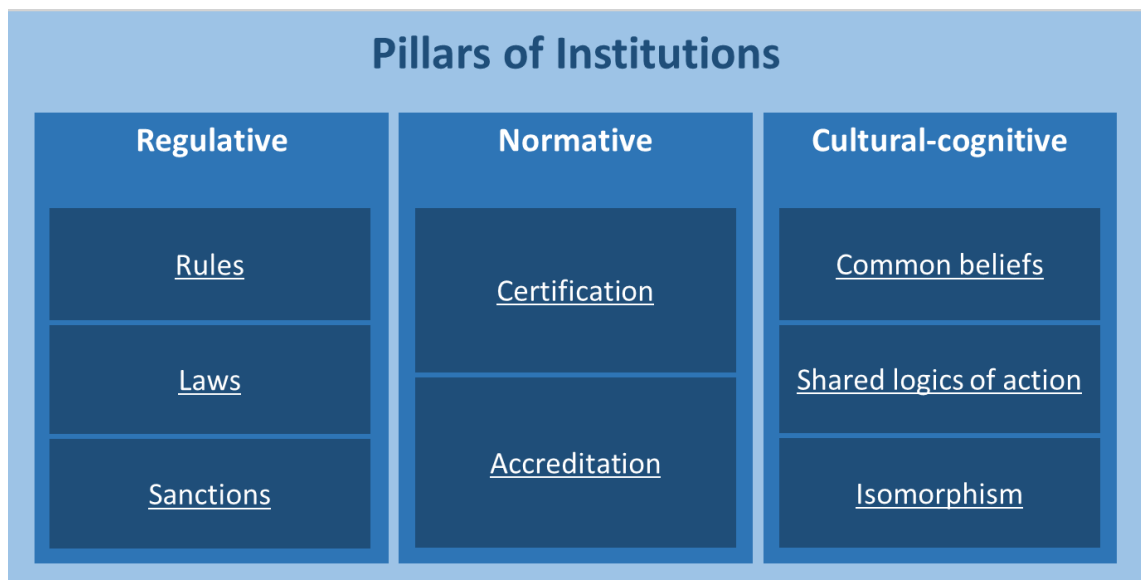
**Table 5.8:** *Business Model Components based on the literature review on business models*

The Circular Economy aspects of the case are analyzed with the 3R-framework, which was identified as the most comprehensive and inclusive framework regarding the circular economy, underlying other frameworks created in that academic domain. The 3R-framework is showcased in table 5.9. To determine how the case is advancing the circular economy, aspects of the case that contribute to the 3R-principles were systematically identified from the collected data.



**Table 5.9:** *Circular economy analysis pane: the 3R principles of CE*

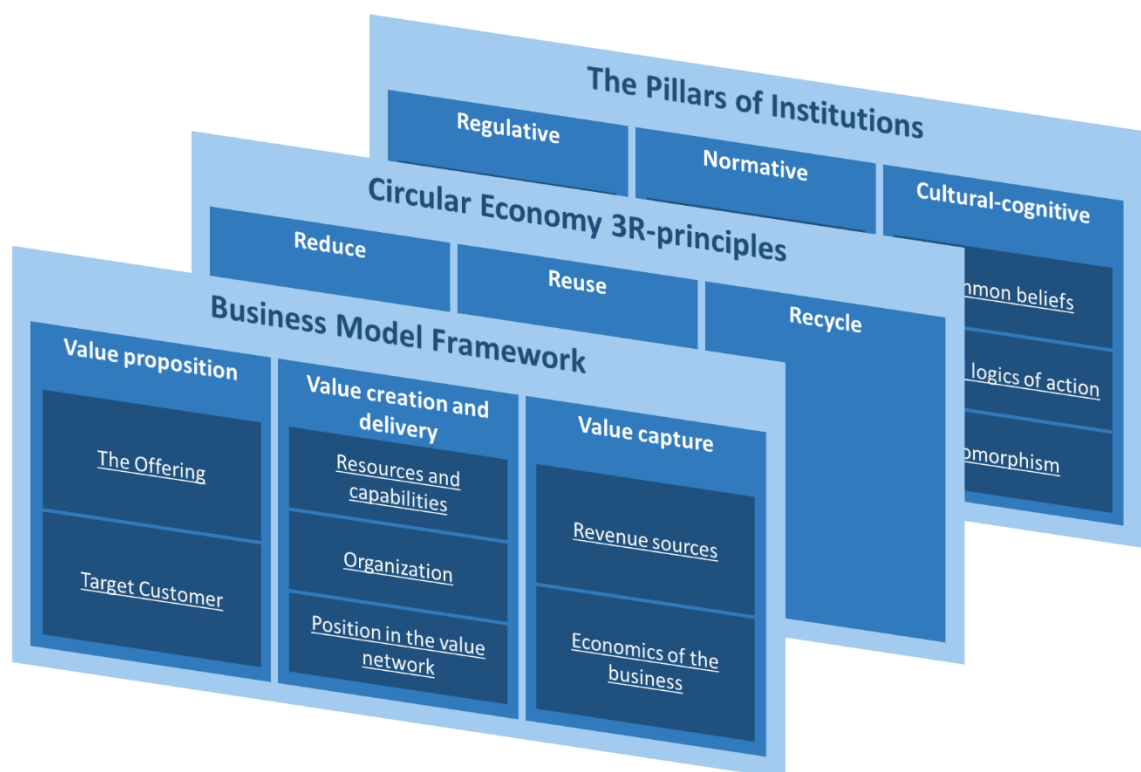
Institutional theory is used as the theoretical framework for analyzing the different geographical markets. Thus, the geographical market analysis is focused on analyzing the institutional landscape, in context of which the business models in each case operate. To analyze the institutional landscape clearly and systematically, the indicators of the three pillars of institutions, the regulative, normative, and cultural-cognitive pillar, are used by systematically identifying them from the case material. The indicators of the pillars of institutions (Scott 2008a) are shown in table 5.10. As the result of analyzing the institutional landscape in this manner, insight into the methods of how the three institutional pillars affect the business model in the institutional landscape, together with how much influence the pillars have, is gained.



**Table 5.10:** *Institutional theory analysis pane: the indicators of the three pillars of institutions*

The within-case analysis is done manually by the researcher by going through the collected data sources line by line and systematically identifying details outlined in the theory-based frameworks illustrated in tables 5.8, 5.9, and 5.10. For example, the UPM ProFi Deck for homeowners is discussed in data point UPM ID 126 with such phrases as “The perfect composite decking should combine high performance with a luxurious look and feel”, and “UMP ProFi’s range of composite decking products has been designed to be ultra-low maintenance”. These are identified as discussing the value proposition due to their nature of discussing what makes the product possibly more valuable than alternative products. As another example regarding institutions, the data point Dell ID 2 discusses that Dell has received a third party certification for their use of recycled plastics: “Dell has secured certification from UL Environment for manufacturing the Optiplex computer with at least 10 percent recycled plastics in the chassis enclosure.” Thus this information is included into analysis as a certification identifier of the normative institutional pillar. Similar efforts are conducted throughout the four cases and throughout the collected data sets.

After systematically going through the different panes of analysis separately, a conclusive view of the relationships between the layers of Institutional Theory, Circular Economy, and the Business Model is put under analysis. This part of the within case analyzed allows for cross-examining over the different theoretical frameworks and how they interact in each case. An illustration of the holistic case analysis framework is shown in table 5.11. The within cases are summarized through this cross-theoretical analysis.



**Table 5.11:** *Illustration of the holistic case analysis framework.*

After conducting within case analysis, a cross-case analysis is conducted to provide answers for the research question of how business model implementations in circular material flows change depending on the geographical market under analysis. Also due to the selection of different types of business models, comparisons can be made between how the business models offer potential to advance the circular economy further by complying with the 3R-principles, and on what scale is it possible in each of the business models.

A major focus in the cross case analysis is to understand the differing boundaries created by the institutional landscape in the selected geographical markets for the identified circular economy aspects and especially the business models. Comparisons of how a certain business model would cope if transferred to another geographical area are made to illustrate the extent of how much the geographical market has to be taken into account in an area as systemic as circular economy. Ideas and business model components between cases are also compared to showcase if a certain business model component is especially relevant for companies that want to operate in a way that complies with the concept of circular economy.

## 6. RESULTS

In this section, the selected cases are analyzed and the results reported. Each of the cases is analyzed by using the business model framework generated through a literature review on business model, circular economy, and institutional theory literature. The case analysis will illustrate the business model of the focal company in the case through the value proposition, value creation & delivery, and value capture methods of each case. In addition, attention is put on to how the business model in the case is enabling the circular economy by analyzing the appearance of the 3R-principles of reduce, reuse, and recycle. To address the market context, the institutional landscape of the cases is analyzed.

The case analysis for each case will proceed as follows. First the background of the case is discussed. In the second section, an analysis of the business model components, value proposition, value creation & delivery, and value capture is done. In the third section the circular economy aspects of the case are analyzed by applying the 3R-principles of reduce, reuse, and recycle to the case. In the seventh section, the institutional landscape effecting the business model is discussed by systematically identifying indicators of the three institutional pillars, regulative, normative, and cultural-cognitive pillar, from the case. In the final section of the case analysis, a summary of the case is given by gathering the central areas of each section into a set of tables and qualitatively analyzing them and their connections to each other.

### 6.1 Case UPM: Industrial symbiosis in the EU

The case of UPM ProFi, where biocomposite deck products are manufactured from label waste generated in another business unit of the company, represents a case of using industrial waste from one operator as a resource for another operator in an industrial system. As such, it fits the description of an industrial symbiosis, which has been discussed as a method of implementing circular economy principles in to an industrial systems operation. Industrial symbioses have been studied in the literature before quite extensively and on a larger scale with a variety of material flows, but in the analysis of those studies, the focus has been mainly on material flows and sustainability rather than on the business model (e.g. Van Berkel et al. 2009; Mathews & Tan 2011; Jacobsen 2006).

#### 6.1.1 Background of the UPM Case

The company in question is an incumbent of the forest industry, and has diversified business operations across product lines such as plywood, pulp & paper, biofuels, water-adhesive labeling products and biocomposites (UPM Annual Report 2015). The efficient use of material side-streams has been a focus of the company for a long time, improving



the material efficiency of the company in total and as such, reducing material costs per unit of value created (interview).

The case was the result of identifying that a waste stream from the company's label business could be used as a material for wood-plastic composites (WPC), which in itself is an emerging business area for the company. The discovery of the material was done in 2005, with a target for the R&D being already at the time the recycling of the waste streams of paper, plastic silicon, and ink that came from the company's self-adhesive label production. The venture was launched in 2007 with the introduction of the new wood plastic composite deck product in various conferences. A Finnish design company collaborated with the company in the design of the original WPC deck product. The ramp up of the production started in 2008, together with the launch of the product to global markets. (UPM 2016 ID 133)

### 6.1.2 UPM: Components of the Business Model

In this section, the business model of the case is systematically analyzed with the business model framework created in chapter 5. In the first part, the value proposition and its components, the customer and the offering, are discussed. Next, the value creation and delivery system including capabilities and resources, the organization, and the position in the value network of the focal firm. In this part, the analysis is expanded to include the actors of the value network that benefit from and enable the business model. In the last section, the focus is on how the focal firm captures the value created by the business model, including the components of revenue sources and the economics of the business.

#### Value proposition

*The offering* of the company in this case can be divided into two different areas. The main focus area in this case study is *the product component, which is a product family of wood plastic composite (WPC) products made partly from recycled label wastes of the company* (UPM 2016, ID 127). The other area is *the service component, which is a waste management service for the customers of the company's label business* (UPM 2013, ID 144). Parts of the waste collected from customers of the waste management service can be used in the production of the WPC products (Interview, UPM 2013 ID 142), and thus the two parts are connected.

*The main customer segments* of the ProFi WPC product line are *individual consumers, professional installers, and architects and designers* who wish to use WPC products in their projects (UPM 2016, ID 124). Consumer customers are the main customer segment (Interview). Based on the material researched for this study, the value proposition for the product line is consistent between the different customer segments, with slight variation on the emphasis of product details.

For the main customer segment, the consumer market, the message is focused on the superior quality of the product when compared with alternative WPC products. On the company's website, the product is said to offer "a closed surface for good stain resistance, the right grades of polymer to achieve good impact resistance, the right proportion of polymer (expensive) and fiber (cheap) for low moisture absorption, good quality colour pigments and UV stabilisers for colour durability, and a textured surface to provide good friction properties, even when wet" (UPM 2016 ID 126). The value communicated to the customer is the durability, low maintenance needs, and ease of installation combined with good aesthetics and looks. The sustainability part of the value for the customer is communicated as ease of disposal for the product, as the product contains no harmful chemicals and can be disposed with regular household waste or recycled as energy through burning. (UPM 2016 ID 126, UPM 2013 ID 131) Thus, the fact that the product is an innovation that is able to close material loops through the use of the company's waste streams is not a main factor in the value proposition to the consumer customer. This was also reflected in the interview with the company representative, who stated that consumers very rarely are willing to pay extra only for the sake of sustainability.

For the professional installer, the value communication of the product itself is similar to the one for the consumer. The value proposition to professional installers is increased with a profession installer programme, an extranet of professionals, and additional information on the care and maintenance needs of the product (UPM 2016, ID 125). These additional services in the offering for professional installers adds trust in the product and can make it easier for installers previously unfamiliar with it to start installations.

*The value of the product line communicated to the architects and designers shows more of the sustainability side of the offering. For this customer segment, the focus is on material innovation, and the fact that over 60% of the raw material in the product can be from recycled self-adhesive label waste is emphasized* (UPM 2016, ID 127). The value of an innovative product for architects and designers in WPC projects can also be seen in the wide range of exhibitions that the product has been featured in, including appearances in Milan (Architectural Record 2010 ID 21), Shanghai (The Herald Tribune 2010 ID 2), New York (Printweek 2008, ID 22), and Miami (Canada NewsWire 2007, ID 27).

*The waste management service's target customer segment is the company's label business customers* (UPM 2013 ID 142&144). For them, *the value is mainly in being able to reduce waste disposal costs*. This reduction of waste disposal costs is a result of reduced amount of waste, as the label waste is being handled by the label manufacturer, together with the logistics of the label waste management (UPM 2015 ID 139, 140). *Additionally, the ability to show corporate social responsibility through the waste management service is quoted as being a large benefit of the service*. The managing director of one of the customers of the service says that "We were pleasantly surprised to learn that the release liner for the labels we use in our production could be transformed into a resource. This is why we chose to sign with UPM Raflatac, becoming one of the first Italian winemakers

to join the RafCycle (the waste management service) project.” (UPM 2013 ID 141). Thus it can be said that while cost reduction is a major component of the value proposition for the waste management service, being able to recycle the waste is a major differentiator from other waste management solutions.

### **Value Creation and Delivery System**

The value creation and delivery discusses about the processes and activities that take place in the business model that turn resources into value for the customer. Although the two sides of the business model, the service and the product, are intertwined in this part of their business model, it is valuable to discuss the systems of each of them separately. This clarifies where value is created for the customers, which is especially important as the customers of the two sides of the business model are different. In the analysis framework, the value creation and delivery system is divided to the subcomponents of resources and capabilities, organization, and position in the value network. In this section, these sub-components will be analyzed with a focus on the WPC product, while taking into account the waste management service as a source of raw material in the form of label waste.

*The main resources and capabilities of the system are the ability to acquire separately collected liner waste for processing, and the process of converting and molding the label wastes into the WPC products.* The ability to acquire liner waste is made possible by two factors. First, the company itself is generating suitable waste in its label manufacturing business, and the recycling of this waste has been one of the main objectives of the development of the WPC product in the first place (UPM 2016 ID 133). The other source of separated liner waste is the waste management service of the company’s label business. Through this service, the company acquires source separated label waste, which is recycled as either paper, WPC products, or energy, depending on the type of label waste (UPM 2013 ID 142,143,144; PackagePrinting 2011 ID 46). The liner business also has a partnership with a recycling company to help collect the waste (ProgressiveMedia 2013 ID12; TendersInfo 2013 ID40).

The converting and molding of label wastes into wpc products takes place in the company’s factories in Germany and Finland. This process involves innovations that improve the product while enabling recycling. The paper label waste contains lignin free cellulose fibres, which have better colour durability than wood fibres, and thus using the waste instead of wood fibres makes the product longer-lasting. The patented manufacturing process also gives the product a closed surface, which offers better stain resistance than traditional wpc decking products. In the process, over 60% of the raw material could be sourced from self-adhesive label waste. (UPM 2016 ID 133)

*From organizational point of view, the two main components act in different business units of the company* (UPM Annual Report 2015). While this could create difficulties, in

this case the collaboration between business units seems to work well, and the waste management service of the label waste business seems to have other business units in addition to the biocomposites unit that they provide waste as a resource as well (UPM 2013 ID 142, 144). While most of the key activities and processes take place in the organization of the company, there are partnerships that act in an important role in the business model. One example is the recycling company partnership of the waste management service (Progressive Media 2013 ID 12, TendersInfo 2013 ID40). The company also relies on distributors to deliver the WPC products to consumers (Interview).

*The position in the value network* is quite different between the waste management service and the wpc product manufacturing. From the perspective of the WPC product, the company is selling a product and thus can be considered as being upstream in the value network, acting as a supplier to consumers, professional installers, and architects and designers, with the help of distributors acting in between (Interview). The waste management service acts as an alternative to the disposal of label waste through e.g. landfilling, and thus could be considered as an alternative to an end-point in the value network (UPM 2013 ID 144, PackagePrinting 2008 ID 29). However, the waste management service simultaneously acts as a supplier for WPC product manufacturing. *Thus in this case, a circular value network is created, enabled by the recycling of label waste.*

### **Value capture**

The value capture component of the business model framework is divided into sub-components of revenue sources and economics of the business. Since both the WPC production and the label business reside in the same company, they are both analyzed for their value capture aspects. However, it must be noted that as the available data for revenue sources and economics of the business was limited, the analysis of the value capture component is done on a general level.

*The revenue sources* of the holistic system when combining the WPC product manufacturing and the waste management service *are the sales of the WPC products, and the fees from the waste management service.* The sales of the WPC product go through distributors, and based on the analysis there are no special details of the revenue acquisition process worth discussion as it is quite straight-forward. From the waste management service, the revenue is gained from the customer of the waste management service, but the way in which this is acquired is not quite clear. What is certain is that the resulting costs for the customer are lower than in the case of disposing the label waste through normal waste management service (UPM 2015 ID 139,140). However, as the waste management service is offered to the customers of the label waste business, the service might act as a value add for the label business contracts, and thus the revenue acquired directly from the service can be small or non-significant (UPM 2013 ID 141). Thus the assumption is made that the sales of WPC products are the main revenue source of the business model.

The basis for the analysis of *the economics of the business* is quite interesting, as a major reason for the WPC products development is the ability to use the waste streams of the company itself as a raw material. Out of the materials of the WPC product, over 60% could be sourced from the self-adhesive label waste, which can be procured from the company's own production and from the customers of the label business unit. Before the development of the WPC product, the label waste in question could not be recycled, but had to be either landfilled or incinerated. (Interview, UPM 2016 ID 133) *Thus in the bigger picture of the company, the WPC product is able to save disposal costs in the company's label business through reduced need for waste disposal, and simultaneously generate revenue from sales of the product.* The value capture effect in this case is a combination of external value capture through sales of the WPC products, and internal value capture through cost savings of waste disposal. However, this requires the WPC products to be sold and the costs of manufacturing the WPC products to be lower than traditional waste disposal.

### 6.1.3 UPM: How the Business Model Embraces Circular Economy?

The analysis of Circular Economy aspects in the case is done by using the 3R-principles of reuse, reduce, and recycle. The system of WPC product manufacturing together with the waste management service for the company's label business is systematically analyzed from the perspective of whether it contributes to reducing waste, to reusing material, components or products in their original use, or to recycling of material. Reducing waste is an indicator of contributing to circular economy through more efficient resource usage. Reuse and recycle-principles contribute to circular economy by increasing the value cycles the material provides before being disposed. In the analysis, the entire life-cycle of the product is taken into account including the potential for recycling the end-of-life products.

The business model is *reducing the amount of waste by turning a major waste stream into a resource for another, completely recyclable product* (Interview). Before the invention of the cases WPC product and the process of manufacturing it from the label waste, the only ways for the disposal of the label waste were incineration or landfilling, with no means of recycling (Interview, UPM 2016 ID 133). Thus the primary way the business model of the WPC product is enabling circular economy is through reducing the amount of waste generated by the company's label manufacturing.

The *recycling* principle is being embraced in multiple ways in the case. The main focus of the analysis is the WPC products, and the manufacturing of the WPC products is creating a recycling cycle for the label waste (UPM 2013 ID 142, 144; PackagePrinting 2008 ID 29; PackagePrinting 2011 ID46). The waste management service for the customers of the label business is also creating routes for recycling for other products that can't be

recycled into the WPC product by recycling other label waste into paper (UPM 2013 ID 142, 144). *As paper the company is a large user of recycled paper, the label waste recycled into paper can potentially enter the recycling loop multiple times.* The paper recycling is also called a closed-loop recycling system by the company (UPM 2016 ID 143), implying multiple recycling cycles.

*In the case of the WPC products, the products themselves are fully recyclable and can be remolded into new WPC products* (Interview). The company recycles waste generated in the manufacturing process into new WPC products, and offers a possibility for large WPC projects where the products are used to gather waste products and extra pieces for recycling into new products. Thus the WPC product also offers potential for a closed loop product (UPM 2016 ID 136). However, unlike paper, which has a good existing infrastructure for recycling in the area, the WPC products are advised to be disposed with normal household waste or incineration, which limits the number of value cycles generated by the products (UPM 2016 ID 126).

#### 6.1.4 UPM: Institutional Landscape of the Business Model

The business model operates in the context of the institutional landscape, which imposes barriers and guidelines to the business. In this chapter, the institutional landscape of the case is analyzed by systematically searching for the indicators of the three pillars of institutions. The regulative pillar's indicators are rules, laws, and sanctions, the normative pillar is indicated by certifications and accreditations, and the cultural-cognitive pillar is indicated by common beliefs, shared logics of action and isomorphism between the actors in the institutional landscape.

##### **Regulative**

The business model is not directly influenced by the regulative pillar in the sense of any regulation enforcing the use of this or similar service on customers. However, the business model is both enabled by the regulation of the geographical market indirectly. The regulative pillar of institution also influences the business model in the form of rules for how the business is allowed to operate.

The indirect effect of regulation on the business model *is the requirement for proper disposal of wastes by the company and the customers of the company's label business.* The proper waste disposal creates costs for the companies, which the use of waste as a resource and the waste management service are able to reduce (UPM 2013 ID 141). If proper waste disposal was not required, the cost reductions from using the label waste as a resource would not exist.

##### **Normative**

Normative institutional pressures are indicated by the environmental and sustainability certifications and sustainability awards received by the WPC product line (UPM 2011 ID 45, UPM 2016 ID 127). *The certifications and awards indicate that sustainability is a valued aspect that can be showcased through certifications.* This can set the end-product apart from other similar products as it is normatively more legitimate than the competition.

Similarly, in the waste management service, where waste is acquired from the customer, *the notion that the waste is being produced into a new product rather than disposed of in another method is a key selling point for the service* (UPM 2013 ID 141), indicating that the normative pillar of institutions is in effect here. Environmental friendliness as a valued trait is the indicator again, similarly to the end-product.

### **Cultural-cognitive**

*The main force behind the business model innovation in the case is the strive the company has for efficient use of waste streams and production's side streams.* According to the interview with a company representative, this is a long-time common practice in the industry. Continuous focus on being able to use these streams to create new products that offer value to the customer have resulted in this business model being born.

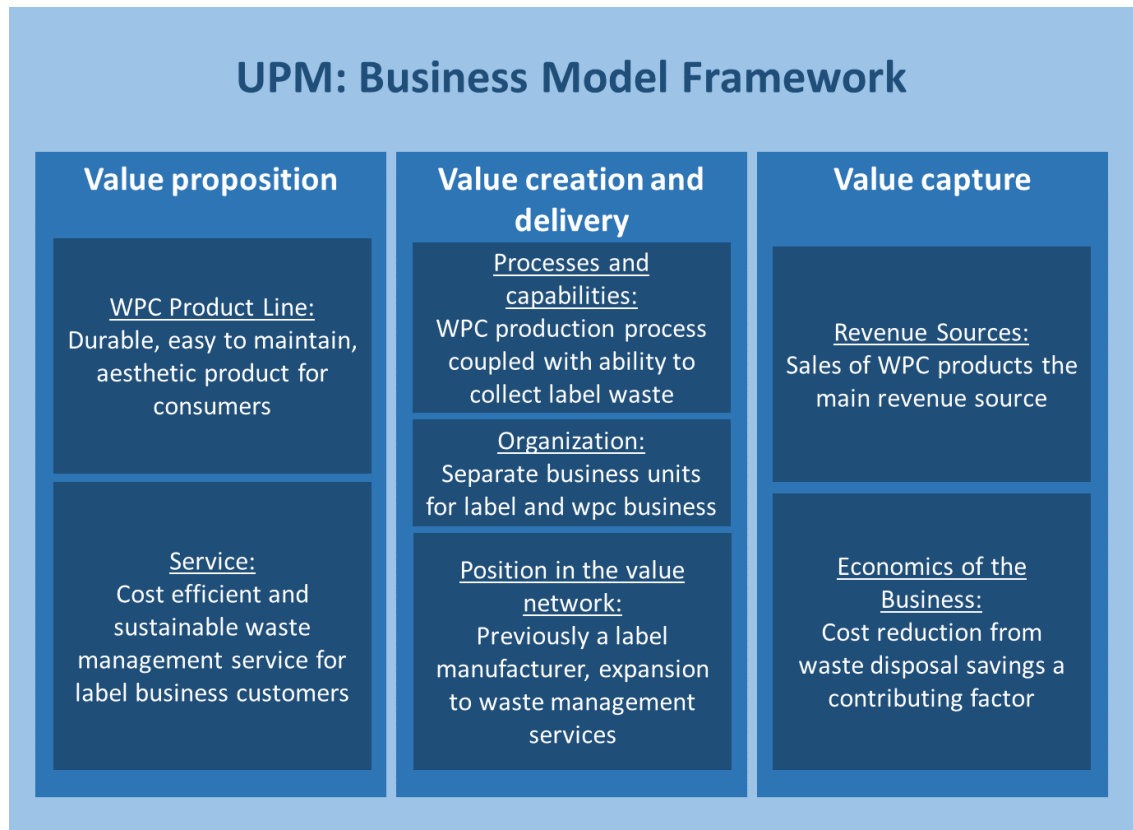
This logic of action is also shared by the customers of the label business. Multiple customers of the waste management service state that the ability to turn waste into a resource and increase resource efficiency are some of their primary goals (UPM 2013 ID 141; UPM 2015 ID 139,140; UPM 2016 ID 138). Thus the cultural-cognitive pillar is also enabling the service component of the business models offering.

Although it seems confusing, being resource efficient is indeed a cultural-cognitive institution in this industry. The notion of it being an institutional effect takes no side on whether the institutional effects are for the better or worse, but the fact that it is confusing to suggest that companies in this industry could strive for less resource efficient operations is a clear indicator of a cultural-cognitive institution and common beliefs being in effect (Scott 2008a).

### **6.1.5 UPM: Impact of the institutional landscape on the Circular Economy Business Model.**

In the previous chapters, the business model, the circular economy aspects, and the institutional landscape of the case were analyzed separately. In this chapter a summary of the case will be done through combining the results of each of the analysis pane together. The context of the institutional landscape the business model operates is a major influence into how the different components of the business model function. Also the Circular Economy principles are contributing factors of the business model. Below in tables 6.1,

6.2, and 6.3, the key findings of the case are showcased in the context of each of the analysis panes.

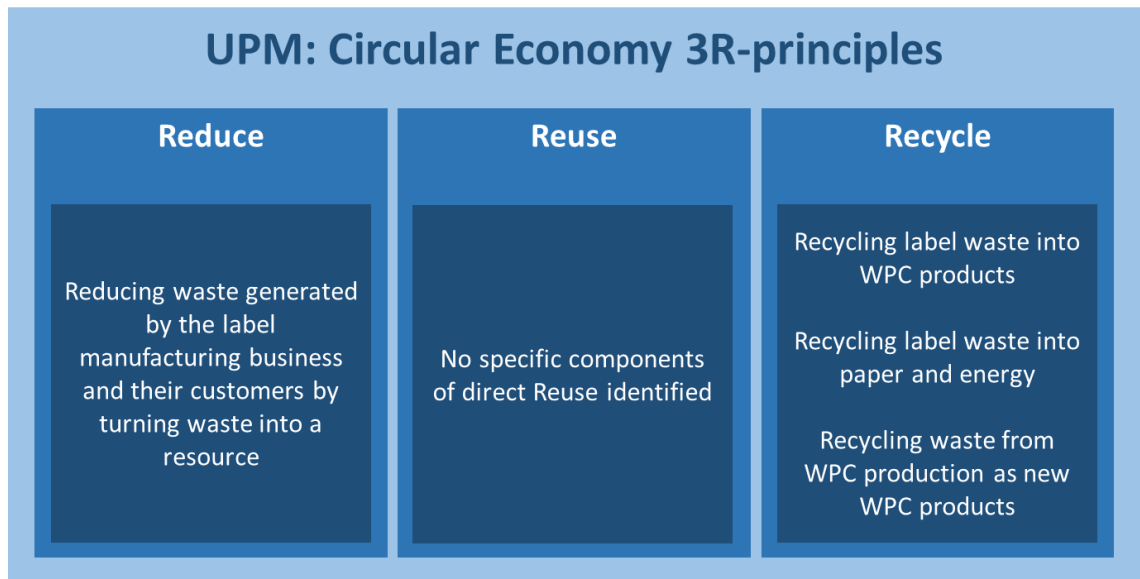


**Table 6.1:** Summary of the main elements of the case in the business model framework.

The institutional landscape appears to be especially influential on the value proposition component of the business model in this case. This is true for both the waste management service and the WPC product. From the perspective of the WPC product, especially the normative pillar of institution influences the perceived value of the product line to customers, and especially customers like architects. The certifications and awards received increase the value proposition of the product by showing that the product is complying with the norms of the institutional landscape, making the product normatively desirable.

While the normative pillar is improving the value proposition of the business model, the main drivers in terms of institutional effects appear to be from the regulative and cultural-cognitive pillars. Both the company and the customers of its label business are focused on improving resource efficiency in the extent that this can be seen as a cultural-cognitive institution. Simultaneously the regulative pillar is imposing costs to other means of waste disposal, further enhancing the need for efficient resource usage while minimizing the amount of waste that needs to be disposed. This interplay of the regulative and cultural-cognitive institutional effects in the institutional landscape have ultimately lead to the creation of the business model.

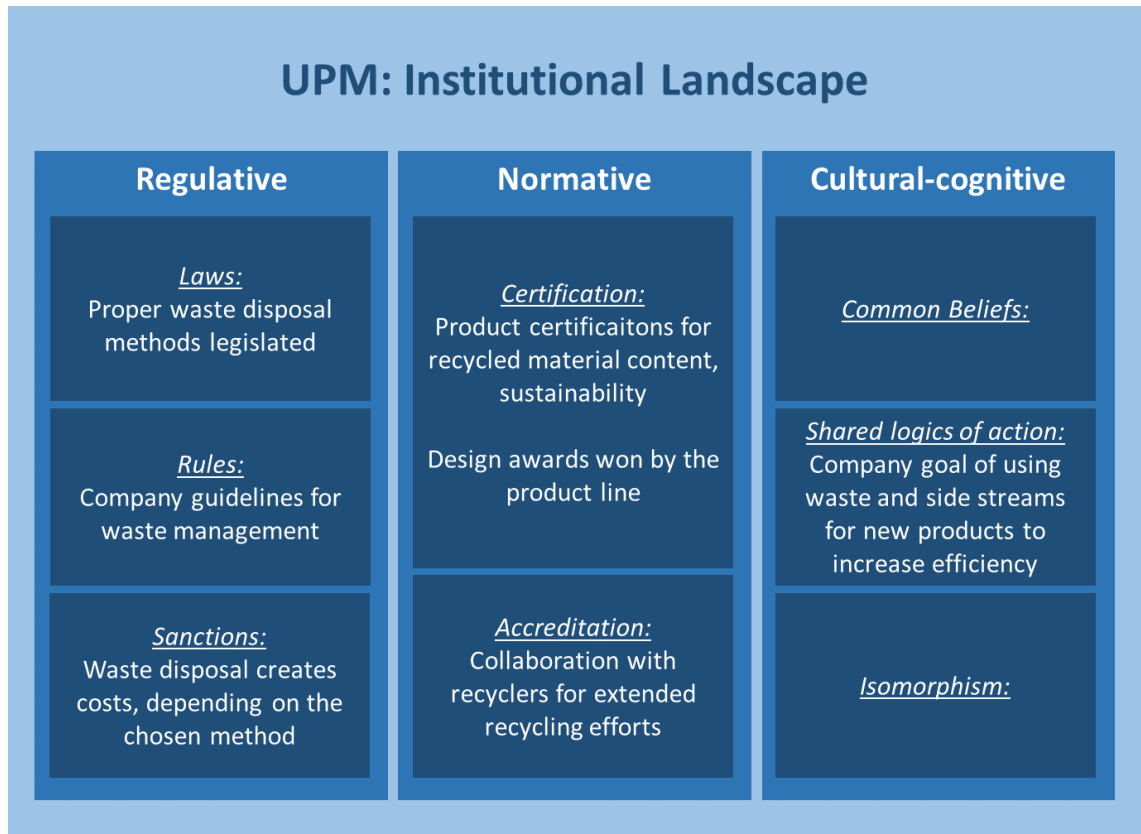




**Table 6.2:** *Summary of the Circular Economy principles embraced in the case.*

As the effects of the institutional landscape can be seen on the value proposition and the drivers of the business model, the Circular Economy is especially visible on the value capture aspect of the business model. As the Circular Economy promotes reducing virgin material usage and increasing value per a unit of material through reducing material usage overall and promoting multiple value cycles for materials, this is not surprising. An important thing to notice is that in this case, the focal firm seems to be able to turn the circular economy principles into value that is captured into the firm by reducing waste disposal costs and selling the WPC products.

In the process of selling WPC products, the company is capturing a new cycle of value from the same materials it used for manufacturing the labels it had previously sold to the customer. This is especially true when the label waste used is procured from the customer through the company's waste management service. In this situation, the label waste has once been a label product for which the company has received revenue from, and is now returned to the company for another round of revenue as a WPC product. Potentially, if the waste management service is generating revenue, that same material is able to generate a third round of revenue in between.



**Table 6.3:** Summary of the institutional landscape of the business model.

One interesting aspect of how the Circular Economy principles become visible in the business model framework is the idea of the focal firm's position in the value network. In a situation where recycling does not take place, the value network is linear and whether an actor is upstream or downstream in the value network can be clearly presented. In this case, the fact that the waste is recycled makes the distinction of a position in the value network more blurred. Just from the perspective of the label business, the company acts both as a supplier of labels, and a waste management service provider. The fact that the label waste is then transferred into another business unit and transformed into a completely different product further complicates the value network, stretching it into new dimensions.

## 6.2 Case Ekokem: Innovative retrieval of resources from MSW

In the Ekokem Circular Economy Village case, mixed waste streams from multiple sources are combined with source separated plastics streams, resulting in a concept that is able to utilize up to 98 % and recycle nearly 50% of the wastes it takes in. The case reflects to an extent a pure recycling case, and shows a waste management industry incumbent has been able to improve recycling rates through a business model consisting of new revenue streams, new partners and new processes.

### 6.2.1 Background of the Ekokem case

The company behind the Circular Economy Village concept is a specialized waste management operator that has recently profiled itself as a circular economy company. Increasing recycling and reuse of materials is high on the company's agenda. At the time of the case study, the Circular Economy Village had only recently started operations. Because of this, much of the information in this case is based on the concept of the eco-village as it is envisioned by the company.

### 6.2.2 Ekokem: Components of the Business Model

In this section, the business model of the case is systematically analyzed with the business model framework presented in chapter 5. In the first part, the value proposition and its components, the customer and the offering, are discussed. Next, the value creation and delivery system including capabilities and resources, the organization, and the position in the value network of the focal firm. In this part, the analysis is expanded to include the actors of the value network that benefit from, and as such, enables the business model. In the last part, the focus is on how the focal firm captures the value created by the business model, including the components of revenue sources and the economics of the business.

#### Value proposition

*The Offering* of the Circular Economy Village case can be roughly divided into two different segments which, a service segment, and a product segment. On the one hand, *the business acts as a waste treatment service*, using the Circular Economy Village's facilities to treat waste collected by their customers, for example nearby municipalities (Interview, Ekokem 2016 ID 43). The waste treatment service has been a business area for the company already before the Circular Economy Village was built, and provides a way for the collectors of waste in the area to legitimately treat the collected waste. The main treatment method before building the Circular Economy Village has been through incineration, turning the waste into energy as electricity and district heating (Interview, Ekokem 2016 ID 43, Projektuutiset 2016 ID 59). Thus a part of the offering has been, and continues to be, sales of energy.

The selling of energy could be considered as a part of the product segment already, but the building of the Circular Economy Village has established the product side as a more tangible part of the business model. With the new business venture, *the company is turning waste it receives into tangible products*, such as granulates of recycled PE and PP plastics, crushed and sorted recycled PET plastics, ready-made profiles from recycled plastics, metals recovered from waste, and recovered fuels (REF) (Interview, Yle 2016 ID 49, Ekokem 2016 ID 46). The waste will also be processed into biogas by a partner operating in the same location (Interview, Yle 2016 ID 49, Gasum 2015 ID 4).

*The Target Customer segments of both of the main offering types of the Circular Economy Village include multiple segments. The waste treatment service receiving waste from waste collectors has customers from waste management companies, such as the collector of municipal waste of the area* (Interview, Yle 2016 ID 49). The Circular Economy Village has the first recycled plastics refinery in Finland (Interview, MTV.fi 2015 ID 51, Ekokem 2016 ID 35), and thus with the new facility, *the company is set to target actors that can provide plastics waste to the plastics refinery as customers of the Circular Economy Village.*

Currently the company has three main types of waste treatment customers that provide plastics. *The organization collecting source separated plastics throughout Finland is utilizing the Circular Economy Village to recycle the plastics* (Yle 2016 ID 49). For this organization, the recycling aspect of the Circular Economy is crucial, as it provides a way for the waste collector to fulfil the implication that source separating plastics waste leads to the circulation of the plastics (Interview). On the waste treatment side, this customer gains the most advantage from the increased capabilities through the new Circular Economy Village.

The other two sources for plastics waste are *mixed municipal waste, and source separated industrial and agricultural waste* (Yle 2016 ID 49). The Chief Executive Officer (CEO) of the partner company that will operate the biorefinery that processes organic waste to biogas is still in construction has said that they are targeting to increase the area from which municipal waste is transported to the Circular Economy Village (Uusiouutiset 2015 ID 48). For the industrial and agricultural actors, the company is creating value for the customers with gate fee pricing that takes into account the plastics quality in addition to transportation and volume (Ekokem 2016 ID 33). Thus actors that produce sufficient quality plastics waste might be able to reduce their waste treatment costs by using the services of the Circular Economy Village. However, as is the case with the other sources of plastics waste, the ability to recycle plastics is communicated as a valuable thing to do for customers (Ekokem 2016 ID 33).

*The product side of selling recycled plastics, metals and recovered fuel (REF) has its target customers in manufacturers and industrial actors that can either use the recycled materials in their manufacturing process, or use the REF as an energy source. The target customers for the recycled plastics products can be divided into customers that further refine and manufacture plastic products using recycled plastics as a material* (Interview, Yle 2016 ID 49, Ekokem 2016 ID 35). For these customers the Circular Economy Village produces recycled plastics granulates. The value proposition for these customers is that using recycled plastics provides material savings compared to using plastics made from virgin materials, while providing similar quality and even added value to the end-product through environmental sustainability (Interview, Ekokem 2016 ID 35). One benefit is also that Ekokem is able to reliably deliver recycled plastics at a volume required by industrial processes, due to the company's reliable supply of waste plastics.

Ekokem also uses a small part of the recycled plastics produced in the Circular Economy Village to manufacture *ready-made plastics profiles*. These are *targeted to construction companies and also consumers*. The plastic profiles can be used to replace wooden and concrete structural elements, and are advertised for use in e.g. terraces, fences, and agricultural buildings. The value proposition of these products is better endurance of moisture and wear compared to wood and concrete. (Ekokem ID 34)

*The separated metals from the waste, and the REF processed from the waste are sold to manufacturing companies, and energy producers, including industrial organizations that produce energy to power own operation.* Based on the studied material and the interview, these are primarily sold with competitive prices compared to virgin material based alternatives. (Interview, Ekokem 2016 ID 41). Thus the value of these parts of the product portfolio of the Circular Economy Village is mainly for the customer to increase cost efficiency while increasing environmental sustainability and increasing systemic material efficiency.

### **Value creation & delivery**

The value creation and delivery system discusses the resources and capabilities, the organization, and the value network of the particular business. Through analyzing these areas, value creation and delivery system showcases how a business creates the value it has communicated to the customers in the value proposition, and how that value is delivered to the customer. In this case, the two sides of the offering, the waste treatment service and the products created from the waste are connected in a way that the value of both sides of the offering are a result of the same system. That system is the Circular Economy Village. Thus, analyzing the value creation and delivery system in this case is done by analyzing each of the system's components in the Circular Economy Village.

*The main resources and capabilities of the Circular Economy Village are the three refineries combined with the ability to gather sufficient volumes of recyclable waste.* The three refineries, the eco-, bio-, and plastics refinery, all have they specific roles in the system, but the main innovation behind the Circular Economy Village is how they work when combined. Only through the combination of all of the facilities can the high utilization rate of up to 98% be achieved. (Interview, Ekokem 2016 ID 6, Yle 2016 ID 49) A key capability of the Circular Economy is also the ability to create customer relationships with companies that can use recycled materials as a resource, since in this case the customers for the products are mainly industrial businesses (Interview).

The Circular Economy Village is able to gather waste that can be recycled through having waste treatment customers that provide both source separated plastics, and mixed waste (YLE 2016 ID 49). The mixed waste in volume terms provides the majority of the waste that can be utilized in the Circular Economy Village, as 100 000 tons of mixed waste is processed annually (Helsingin Sanomat ID 47). The.ecorefinery is the key resource in

turning the mixed waste into valuable resources, as it separates the different recyclable streams of organic waste, plastics, metals, and REF (Ekokem 2016 ID 46). Without the ecorefinery, the separation of plastics and organic waste from mixed waste would not take place (Interview).

The plastics refinery and the biorefinery that complete the Circular Economy Village are crucial for making the concept better at creating value from waste, since they create the recycled plastics and biogas that are then sold to the market. In addition to the plastics separated from the mixed waste by the ecorefinery, the plastics refinery also processes the plastics received through source-separation (Interview, Ekokem ID 46). The combination of plastics from mixed waste and plastics from source separation increases the cost effectiveness of the refinery through increased volumes, and thus allows the recycled plastics created to be competitive with new plastics (Interview).

To create customer relationships for the recycled plastics products, the company has partnered with companies in the plastics industry. For example, a company manufacturing recycled plastic bags has already entered into a contract with the company before the start of the concept. The objective of the company is to attract similar partnerships throughout manufacturers using plastics in their products (Interview)

*The organization of the Circular Economy Village is a combination of multiple companies working in collaboration.* In the Circular Economy Village facility itself, the focal company and a biogas company operate in unison to achieve an economically viable system for recycling. Ekokem, the focal firm and the firm under analysis, operates the ecorefinery, and the plastics refinery, and takes care of receiving the waste and selling products of its two refineries (Interview, Yle 2016 ID 49, Ekokem 2016 ID 46). The other partner company of the concept, the biogas company, receives organic waste from Ekokem's ecorefinery and refines it to biogas and fertilizers.

The *value network* around the Circular Economy Village mostly relies on creating demand for the recycled materials created in the bio- and plastics refineries. Also the fact that all source separated consumer plastic packaging that is collected throughout Finland is contributing to the availability of suitable waste (Yle 2016 ID 49). However, the capabilities of the ecorefinery are significant in reducing the dependence in incoming source separated waste, as it can separate plastics from the mixed waste stream as well. At the time of the case data collection, the plastics refinery is planned to process 20 000 tons of plastics waste annually, of which half will come from the mixed waste stream (Interview, Ekokem 2016 ID 46). In the demand side of recycled plastics, the main product is the granulated recycled plastics, which needs to be created into an end-product by the customer company (Interview, Helsingin Sanomat 2016 ID 47). The plastic profiles created by Ekokem are sold to end-users through a network of distributors (Ekokem 2016 ID 34).

## Value capture

The value capture component includes the revenue sources and the economics of the business model. While the collaboration of the biogas company is central to the Circular Economy Village concept, the value capture analysis will be done from the perspective of the focal firm Ekokem. This way the methods of how the particular company captures value can be identified more clearly. Also, the biorefinery was not in operation when the case study was conducted and thus data for how it would capture value was very limited. Also the value capture analysis is done on a generic level, focusing on methods and relations rather than numerics.

*Revenue sources* for the company come from two sources. The first one and the one that the company has been involved already before the new business model, is the waste treatment service for receiving waste from waste collectors (Interview, Ekokem ID 39). The new source of revenue is the sales of recycled materials produced by the Circular Economy Village (Interview, Helsingin Sanomat 2016 ID 47, Ekokem 2016 ID 38). Both contribute significantly to the ventures overall revenue (interview), and thus the service offering can offer a potentially steadier source of revenue, shielding the venture from volatility in commodity prices.

The waste treatment revenue is collected *through contract and transaction based gate fees for the received waste*. The fee is mostly based on the method of how the waste is transported to the facility, and on the amount of waste (Interview, Ekokem ID 39, Ekokem 33). In the case of plastics waste, the quality of the plastics waste also has an effect on the gatefee, but this appears to only apply to source separated plastics (Ekokem ID 33). The revenue from waste treatment can be seen as fairly stable, as the options for waste treatment are limited.

The revenue from the sales of products on the scale of the potential from the concept is of a new type to the company. *The price of the recycled products is connected to the price of virgin materials on the market, as part of the value proposition of recycled materials for the Circular Economy Villages customers is the potential of material cost reduction from cheaper recycled materials* (Interview, Ekokem 2016 ID 35). If the customers purchase recycled materials only when they are cheaper than virgin materials, the higher boundary of the price of materials is directly bound to the price of virgin materials. Thus compared to the revenue source from the waste treatment service, this revenue source can be more volatile.

How the *economics of the Circular Economy Village* have been achieved is the main innovation behind the entire concept, and a result of the combination of the three refineries into a single co-operating system. The entire system is geared to utilize as much of the waste as possible as valuable resources. (Tekes 2016 ID 54) From the waste stream, up

to 98% can be utilized and turned into a resource for a product or for energy that can be sold onward (Helsingin Sanomat 2016 ID 50, Ekokem 2016 ID 46), creating revenue and contributing to covering the costs of the process together with the waste treatment gate fees. However, it must be noted that the investment of the Circular Economy Village has been a significant 50 million euros in total (Yle 2016 ID 49, Helsingin Sanomat 2016 ID 50), and the new process is substantially more complicated than for e.g. strict incineration of waste (Ekokem 2016 ID 46). Thus the increased revenue from recycled products is required for the concept to be economically viable.

### 6.2.3 Ekokem: How The Business Model Embraces Circular Economy

The focal firm in this case has recently rebranded itself as a circular economy company (US Official News 2016 ID 1). Thus it is very interesting to see how the activities and effects of the firm's circular economy village compares with the 3R-principles that underlie the circular economy concept in the academia. In this section, the Circular Economy Village of Ekokem is systematically analyzed for the contributions it makes to the Circular Economy through the 3R-principles of reuse, reduce and recycle.

From the perspective of *reducing* use of materials, the cases main contribution comes from the sales of recycled materials. If *virgin materials are substituted with recycled materials*, then the Circular Economy Village will be reducing the amount of virgin materials used in its market. This seems to be the case as the value proposition of the recycled plastics produced in the concept include reducing material costs through substitution of virgin materials with recycled ones (Ekokem 2016 ID 38).

Activities that would showcase embracing circular economy through the *reuse-principle* was not identified in the case analysis. The incoming waste is not reused as is, or through refurbishment or similar methods, but rather refined to recycled material or energy. (Interview, Ekokem ID 46) Considering the background of the focal firm as a waste management industry incumbent, this is not especially surprising.

The Circular Economy Village contributes to reducing the leakage of resources through landfilling and incineration by increasing the amount of waste that can be *recycled*. According to the director responsible for new businesses at Ekokem, the recycling rate in Finland is currently 35%. At the Circular Economy Village, the recycling rate reaches 50% for mixed waste. When combined with source separation of waste, a recycling rate of 65% is achieved (Yle 2016 ID 49). Thus the central method of how the *Circular Economy Village is embracing the Circular Economy is through the Recycle –principle*.



#### 6.2.4 Ekokem: Institutional Landscape of the Business Model

The business model operates in the context of the institutional landscape, which imposes barriers and guidelines to the business. In this chapter, the institutional landscape of the case is analyzed by systematically searching for the indicators of the three pillars of institutions. The regulative pillar's indicators are rules, laws, and sanctions, the normative pillar is indicated by certifications and accreditations, and the cultural-cognitive pillar is indicated by common beliefs, shared logics of action and isomorphism between the actors in the institutional landscape.

##### Regulative

In this case, the regulative pillar of institutions can be detected influencing the business. The ones that stand out are the ban of landfilling organic waste in Finland, and the requirements for recycling rates in the directives of the European Union. Both act as in support of the business venture (Interview).

The *Law of banning the landfilling of waste that includes over 10 % organic material* (Valtioneuvosto 2013 ID 72) acts in direct support for the Circular Economy Village, as the refineries can in co-operation separate the organic parts from mixed waste and process the organic waste into biogas (Interview, Ekokem 2016 ID 46). However, the processing of organic waste is only one part of the entire concept, and the one that is being operated by a different company (Ekokem 2016 ID 46). Thus this regulation cannot be seen as the reason that the concept is viable, although it certainly is a contributing factor.

The other contributing regulative institutional factor is *the upcoming EU directive which lists the goals of common EU recycling target of 65% for municipal waste and 75% for packaging waste by 2030* (EU 2016). The Circular Economy Village is contributing to achieving both of these goals by achieving 65% recycling rate for the municipal waste when source separation is taken into account (Ekokem 2016 ID 46, Yle 2016 ID 49).

The Circular Economy Village is also implementing regulative institutional effects by charging a gate fee for waste treatment and basing its pricing on the quality and recyclability of the waste (Ekokem 2015 ID 28, Ekokem 2016 ID 33). Since waste treatment in Finland is necessary by law, these fees and their flexibility based on potential for capturing resources from the waste could be seen as imposing sanctions on less desirable ways of waste treatment.

##### Normative

The normative pillar of institutions is visible in the form of *certifications for the recycled plastics created in the Circular Economy Village* (Ekokem 2016 ID 44). Also the collection and processing of the source separated plastics is an accredited process, so that the plastics truly get recycled when they are source separated by the consumers (Uusiouutiset

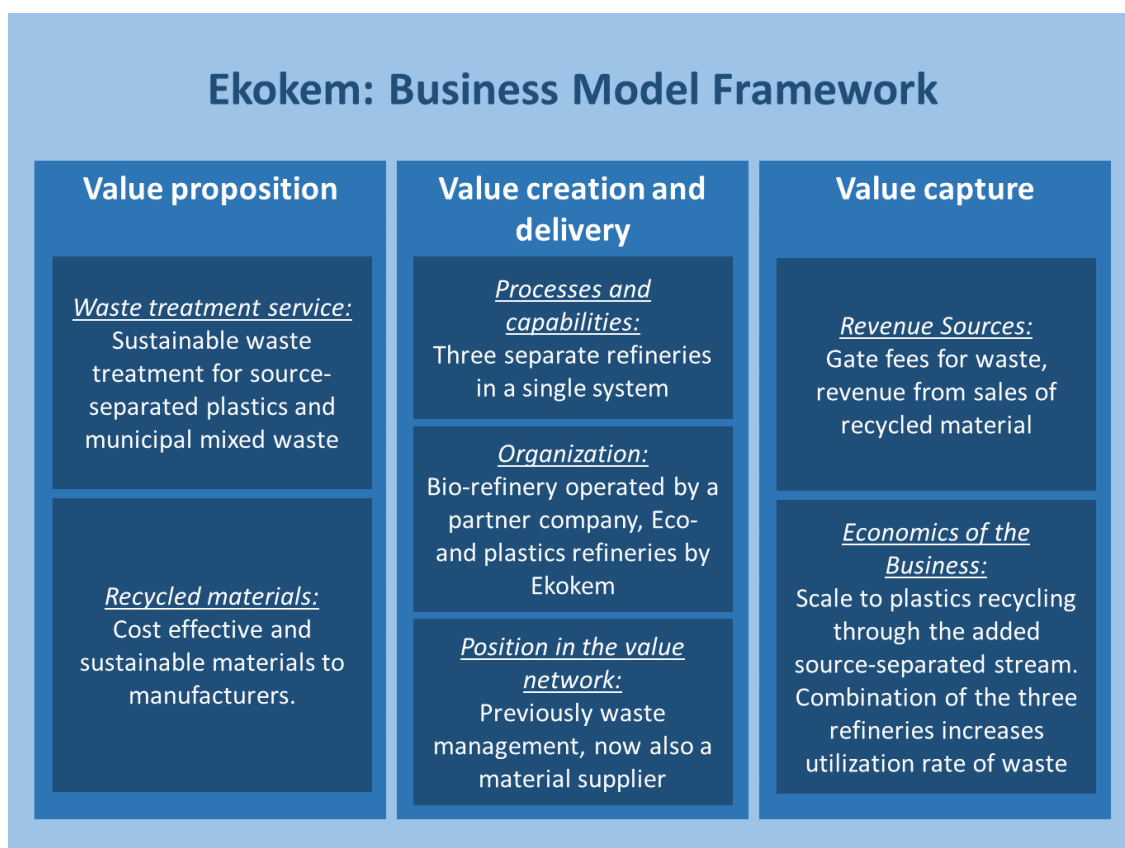
2015 ID 48). Both of these imply that the recycling efforts of the Circular Economy Village and the extended value network are normatively appreciated.

### **Cultural-cognitive**

The cultural-cognitive institutional effects in this case can be identified *in the technologies used and the way how recycling is at the forefront of the method of embracing circular economy*. The technologies that are used in the Circular Economy Village are similar to the ones in use elsewhere in Europe, and the development process for the Circular Economy Village was started with analysis of European facilities that have similar capabilities to the Circular Economy Village. (Tekes 2016 ID 54). Thus *Shared logics of action* have guided the selection of separate processes into the Circular Economy Village. However, the Circular Economy Village as a system is not set up in the same way as the ones elsewhere, as the waste streams are different in quality in Finland, requiring different set up for the system to work (Tekes 2016 ID 54).

### **6.2.5 Ekokem: Impact of the institutional landscape on the Circular Economy Business Model Summary**

In the previous chapters, the business model, the circular economy aspects, and the institutional landscape of the case were analyzed separately. In this chapter a summary of the case will be done through combining the results of each of the analysis pane together. The context of the institutional landscape the business model operates is a major influence into how the different components of the business model function. Also the Circular Economy principles are contributing factors of the business model. Below in tables 6.4, 6.5, and 6.6, the key findings of the case are showcased in the context of each of the analysis panes.



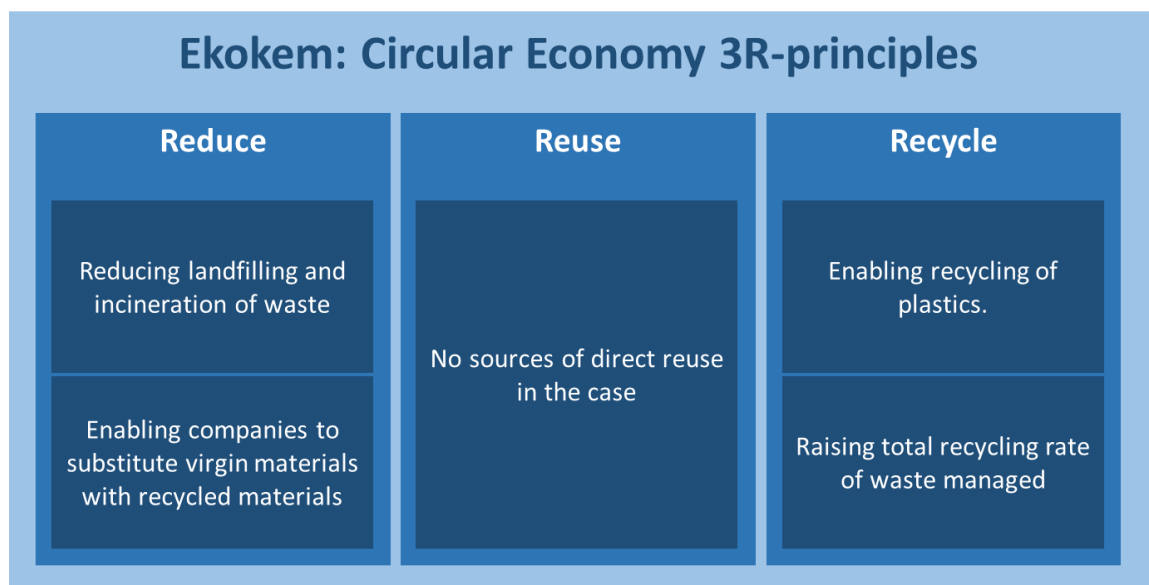
**Table 6.4:** Summary of the main elements of the case in the business model framework

In this case, the institutional landscape seems to have been quite influential through the regulative pillar. Many of the goals that the Circular Economy Village has been set out to accomplish have been derived from laws that have been recently imposed on the industry, or in anticipation of future laws. One example of the regulative institutional influence is the ban on landfilling organic waste (VNa 331/2013) that since January 1<sup>st</sup> 2016 prohibits landfilling of waste when its organic carbon-contentration is over 10% measured with total organic carbon analysis. This has motivated the inclusion of the biorefinery into the concept. The method of the concept is not the only way of complying with the landfill ban, but from a business model perspective it can be more desirable than the alternative. The combination of separating organic waste from mixed waste and feeding it to the bio-refinery acts as an alternative to incineration of the waste, creating more value with a process geared towards recycling.

While the biorefinery of the Circular Economy had an interplay between the benefits from the regulative influences and the added value creation in the business model, the plastics refinery appears to have a more direct need created by the regulative landscape. Collection of source separated plastics packaging started in Finland in 2016, contributing to reaching the requirements for recycling rates by EU directives. As the plastics refinery is the first of its kind in Finland (Ekokem 2015 ID 35), the source separation previously had very limited abilities to actually increase the recycling rate. The meeting need and demand

is visible in the fact that all source separated plastics packaging collected throughout Finland will be processed in the Circular Economy Village, creating a continuous source for recyclable material.

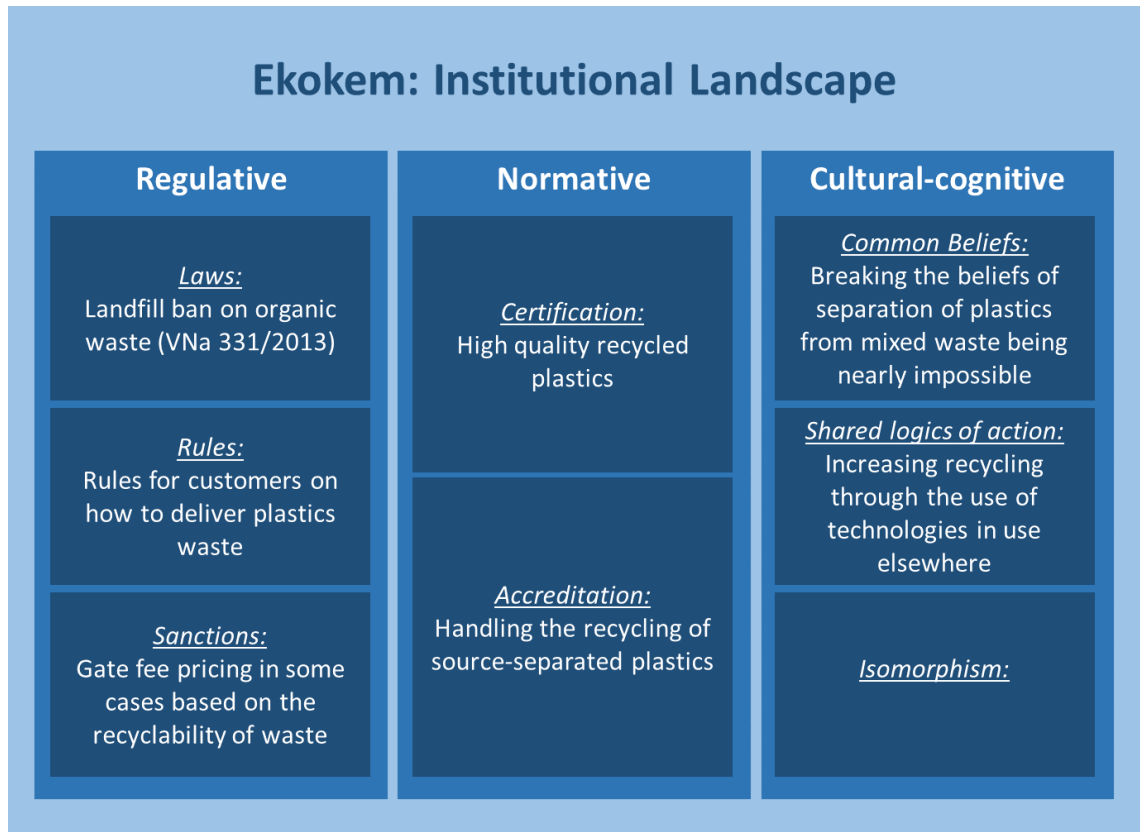
The new plastics refinery has a large impact on the business model, as the company needs to be able to attract customers for recycled materials for manufacturing. While previously, the end-products of the company's waste treatment activities have been energy in some form, the plastics, and also metals from the ecorefinery, create the need for new customer segments, where the company acts as a supplier of materials. In this case, the materials are mostly processed into granulates of recycled plastics, leading to a potential customer base of any company using plastics in their products.



**Table 6.5:** Summary of the Circular Economy principles embraced in the case.

The main goal of the Circular Economy Village is to increase recycling rate for mixed waste, while operating an economically viable business model. The decisions around the selection of processes, refineries, and how they are connected, have been done with this objective in mind. Thus it can be said that the Circular Economy is visible not only in the name of the concept, but also heavily in its goals and operations through the 3R-principle of recycling.

Especially notable in the case is the quality of waste that can be highly utilized. Even when the waste taken in is mixed waste, around 50% of it can be recycled. Thus, from a waste stream that is well available can be effectively recycled. However, the content of mixed waste is an important factor, and the Circular Economy Village has been optimized for the waste streams in the particular area. Thus the value creation component of the Circular Economy Village is in this form tied to the geographical area. The possibility of optimizing a similar concept to another area does exist however, as the company states it is interested in international expansion through this concept (Tekes 2016 ID 54).



**Table 6.6:** Summary of the institutional landscape of the case.

From the Business Model perspective, the case is an example of creating a set of value capture mechanisms to support the increase in recycling capability. An important factor is the ability to capture value through both the waste treatment service and the end-products of the Circular Economy Village. The waste treatment service can be seen as an established source of revenue. The end-products need to compete with commodity prices in the markets, and thus are more suspect to volatility. Overall the business model aims to maximize the value capture from the mixed waste stream, and thus this case is contributing to creating increased economic activity through Circular Economy.

### 6.3 Case Suzhou: Recycling in a developing waste management infrastructure

The Suzhou Case discusses the recycling system of household waste in Suzhou. The recycling system is a combination of informal and formal sectors. The actors in the system acquire recyclables from multiple sources, separates the recyclables from other wastes, and processes the recyclables so that they are usable by the manufacturers in the area. The case shows how recycling efforts work in an environment where the recycling infrastructure is still developing, and the informal sector has a major part in the creation of value through recycling.

### 6.3.1 Background of the Suzhou Case

China is a critical geographical area when considering the circular economy due to it being dominant in the volume of raw material use and waste generation. In 2011, China consumed 25.2 billion tonnes of raw materials, more than the 34 countries of the Organisation for Economic Co-operation and Development (OECD) combined. In 2014, the industrial solid waste generation by China was calculated at 3.2 billion tonnes, of which 2 billion was recovered through reuse, recycling, composting or incineration. To compare, the waste generated by the firms and households in the EU-28 in 2012 was 2.5 billion tonnes, of which 1 billion tonne was recycled or turned into energy. At the same time, fuels and minerals have turned to major imports for China, accounting for 30% of the total cost of all imports in 2012, compared to just 5% in 1990. (Mathews & Tan 2011, pp. 440–441) Thus there is a lot of potential for China to benefit from adopting the Circular Economy.

A big advantage that China has over Western developed countries that could make the closing of material loops more feasible is the fact that more than half of the country's manufacturing activities take place in industrial parks and export processing zones. In these areas, a large number of manufacturing firms from multiple industries are located in a close proximity to each other (Mathews & Tan 2016). China has also capitalized on this advantage by specifically targeting industrial parks with circular transformation initiatives. In the 12th Five-Year Plan of China (2011-2015), the circular economy was set as a national development strategy, and in 2012 the country's planning agency, the National Development and Reform Commission (NDRC) called for 50% of national industrial parks and 30% of provincial ones to complete circular-economy transformation initiatives by 2015, aiming for close to zero discharge of pollutants in these initiatives. (Mathews & Tan 2016)

The successes of these initiatives have had limited effect on the overall environmental sustainability of the countries waste management activities on the residential level (S. Zhang et al. 2016). China has attempted to build a formal recycling system, for example in Suzhou, household solid waste source separation has been provided by Suzhou government since 2000 (Zhang & Wen 2014, p.6446). However also that program remains largely ineffective, as taxes, control of environmental protection and other costs have led to the informal system being more competitive (Fei et al. 2016). In this case, analysis of the business model with the institutional landscape and circular economy principles is conducted to illustrate how the system that recycles household waste operates. During the analysis, specialties regarding the developing waste management infrastructure in the area, and its implications on the business model will be systematically mapped with the analysis frameworks of the business model, 3R-principles, and the pillars of institutions.

### 6.3.2 Suzhou: Components of the Business Model

In this section, the business model of the case is systematically analyzed with the business model framework presented in chapter 5. In this case, the focus is not on a particular company, but rather on the recycling system for household waste in Suzhou. Thus, the role of the focal firm in the business model is fulfilled by the recycling system in this case. In the first part, the value proposition and its components, the customers and the offering, are discussed. Next, the value creation and delivery system including capabilities and resources, the organization, and the position in the value network of the system. In the last part, the focus is on how the actors in the system capture the value created by the business model, including the components of revenue sources and the economics of the business.

#### Value proposition

*The Offering* of the recycling sector in Suzhou is a product-oriented one. While the sector is in essence providing a recycling service, it is difficult to categorize as such as it seems that in the way recycling activities are operated, the provider of the waste is not paying for the service, but is rather receiving payment for the provision of resources in the form of recyclable waste (Fei et al. 2016).

Depending on the manufacturer that the recycled products are sold to, the amount of processing done to the waste differs. Some manufacturers have capabilities to process, for example, waste plastics into plastics that can be used in production by themselves. For these types of customer, the product is in fact separated waste. For some manufacturers, the recycling sector processes the recyclables further, providing raw materials for manufacturing. (Fei et al. 2016)

The system as a whole is entirely geared towards providing recycled materials to local manufacturers. As such, the *Target Customer* of the business model are the local manufacturers that can use recycled materials, mostly plastics, metals, and paper, as materials in their production (Fei et al. 2016). For the manufacturers, the reason they are choosing recycled materials is the cost efficiency from the cheap material source (Someno & Miao 2016) (Someno & Miao 2016).

#### Value creation and delivery

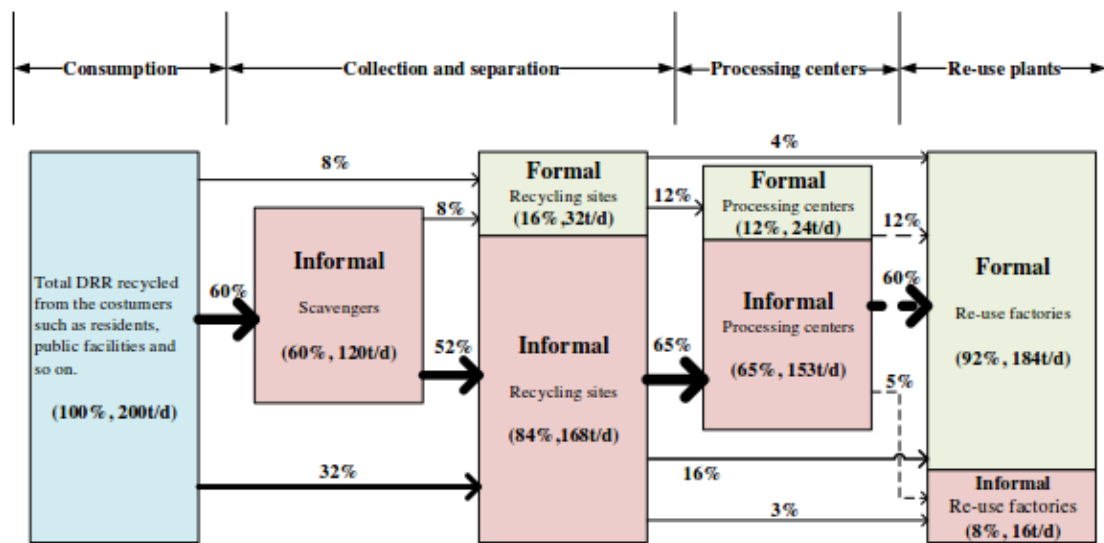
*Resources and capabilities* in use by the recycling sector are in general not advanced. Generally, a majority of the processing of recyclables that happens in the recycling sector, and not by the manufacturers themselves, happens in small family-type businesses with inadequate attention to environmental damage control. (Fei et al. 2016)

*Organization* of the recycling sector in Suzhou is a mix of formal and informal actors. These actors act in a type of symbiosis with little organizational guidance. Main driver

for the operation of the entire system is profit gained by single actors. (Fei et al. 2016) Thus each actor tends to attempt to gain as much profit as possible for their part in the system.

In the larger *value network*, the system is providing cheap materials for manufacturers. Thus while the system acts as a supplier of materials, the value generated by the sector can be seen as being lower than suppliers of virgin materials. Some of the recyclables enter the system from the residents to the area, while a large part of the recyclables is collected and separated from other wastes by scavengers, that are here considered as a part of the recycling sector. (Fei et al. 2016)

In the recycling process, the main proponents are recycling sites, processing centers, and reuse factories. The material flows of the recyclables in the Suzhou system are illustrated in figure 6.7. The recycling sites operate as hubs for the DRR recycling, buying waste materials from scavengers and residents, and sell them onward. If the DRR needs processing, it is sold to processing centers, and in the case of the DRR being good for reusing as is, after some primary sorting, recycling sites also sell the material directly to reuse factories. (Fei et al. 2016, p.77)



**Figure 6.7:** Material flows of domestic recycling resources (DRR) in Suzhou (Fei et al. 2016)

Processing centers engage in sorting and initial processing of the DRR before selling it to reuse factories. In Suzhou, there are nearly one thousand processing centers, however the vast majority of these are focused on processing industrial recycling resources, and only around 20-30 focus on domestic recycling resources (DRR). Most of the processing centers are informal, and those operated by the government do not have essential distinction with the informal ones. (Fei et al. 2016, p.77)



In Suzhou, most of the reuse factories are normal production enterprises using DRR as a part of their raw materials. However, the distinction of formal and informal can be made here, as factories that “were in conformity with the relevant provisions of the country and had the qualifications of the recycling and reuse” were mostly using the paper, metal, and fabric components of the DRR, while other reuse factories, i.e. the informal ones, use most of the plastics due to it only needing melt granulation and injection molding. (Fei et al. 2016, p.77)

### **Value capture**

*Revenue sources* for the sector appear to be entirely from the sales of recyclables and recycled materials. Gate fees do not appear to exist in the system, as even formal actors have difficulties collecting gate fees for recyclables as they carry value that scavengers can capture by selling the recyclables to informal processing sites. (Fei et al. 2016) Thus even the formal sites need to pay for scavengers to acquire waste to recycle.

The dependence on revenues solely from the sales of recycled materials makes the systems income highly dependent on commodity prices for virgin materials. As the only reason for manufacturers to acquire the recycled materials appears to be their cheap prices, the upper bound for the price of recyclables, and thus the entire value capture potential for recycling, is tied to commodity prices.

The inability to collect gate fees, single source of revenue, and dependence on the price of commodities create tough requirements for the *economics of the business* in the system. The actors need to be very cost efficient, as they compete for suppliers of recyclable waste through their ability to pay for recyclables, and for customers in the manufacturing industry through their ability to sell at a cheap price. In this environment, the informal sector appears to have significant advantages over the formal sector.

The processing capabilities of processing sites in the recycling sector do not have a significant enough value for the manufacturers, as the ones that require higher quality can either have their own capabilities for recycling, or use virgin materials in their production. The quality of the recyclables in household waste is also generally poor to start with, making it more difficult to process into higher quality recycled material. (Fei et al. 2016; Gu et al. 2015) Thus informal actors with low technology processing capabilities are able to compete with formal actors with their product.

The informal sector however is acting in ways that could be considered illegal. They do not comply with environmental regulations, avoid taxation by being informal actors, and pay very low wages. This combination creates a significant cost advantage to the informal sector, squeezing the formal sector in to a very tough situation to operate in. (Fei et al. 2016; Someno & Miao 2016) This has led to the majority of the recycled material flowing through the informal sector, as illustrated in Figure 7.7 on page 78.

### 6.3.3 Suzhou: How the Business Model embraces the Circular Economy

The Circular Economy is an officially stated development plan for China, and the country has been embracing it since 2010 (Mathews & Tan 2011). The country has also been building its circular economy initiatives specifically around the 3R-principles of reduce, reuse, and recycle, as the 3R-principle track has been very popular in the nations academic literature about CE (Yuan et al. 2006; Su et al. 2013; Mathews & Tan 2011). As Suzhou is one of the more economically developed cities in the country, the analysis of the 3R-principles when applied to the cities household waste management should showcase 3R-principles.

From the *reduce* principles perspective, the recycling system is reducing the amount of virgin materials used by substituting them with cheap recycled materials. This effect is effectively fulfilled by the manufacturers using the recycled products, but is enabled by the low income recycling system. Based on the need for cost efficiency and the issue of some processing sites running at a loss due to the inability to cover costs with sales of recycled materials (Fei et al. 2016), it is apparent that the manufacturers would opt for virgin materials if recycled materials were not significantly cheaper.

From the perspective of the *reuse* principles, the system is somewhat embracing it through the informal sector. As some products, for example electronics, can be very valuable to the low income individuals as products compared to the recycled materials that can be acquired from them, the lifetime of such products is lengthened through fixing products for reuse (Fei et al. 2016) However, compared to dismantling and recycling, this is rare and not systematic, and mostly the system is contributing to the Circular Economy through the principle of *recycling*.

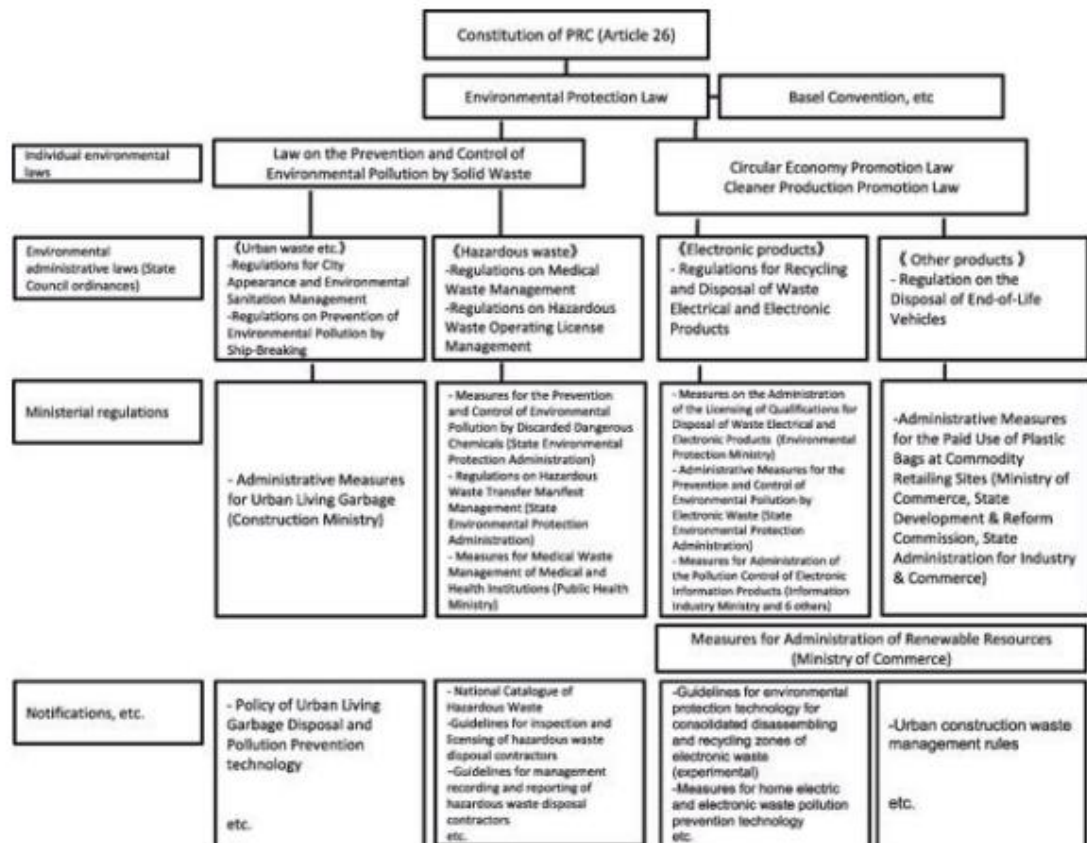
In this case, the main principle through which the Circular Economy is advanced is through *recycling* waste into a resource. A good indicator of this is that the entire system is based on collecting waste, separating recyclables from waste, and processing the recyclables into recycled materials.

### 6.3.4 Suzhou: Institutional Landscape of the Business Model

The business model operates in the context of the institutional landscape, which imposes barriers and guidelines to the business. In this chapter, the institutional landscape of the case is analyzed by systematically searching for the indicators of the three pillars of institutions. The regulative pillar's indicators are rules, laws, and sanctions, the normative pillar is indicated by certifications and accreditations, and the cultural-cognitive pillar is indicated by common beliefs, shared logics of action and isomorphism between the actors in the institutional landscape.

## Regulative

The regulative pillar of this case can be seen as both highly relevant, and irrelevant. On one hand, the country is clearly legislating to advance towards a Circular Economy, and has created many laws that regulate activities of the system under analysis. On the other hand, based on the analysis of the case, the effectiveness of the legislation appears to be low. The structure of the Chinese Circular Economy legislation is shown in Figure 6.8.



**Figure 6.8:** Legal system of the circular economy in China (Someno & Miao 2016, p.138)

Figure 6.8 showcases that the high level legislation for the Circular Economy is taking its place. Examples of these high level laws are Law on the Prevention and Control of Environmental Pollution by Solid Waste passed in 1995, enforced in 1996, and revised in 2004, and the Circular Economy Promotion Law, passed in 2008 and enforced in 2009. However, in China, the areal governments need to legislate accordingly to bring effectiveness to the high level legislation. At this level, there appears to still disconnections between the high level vision and lower level implementation. (Someno & Miao 2016)

The recycling system in Suzhou is split into two types of actors, formal and informal. While the formal actors generally comply with rulings, these rulings appear not to be very strictly enforced, and the governmental oversight over the actors in the system is loose.

Thus, the actual operations of the formal actors are similar to those of the informal actors. (Fei et al. 2016)

Also the sanctioning of those breaking the laws and rules appears to be quite situational, and even while there are sanctions, large illegal waste dumping takes place, even in the vicinity of tourism leaning cities such as Suzhou (China Daily 2016 ID 91, 92). The sanctions landed for the offenses are large for individual actors, but in the grand scheme of things, small for the largest companies that might be involved through intermediaries (China Daily 2016 ID 92).

### **Normative**

Certifications and standards for recycling exist, but they do not seem to carry much value until the system reaches the manufacturing part. There, most of the companies using recycled materials are certified for doing so. However, before that, the informal sector which acts out of the reach of certifications and standards is dominant in the recycling system. This part is also where the residents are in contact with the system. Since the residents are not concerned with how the recycling of waste is done, but rather provide recyclables to the highest bidder in their vicinity, the normative value of recycling with the environmental effects in mind is questionable. (Fei et al. 2016)

### **Cultural-cognitive**

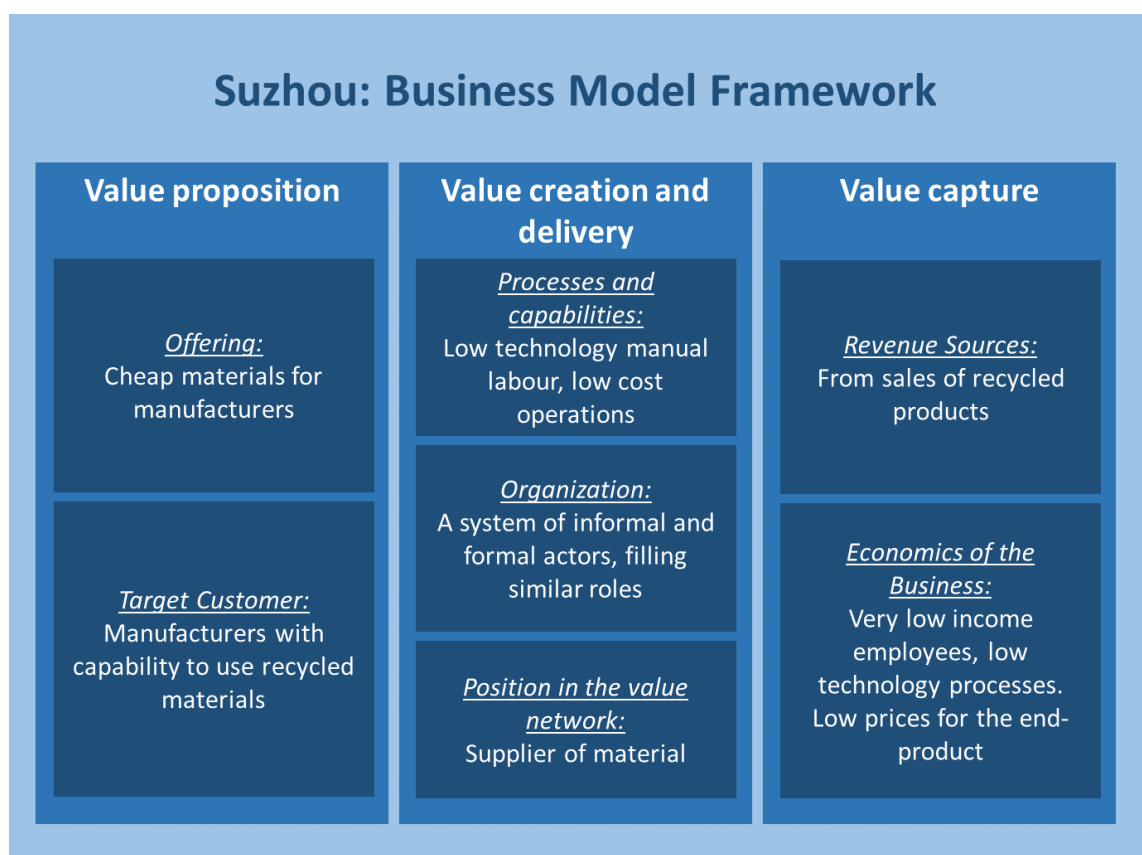
The regulative and normative pillars of institutions both are perceived as being present but with relatively low effect in this case. However, the cultural-cognitive pillar appears to be dominant in the institutional landscape. Many of the actions of the residents and the actors of the recycling system are a result of the cultural-cognitive pillars influence.

The actions of the residents are based on *common beliefs* of how they perceive the waste management system. For example, implementing source separation has been difficult, since while the residents have communicated their willingness to do source-separation, the need of change in behavior has led to low source-separation rates in practice. In addition to inconvenience from the need to change behavior, also the residents believe that source-separation has little actual effect in the total system. (Wen et al. 2015; H. Zhang et al. 2016)

Another cultural-cognitive influence in the institutional landscape of this case is the *shared logics of action* by the informal and formal actors in the system. While the informal sector holds a cost advantage due to it not complying with environmental standards and, e.g. taxation, *the formal actors in the system have very similar methods for their recycling operations*. This is due to the majority of the formal actors actually being former informal actors, that have been reformed by the government. In many cases, the governmental reform has had little effect on the actual operations of the actors. (Fei et al. 2016)

### 6.3.5 Suzhou: Impact of the institutional landscape on the Circular Economy Business Model

In the previous chapters, the business model, the circular economy aspects, and the institutional landscape of the case were analyzed separately. In this chapter a summary of the case will be done through combining the results of each of the analysis pane together. The context of the institutional landscape the business model operates is a major influence into how the different components of the business model function. Also the Circular Economy principles are contributing factors of the business model. Below in tables 6.9, 6.10, and 6.11, the key findings of the case are showcased in the context of each of the analysis panes.

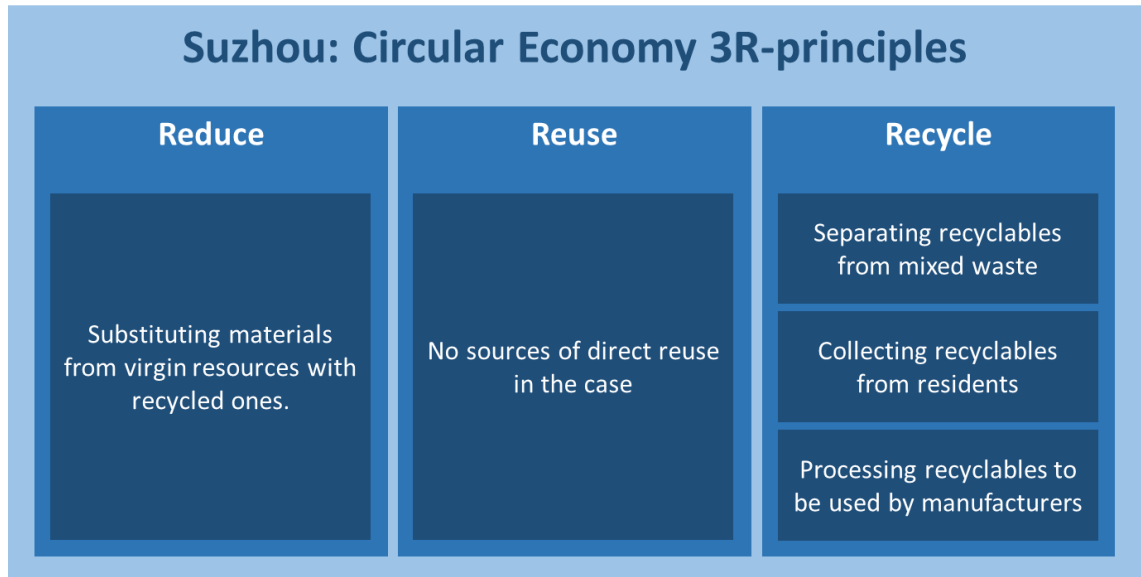


**Table 6.9:** Summary of the main elements of the case in the business model framework

A major influencer by the institutional landscape on the business model of the case is the relative weakness of the institutional pillar compared to the normative and cultural-cognitive pillars. The institutional pillar in Suzhou has laws that are targeting the case situation, but the actors are squeezed if they are to comply with the institutional pillar, as the normative and cultural-cognitive landscape in general is not supporting legal recycling activities.

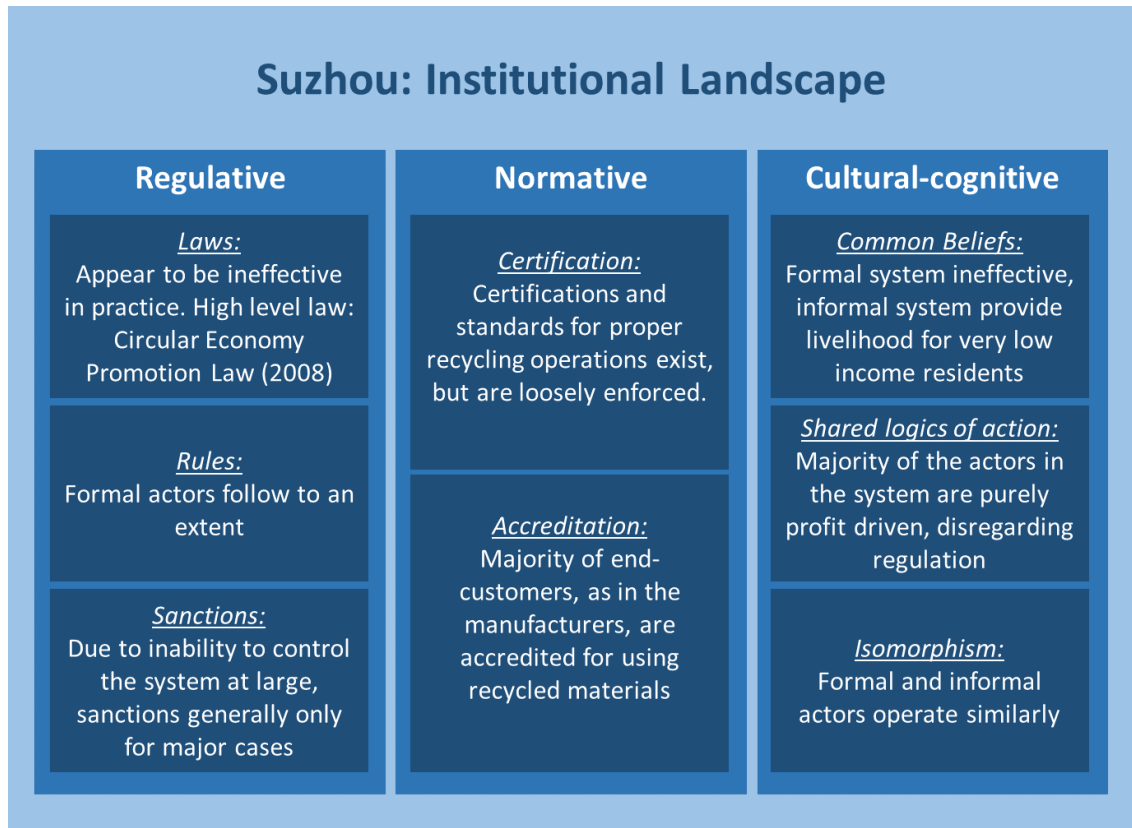
A direct result of the landscape is that the actors operating without environmental responsibility and with disregard to sustainability have an advantage from the business model's

perspective compared to the actors that are complying with sustainability. Due to this, even the formal actors operate similarly to the informal ones, as doing otherwise would mean inability to compete and generate profits even to the extent that is being generated today. The market is basically in a run to the bottom cost efficiency struggle.



**Table 6.10:** *Summary of the Circular Economy principles embraced in the case.*

The resources and capabilities of the actors in the system is very low throughout. Thus improving the capabilities of formal actors could increase their competitiveness through increasing quality and effectiveness of the recycling process. However, as the household waste recycling system is seen as a secondary recycling material source, compared to industrial systems for recycling, the increased quality of the plastics would need to be communicated to the manufacturers. Also, while being based on lots of manual work and low tech processes, the recycling system is effective due to the amount of informal workers that are relying their livelihood on providing the recyclables to the system. These workers are working on extremely low income, and overcoming the cost advantage would require large volume facilities with high uptimes.



**Table 6.11:** *Summary of the institutional landscape of the case.*

While the cost efficiency is important to being able to gain profits from sales to manufacturers, it is also important for being able to acquire recyclables from residents and informal workers into the process. As recyclables are traded as valuables from the beginning, recyclables collected by scavengers go to actors that are able to pay the best price for the recyclables. Thus the cost efficiency is important to being able to operate in the business at all. This also makes it more difficult to achieve the high volume recycle process required to overcome cost advantage of low income manual workers.

## 6.4 Dell

The Dell case discusses the computer and computer equipment manufacturer Dell's initiative to move towards a circular economy model in its business. To achieve this goal, Dell has set up partnerships with recyclers and manufacturers, in addition to setting up a collection network in the United States (the US) for consumers to bring in their used electronics (Dell 2016 ID 31, 34). The focus of this case is on Dell's business model of its retake program, where end-of-life computers are turned into valuable products, including recycled materials through the recyclers and new computers by Dell through its manufacturing partnerships. While Dell operates take-back programs globally, this case is focused on the business model of its closed-loop recycling program in the US.

### 6.4.1 Background of the Dell Case

Dell is a leading manufacturer of personal computers (PCs) and computer equipment based in the US. It is the third largest PC-manufacturer when measured by unit's shipped, with shipments of 10,2 million personal computers in the fourth quarter of 2015, according to technology analyst Gartner Inc. (Plastic News 2016 ID 38). Dell has also been a pioneer in enabling recycling for end-of-life computers and computer equipment. For example, Dell was the first in the PC industry to provide free recycling of computers to consumers, and is now the first in the industry to launch a computer that is made with third-party certified closed-loop recycled plastics (Dell 2016 ID 34). Thus the analysis of Dell's recycling efforts and retake program provides a view into a leading circular economy business model in the much discussed area of e-waste.

Another interesting aspect about the Dell case is the scale of Dell's recycling operations, whether measured by the amount of e-waste collected, or by the amount and type of partnerships. Through a combination of its retake program directed to consumers and similar services for businesses, the company had in 2014 recycled more than 450 million kilograms of computer electronics since 2008. For the consumers, their US take-back program is called Reconnect, in which through their partnership with Goodwill, a US based non-profit organization, the company has over 2000 location in the US that accept end-of-life computers. (US Official News 2014 ID 42) The logistics of the retake program extend to China, where the manufacturing of Dell computers takes place (Dell 2016 ID 34). Thus the case also provides information about a Circular Economy case that is taking place on a large scale and has a global network for recycling.

### 6.4.2 Dell: Components of the Business Model

In this section, the business model of the case is systematically analyzed with the business model framework created in chapter 5. In the first part, the value proposition and its components, the customer and the offering, are discussed. Next, the value creation and delivery system including capabilities and resources, the organization, and the position in the value network of the focal firm. In this part, the analysis is expanded to include the actors of the value network that benefit from and enable the business model. In the last section, the focus is on how the focal firm captures the value created by the business model, including the components of revenue sources and the economics of the business.

#### Value proposition

*The Offering* of Dell's retake program can be divided into three separate areas which are connected in the business model, but are valuable to discuss separately. These are the *products made from closed-loop plastics* captured by the program (EFYtimes 2015 ID 8, The Guardian 2015 ID 5), *the consumer focused Reconnect-program* that offers free recycling of end-of-life products (Pittsburgh Post-Gazette 2014 ID 43, Dell 2016 ID 31),



and *the asset resale and recycling services for businesses* (Dell 2015 ID 21). Thus as a categorization, the business model has two types of offerings, service offerings that help the company capture end-of-life computer electronics from the market, and product offerings that leverage the recycling system in place.

*The products made from recycled materials* are targeted towards *both consumers and businesses*. While the first product made from the recycled plastics sourced by Dell's program was the all-in-one desktop Optiplex 3030 in 2014 (Plastics News 2014 ID 2), the company has since expanded the use of recycled plastics into other products such as flat panel monitors (EFYtimes 2015 ID 8). While these products contain recycled plastics, and the Optiplex 3030 is certified to have more than 10 percent of the product made from closed-loop plastics gathered through Dell's recycling program (The Guardian 2015 ID 5), the value for the customer in the case of these products is communicated to come from performance. In fact, the company acknowledges that while customers do want products that are better for the environment, they do not want to pay more for it, and it should not affect performance. Dell claims that through their program, they are able to do just that. (Dell 2016 ID 34).

*The consumer focused take-back program, called Reconnect*, is targeted to *consumers that have computers in need of disposal*. The program accepts any brand of computer regardless of whether it is in a working condition or not. By leaving their end-of-life computer electronics at a collection location in the Dell Reconnect program, consumers are assured that the computer is refurbished or recycled in a responsible way. The program is operated in partnership with Goodwill, which helps people with disabilities and disadvantages through education and training. One major aspect of the recycling program is also that it is free to consumers (Dell 2016 ID 31). Thus the value for consumers for participating in the program is convenient disposal of old electronics free of charge, while also contributing to the society.

*The Asset Resale and Recycling program is directed to businesses and enterprise customers*. The main values communicated for the customers are Dell's data security practices for wiping data from old hardware, potential for the customer to capture value from the equipment through Dell's resale services, and meeting regulatory guidelines for the removal of IT assets of the company (Dell 2015 ID 23). Thus the business oriented service's main value propositions are better aligned with goals of business continuity and efficiency, rather than environmental aspects. Environmental aspects are mainly communicated as being able to comply with local regulations.

### **Value creation and delivery**

*The main resources and capabilities* that enable the Dell business model of its retake program are *the global large scale personal computer market* (Dell 2016 ID 34), *the partnerships it has with various organizations* from non-profits collecting the computers to

manufacturers that can use the recycled plastics (The Guardian 2015 ID 5, EFTimes 2015 ID 8, US Official News 2014 ID 42, Dell 2016 ID 31, and its *own operations in enterprise asset resale and recycling* (Dell 2015 ID 23). The combination of these enables the value creation and delivery system to leverage a wide market for acquiring suitable waste and selling products made from recycled materials, and to have a cost efficient process of turning the computers that cannot be refurbished into the recycled materials that are then used (Dell 2016 ID 34).

*The large scale personal computer market* means that Dell has a large supply of suitable waste into its retake program that it can then recycle. In collecting suitable waste, Dell has the benefit of *partnering* with a non-profit organization Goodwill that helps to sort the incoming computer equipment before sending it to Dell for recycling (Intelligencer Journal 2012 ID 44). Goodwill has over 2000 locations, spanning 44 states in the US. These locations accept any brand of computers, and these other brands are also delivered into the Dell closed-loop recycling system. Computers that can be refurbished are separated from other equipment, and refurbished and resold by Goodwill. (Plastics News 2016 ID 38). The consumer focused Reconnect program accounts for a little less than half of the overall plastics recycled by Dell in its closed-loop program (US Official News 2014 ID 42).

*The other source of computer equipment for the closed-loop program is Dell's own service of asset resale and recycling for businesses.* These services account for over half of the amount of plastics recycled by the closed-loop program (US Official News 2014 ID 42). Differently from the consumer focused Reconnect program, here Dell operates the collection and separation of assets with resale value itself (Dell 2016 ID 22).

*For the recycling of materials from collected computer equipment that no longer has value for resale, Dell partners with US based recycling companies.* The recycling companies receive the packed computer equipment, disassemble them. After disassembly, the recycling companies separate different recyclables from each other (Dell 2016 ID 26, Plastics News 2016 ID 38). Currently the plastics portion continues in the closed-loop program, while other materials are processed into recycled material and sold by the recycling companies (Plastics News 2016 ID 38).

After the suitable waste plastics have been separated from other waste in Dell's closed loop program, *the processed material is sent to China*, where it is further purified and processed before mixing with plastics from other sources and molded into new parts. Dell uses also other sources of recycled plastics, such as plastics from plastic bottles and CD cases. Currently Dell's products from recycled plastics are 35 % recycled plastics for their plastics content (Dell 2016 ID 34). In its fiscal year 2016 from March 2015 to February 2016, Dell used 6.40 million kilograms of recycled plastics in its products. From that amount, 1.55 million kilograms came from Dell's own closed-loop program, and 4.85

million kilograms came from other sources. (Dell 2016 ID 26). Thus the majority of recycled plastics used by Dell is actually coming from other sources than its own closed-loop system. Notable however is that the usage of other recycled plastics rose by 12,6 percent from 4,31 million to 4,85 million kilograms, while the use of closed-loop recycled plastics rose by 55 percent from 1,00 million to 1,55 million kilograms (Dell 2016 ID 26).

After being molded into new parts, the Dell products are assembled and then shipped to customers. It takes approximately six months for plastics from entering the closed-loop system as an end-of-life computer to being manufactured into a new product (Dell 2016 ID 26). As Dell operates in multiple different customer segments for its computer products, the channels by which the computers are sold to customers differ greatly. Also, as the sales channels are the same as for any other Dell products and do not depend on the product including materials from Dell's closed loop program, the sales channels are not central for the analysis of this case.

From the *organizations* point of view, the Dell case is quite interesting as the system involves many partners in different phases of the closed-loop program. In the collection phase, Dell itself handles business customers (Dell 2015 ID 23), but *the collection of end-of-life computers from consumers is handled by other organizations* such as Goodwill and Staples in the US (Pittsburgh Tribune News 2009 ID 36). In the processing of the computers, *the disassembly of computers and separation of recyclable materials is done by contracted recyclers* in the US (Plastics News 2016 ID 38). After disassembly, the plastics from the disassembled equipment is send to China for further processing done by companies such as Wistron GreenTech (Dell 2016 ID 26, India Retail News 2014 ID 1).

From *the value network* perspective, Dell is in an interesting place in with its closed-loop recycling program. As Dell handles manufacturing through partners and is in control of the closed-loop program, Dell is *effectively turning customers into suppliers of material* for the manufacturing of new products. However, as the closed-loop program involves a step where the plastics separated from the recycled computers go through Dell's material suppliers for further processing and purification (Dell 2016 ID 26), the value network still involves material suppliers to the same extent as without the closed-loop program. Thus the biggest change in the value network in the manufacturing side is the additional stream of separated plastics from the program.

The *value network for the collection of end-of-life computers and turning them into recycled material* is a value network that enables and is set up for the recycling of end-of-life computer by Dell, and thus is very specific to the case. An interesting aspect is that while Dell is controlling its closed-loop program, it has quite clearly had the objective of using it to provide recycle materials for itself, while leaving other possible benefits that are not as central to its own operations to others. Examples of these are that while Goodwill is paid by Dell to receive computers from consumers and package and send forward the non-functioning ones, Goodwill itself sells computers that are turned in in functioning

condition (Public Opinion (Chambersburg, Pennsylvania) 2013 ID 18, Reading Eagle 2012 ID 46). Thus Dell is offering a way for Goodwill to process non-functioning computers without the costs Goodwill would have to carry from doing so otherwise.

### **Value capture**

For Dell, the identified *revenue sources* of the business model of its closed-loop program are *sales of products made with recycled materials* and *the asset resale and recycling service for businesses*. If compared with the situation that the closed-loop program did not exist, the products would still be made as the closed-loop program has not created no products, but only introduced recycled materials to existing product lines (Dell 2016 ID 26, Plastics News 2014 ID 2, Progressive Media 2014 ID 3).

In the asset resale and recycling service, Dell helps business customers resell their functioning equipment forwards, and charges a fee for the service. The majority of the reason for the customer to use Dell's service however appears to be for an optimal renewal of information technology (IT) assets, combined with answering data security concerns and complying with local environmental regulation for the disposal of end of life IT assets. (Dell 2015 ID 23). As the closed-loop program enables Dell to an extent to comply with regulations, the closed loop program is indirectly helping with value capture from the service. However, similarly to the sales of new products, complying with regulations has been done in other ways also before the closed loop program (The Guardian 1996 ID 7).

The more direct value capture mechanism for the case seems to be through the *economics of the business*. By using recycled materials in its products, Dell is able to save material costs, while providing a product with same performance as before. Currently Dell says this cost saving to be nominal, while the company is expecting them to increase as the use of recycled materials and the program are scaled up (Dell 2016 ID 34). The *savings from material costs* is however the only clearly direct value capture mechanism for Dell in this case.

Interestingly, the partners that are collaborating with Dell seem to have more value capture mechanisms, increasing the total value captured by the system. While Dell pays Goodwill to take in and package the end-of-life computer equipment for the closed-loop program, any computers that can be refurbished are then sold by forward by Goodwill (Reading Eagle 2012 ID 45, Pittsburgh Tribune Review 2009 ID 35, Plastics News 2016 ID 38). Thus *the collecting partner is receiving revenue from Dell, and from sales of refurbished computers*. Notable is that the Goodwill organization is a non-profit that uses the revenue acquired from the sales of refurbished computers and from Dell directly to helping employ people with barriers to employment (Plastics News 2016 ID 38).

Another area where a partner of Dell's closed-loop business model is creating value capture opportunities for partnering organizations is when the collected computer equipment is processed further in the US before shipment to China. As Dell currently uses only the

plastics portion of the e-waste collected in its closed-loop program (Plastic News 2016 ID 38), *the recyclers* that process the e-waste in the US by disassembling the equipment and separating different recyclables from each other *receive revenue from Dell for processing the e-waste, and from the sales of recyclables not taken in to the closed-loop program, such as metals.*

### 6.4.3 Dell: How the Business Model embraces the Circular Economy

Dell sites advancing the circular economy as one of its goals, and is involved in multiple circular economy related forums. For example, in 2016 Dell engaged within the IEEE 1680.1 (Revision) standard material group, which is an industry group updating environmental standards for electronic products, promoting “the inclusion of optional closed-loop plastic criteria and post-consumer recycled content criteria.” Dell is also a member of the pre-competitive innovation program CE100 managed by the Ellen MacArthur Foundation, and “has used this platform and others to openly share our insights and advance our belief that there is a great opportunity – both in terms of better economics and reduced externalities – in moving to a circular economy.” (Dell 2016 ID 26 p. 51) Based on these actions it seems clear that Dell is set on advancing the circular economy, and thus it is interesting to see how the closed-loop program fares when analyzed with the framework of the 3R-principles of reduce, reuse, and recycle.

In terms of *reducing* the use of natural resources, Dell’s closed loop program is doing that by *substituting plastics made from virgin resources with recycled plastics*. Currently, in Dell products that use recycled plastics, 35 percent of the plastics content comes from recycled plastics (Plastics News 2016 ID 38). While the majority of the recycled plastics are sourced from other sources than the closed-loop program, the inclusion of plastics from end-of-life computer means that, as the name of the program states, some of the plastics complete a closed loop from an old product to a new product (Dell 2016 ID 34). Thus the closed-loop program is also *helping to reduce e-waste that needs to be disposed with some other method*, such as incineration.

The case also includes aspects that embrace the *reuse principle*. In both the Reconnect service for consumers, operated in partnership with e.g. Goodwill, and Dell’s own asset resale and recycling service, *computer that are no longer of value to the original owner, but are still functional, are refurbished and sold to new customers* (Plastic News 2016 ID 38, Dell 2015 ID 22). This is a good example of the reuse principle in action, as the same product is directly providing the new value cycle without the need to process it back to materials.

The end goal and a large focus for Dell in the closed-loop program is enabling *recycling of end-of-life computer equipment*. Dell’s focus is largely on the recycling of the plastics content of the computers, as that is the material that the company can currently efficiently

use in its manufacturing of new products (Dell 2016 ID 34). Dell itself is not concerned with operating in the recycling business for other materials extracted from the e-waste, such as valuable metals. This is done by the recycling companies Dell has contracted to disassemble and separate the materials suitable for the closed-loop program. (Plastics News 2016 ID 38)

#### 6.4.4 Dell: Institutional landscape of the Business Model

The business model operates in the context of the institutional landscape, which imposes barriers and guidelines to the business. In this chapter, the institutional landscape of the case is analyzed by systematically searching for the indicators of the three pillars of institutions. The regulative pillar's indicators are rules, laws, and sanctions, the normative pillar is indicated by certifications and accreditations, and the cultural-cognitive pillar is indicated by common beliefs, shared logics of action and isomorphism between the actors in the institutional landscape.

##### Regulative

The regulative pillar of institution is very much visible in the case, as many of the different aspects of the business model either help Dell or its customers to *comply with laws on proper disposal of e-waste*. In the US the laws mandating the proper disposal are implemented at state level. Examples of laws mandating proper disposal are Californias Electronic Waste Recycling Act, enacted in 2003, which requires Dell to collect a fee from sold electronics to be used for recycling of the electronics, and the Electronic Products Recycling & Reuse Act of Illinois that requires that manufacturers participate in the management of discarded and unwanted electronic products.

Dell has its own electronics disposition policy, a *ruleset* that strictly defines *how to operate in disposal of electronics*. The policy includes six policies to follow: maximize reuse opportunities, on-board environmental partners providing electronics disposition services, functionally test equipment for reuse, properly manage end-of-life electronics throughout disposition channels, electronic waste is not exported to developing countries, and continually manage Dell disposition channels and communicate our performance. By complying with the policies, Dell is simultaneously complying with the disposal hierarchy of whole system reuse, refurbishment of the whole system, repair, component-level reuse, commodity material reuse and finally disposal. The highest economically feasible alternative is to be chosen as the way of disposition. (Dell 2014 ID 32)

Not a lot of evidence about the sanctions related to the regulative pillar were visible in the case material. An area which could be considered as *a sanction for suboptimal disposal of e-waste by the customers* however can be identified in Dell's asset resale and recycling service. As the customer receives value for assets that can be resold entirely or

partially, Customers that opt in for this service are effectively receiving a discount in the service. (Dell 2015 ID 22)

### **Normative**

The normative pillar of institution is clearly visible in this case, especially through *certifications and awards won by the company following the implementation of the closed loop recycling system*. The most prolific certification in this case is the Underwriters Laboratories (UL) certification of closed-loop plastics for the Dell Optiplex 3030, marking an industry first (Dell 2014 ID 2, Dell 2015 ID 5). The certification for specifically closed-loop sourced plastics in a product signals that not only recycling, but also closing loops and recycling the materials back to their original industry are normatively valued aspects that the business model embraces.

The company has also received multiple awards that further *certify* not only that the closed-loop recycling system is valued, but also the way it is set up. By partnering with the non-profit organization Goodwill for collecting the electronics, Dell is supporting the organization to employ and educate people that have disabilities or other disadvantages for employment. Thus in this case not only is the normative pillar influencing towards more sustainable resource usage, but also to acting in a socially responsible manner supporting those with difficulties.

*Accreditations* are showcased especially in Dell's policies on electronics disposal, that specifically states the proper methods of disposition of electronics in the company's operations (Dell 2014 ID 32). Also the fact that the recycling operations and manufacturing processed are operated by accredited recycling companies shows that there is high normative value on proper management of end-of-life electronics.

### **Cultural-cognitive**

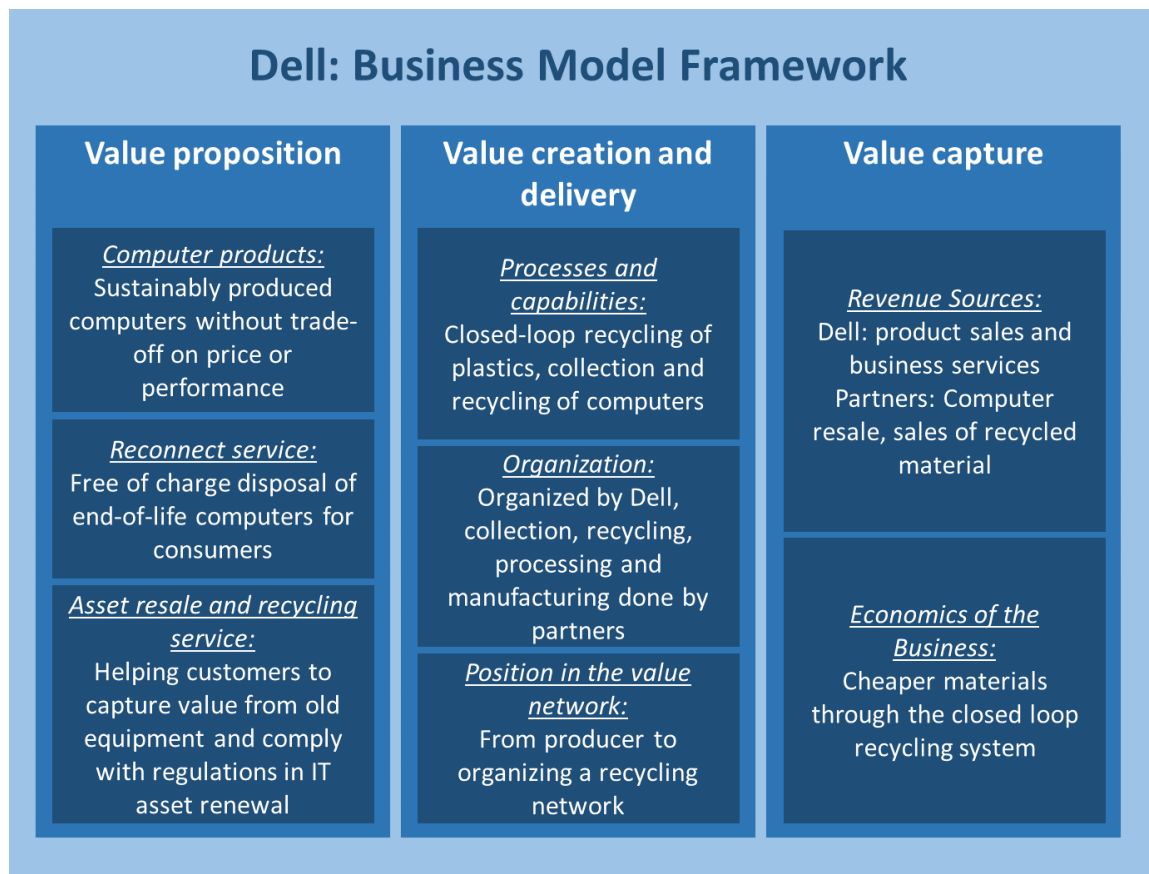
The cultural-cognitive pillar indicators come to light in an interesting way in this case. Rather than following what others in the industry or in the institutional landscape have done, Dell seems to have been a pioneer in multiple fronts. For example, Dell was the first one to introduce free recycling of old computers for consumer customers (Dell 2015 ID 25). Also Dell was the first company in the industry to start using closed-loop recycled plastics in its products, and following that the first in the industry to receive a third party certification for a closed-loop plastics product (Plastics News 2014 ID 2).

Dell has also been pushing other companies for moving to circular economy. Examples of this include Dell's contribution of promoting the inclusion of optional closed-loop plastics and recycled consumer plastics into new standards in industry groups that are negotiating the renewal of those standards. Also through its participation in Ellen MacArthur Foundations CE100 pre-competitive program, Dell is sharing its knowledge and

experience in circular economy business to other companies to accelerate the move to circular economy. (Dell 2016 ID 26 pp 51-53)

#### 6.4.5 Dell: Impact of the institutional landscape on the Circular Economy Business Model

In the previous chapters, the business model, the circular economy aspects, and the institutional landscape of the case were analyzed separately. In this chapter a summary of the case will be done through combining the results of each of the analysis pane together. The context of the institutional landscape the business model operates is a major influence into how the different components of the business model function. Also the Circular Economy principles are contributing factors of the business model. Below in tables 6.12, 6.13, and 6.14, the key findings of the case are showcased in the context of each of the analysis panes.

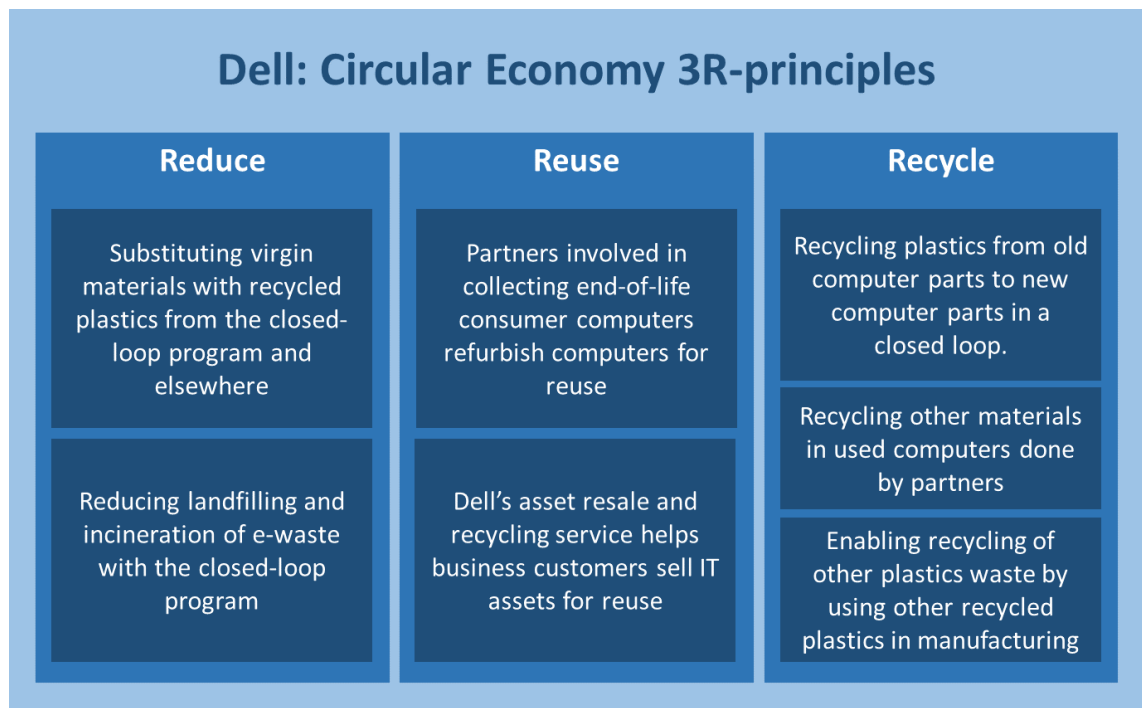


**Table 6.12:** Summary of the main elements of the case in the business model framework

A major motivator for the business model of the closed-loop recycling program appears to be the regulative institutional pillar. Laws practically mandate Dell to organize recycling for old computers. Also consumers and businesses are mandated to dispose their e-waste in a proper manner. However, in this case it seems that Dell is taking the model



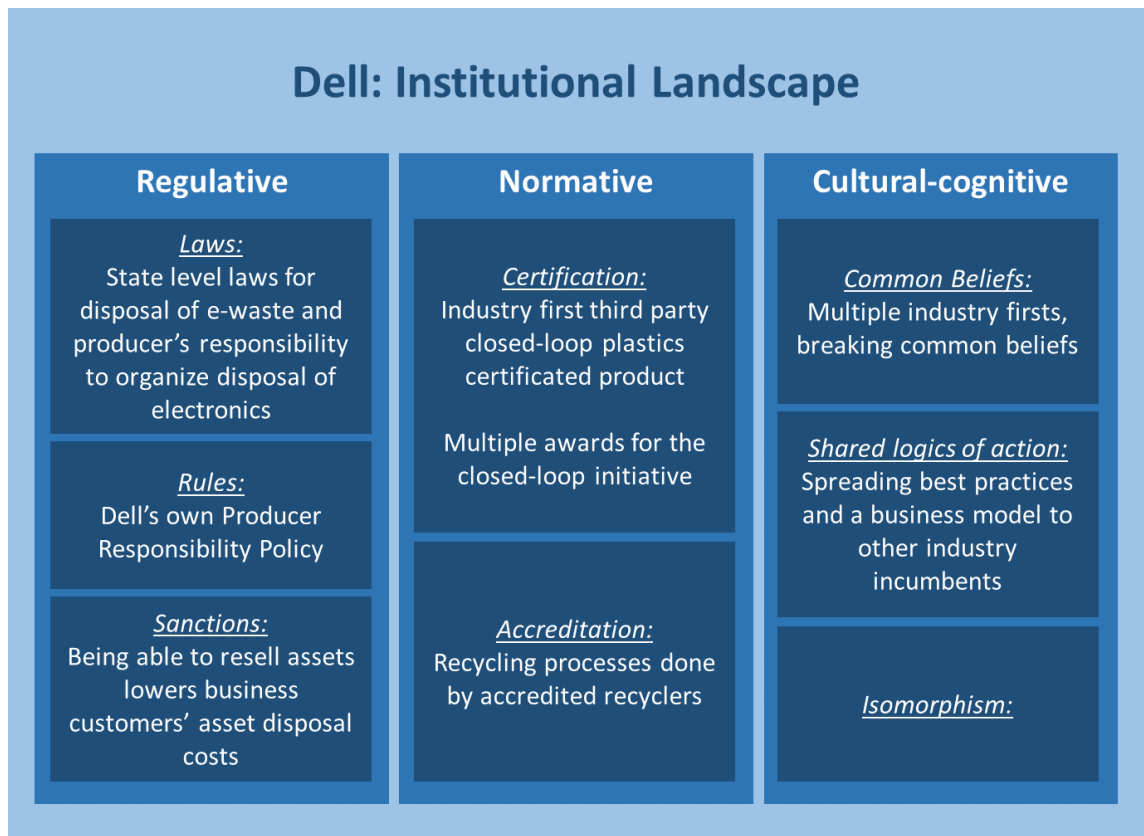
much further than strictly required by legislation, and thus the regulative pillar cannot be the only influence behind the case.



**Table 6.13:** *Summary of the Circular Economy principles embraced in the case.*

The cost savings from the use of recycled plastics from both the closed-loop program and other sources such as plastic bottles is the other driving force behind the business model. The cost savings are contributing to the value capture mechanism of the business model, and are actually the primary method of value capture for Dell in this case. The fact that Dell has been ramping up the program communicates that Dell truly is capturing value through the business model, and believes that scaling up the program will lead to more significant cost savings.

A very interesting aspect of the institutional landscapes influence in this case is that while the regulative and normative institutional pillars are largely aligned with the business model, the cultural-cognitive indicators such as common beliefs and shared logics of action are things that Dell through the business model has set its sights to overcome. By introducing multiple industry first achievements around recycling and circular economy, the company is rather changing the institutional landscape in terms of the cultural-cognitive pillar than being under its influence.



**Table 6.14:** *Summary of the institutional landscape of the case.*

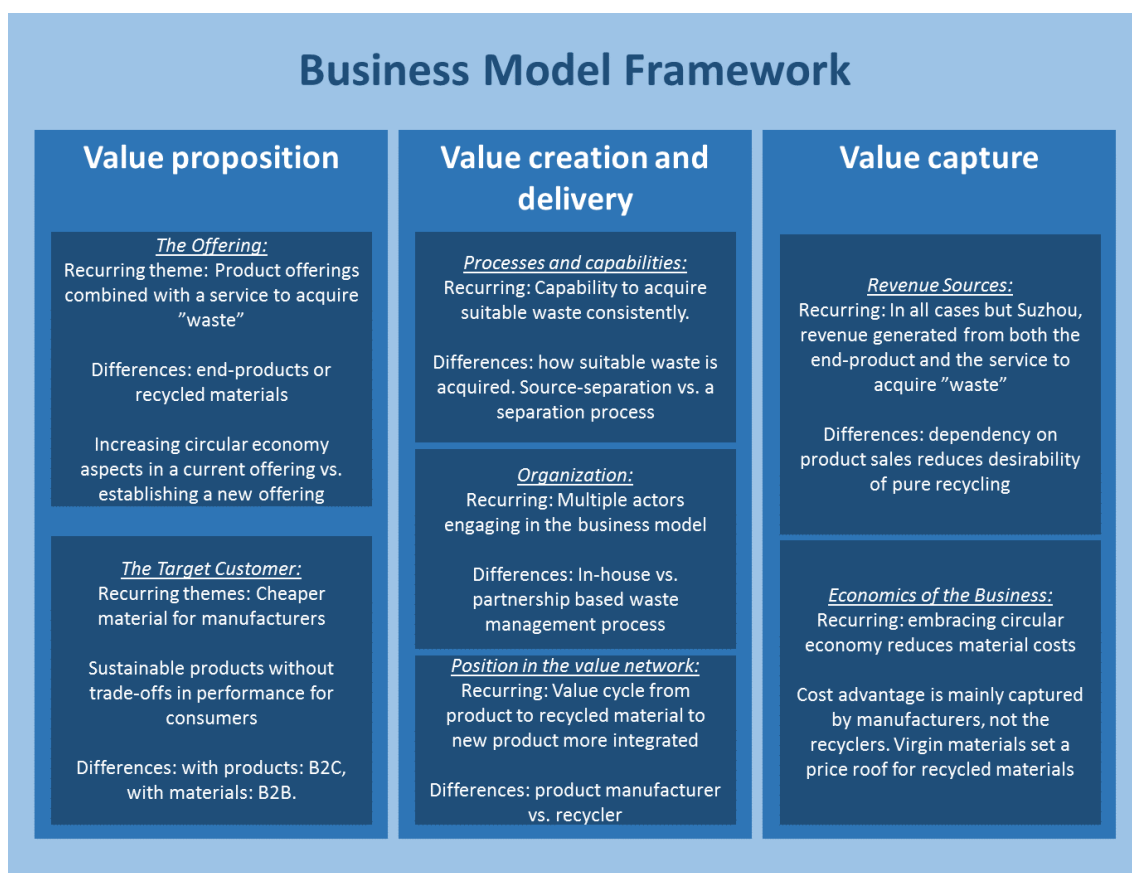
The way that Dell is including its partners into the business model and how those partners are also advancing the circular economy is very interesting. While the business model as a complete system is embracing all of the 3R-principles of circular economy in multiple ways, Dell itself is not responsible for all of them. Rather, the company is collaborating with organizations that share its vision for circular economy, and spreading the benefits between these actors. For example, while Dell itself handles the resale of business customers' IT assets, the resale of computers from consumer customers is handled by the non-profit organization Goodwill. Similarly, other recyclables than the plastics that can be used for manufacturing new Dell products are processed and sold as recycled materials by the recycling companies whose services Dell uses for disassembly of the computer equipment it has collected.

## **7. SUMMING UP THE RESULTS WITH A CROSS-CASE ANALYSIS**

In this chapter, to combine the findings of the four cases, a cross-case analysis is done. The cross-case analysis of the cases will follow similar structure to the within case analyses, but with a different method. While the within case analysis was focused on identifying the different aspect of the business model, its components, how it embraces the circular economy and what is the institutional landscape of the business model like, the cross case analysis will focus on identifying patterns in these identified details of the cases. In the first section, the business model components will be discussed component by component. After this, the appearance of the 3R-principles in the cases is analyzed. In the third section of the cross-case analysis the institutional landscapes of the cases are compared. In the final section, the insights gained from analyzing the different areas with a perspective of how the areas are connected are discussed.

### **7.1 Patterns in Business Model Components of the Circular Economy Cases**

This section focuses on the business model analyses of the different cases. The method of analysis is to compare patterns across cases for each of the sub-components in the business model framework used for the within case analyses. The emerging similarities and differences between cases are identified and discussed primarily from the business model perspective. The main patterns identified are shown in Table 7.1, with further discussion of each in the value proposition, value creation and delivery, and value capture sections providing more information about the patterns.



**Table 7.1:** Cross-case patterns of the implementation of the business model components in the cases.

### Value proposition

The recurring pattern over the cases for *the offering* sub-component is that in three of the four cases, *the offering of the business model is a combination of a product oriented component, and a service oriented component*. This occurs in the Ekokem, Dell, and UPM cases. What is also notable is that in each of these cases, *the service oriented offering component enabling the focal firm to acquire waste that it can then use towards the product oriented offering component*.

In case Ekokem, the company operates a waste disposal service that takes in, for example, mixed municipal waste from the region, and source-separated plastics packaging waste. In return, the company collects a gate fee. In case UPM, another business unit, the firm's liner business, has a service offering for the collection of liner waste. The suitable parts of the liner waste are then transported to UPM facilities that produce wood-plastic composite products using the liner waste as a resource. In case Dell, the company itself operates an asset resale and recycling service, which helps companies resell and recycle their old IT equipment. Equipment that does not have resale value enters Dell's recycling system, and can be used as recycled plastics in Dell's new products.

However, in case Suzhou, this type of two-sided offering does not appear. Rather, the actors processing the recyclable wastes are paying for the recyclables, as the recyclables in that case are treated as valuables from the start. As the recyclers pay for the material, the activity of acquiring suitable waste for recycling in that case fits poorly as an offering component in the business model.

Another aspect of *the offering component* worthy of discussion is whether embracing circular economy required a new product offering. Based on these cases *the results are mixed*, as in cases Ekokem and UPM, the companies have established new product offerings to embrace circular economy. Ekokem through the CIRCO™ recycled plastics granulates and products, and UPM through the ProFi wood-plastic composites. However, in case Dell, the company is implementing circular economy principles directly to current product offerings by increasing the use of recycled plastics, and especially closed-loop plastics sourced from its own recycling system.

In the analyzed cases, two main types of product offerings appear. Either the product offering is focused on *providing recycled materials to manufacturers*, or on *creating sustainable products to end-users*. The Ekokem and Suzhou cases are of the former recycled materials type, and Dell and UPM of the latter sustainable end-products type. While intuitive, it is worthy of noticing that when the actors core business is in the domain of waste management, the offering appears to lean to providing recycled materials to manufacturers. Similarly, companies that are familiar to manufacturing end-products do not move to offering recycled materials to manufacturers, but are focused on creating end-products from the waste themselves.

What also differentiates the two types of product offerings from each other is what the value to the customer appears to be. With recycled materials to manufacturers, the value for customers in both Ekokem and Suzhou cases is that recycled materials offer a cheaper alternative to virgin materials. However, in the end-product type of product offering, no claim of being a cheaper alternative due to using recycled materials appears. Actually, for example in the Dell case, the fact that the end-products use recycled materials and thus are more sustainable than alternatives without being more expensive is the value. This dynamic is interesting, as it seems that for the end-product manufacturers, if they in fact are able to realize cost reductions from using recycled materials, selling products made from recycled materials is purely more profitable, and would not need to be rationalized through sustainability. If customers were willing to pay extra for sustainability, using recycled materials would be even more desirable for manufacturers.

From the perspective of the companies of which the product offering is focused on providing recycled materials for manufacturers, the requirement for the material to be cheaper is creating pressure as the companies need to directly compete with commodity prices. The value of being cheaper than virgin materials creates a roof price for the product that is out of the companies, or even the industries control. Thus the companies with a recycled

material product offering appears are in a way in a more difficult position than the companies with an end-product focused product offering.

### **Value creation and delivery**

The most apparent capability that is visible in all of the cases is the *capability to acquire suitable waste*. However, the method of how this is done varies. In the Ekokem, Dell, and UPM cases, the acquisition capability was a very integral part of the business model, *done through a service oriented offering component*. Dell and UPM both target acquiring closed-loop type of waste, recapturing waste that is of their own products origin back to the company. A benefit of this is that, e.g. the company has an understanding of what is in the waste, as opposed to if the acquired waste was mixed waste. In case Ekokem, part of the acquired waste was from a nationwide collection network of source-separated consumer plastics packaging waste. In that case, the company is also able to separate recyclables mechanically from mixed waste. Both of these waste streams are however collected through a service oriented offering component. In Suzhou case, recyclables are traded as valuables, and actors in the system processing recyclables into recycle material need to purchase the recyclables. Thus for the capability of Suzhou cases actors to acquire waste, ability to pay for recyclables is required.

Otherwise from the capability to acquire suitable waste, the cases are quite different from the value creation and delivery perspective. All of the business models do have resources and capabilities to recycle waste into a recycled material. However, whether the business model has resources and capabilities for example to turn the recycle materials into end-products, or embrace other loops of circular economy, e.g. reuse or remanufacturing, seems to highlight the importance of the *organization, and the value network of the business model*.

Especially in the Dell case it is apparent that for the system to work, partnerships are required. Dell is mostly an organizer in the system, while tasks such as collecting e-waste from consumers, disassembling the equipment, separating different recyclables, processing plastics waste into recycled material, and manufacturing are all done by partners. Also in the UPM and Ekokem cases, while the outsourcing of activities to partners is not nearly as extensive many processes are done by partners. Thus the *capability to create effective partnerships* appears as an important aspect for a business model in a circular economy.

*Position in the value network* is an interesting component in these business models. This is visible in the UPM, Ekokem, and Dell cases. The companies in these cases have both a *product and a service oriented offering component*. The two are *connected through turning the waste received through the service offering into the product offering*. Thus the companies act both as a waste disposal service, and a material supplier. In the cases of UPM and Dell, this aspect is highlighted even more as the company acts as the waste

## Value capture

*The combination of a service aspect and a product aspect of the offering*, both of which are also bringing in revenue for the company, are a recurring theme for the *revenue sources* of the business model cases. The significance of the service offering revenue varies, for example in the Ekokem case the service offering provides a significant source of revenue for the business venture itself, while in the UPM case the revenue for the service is directed to a different business unit than that of the product offering.

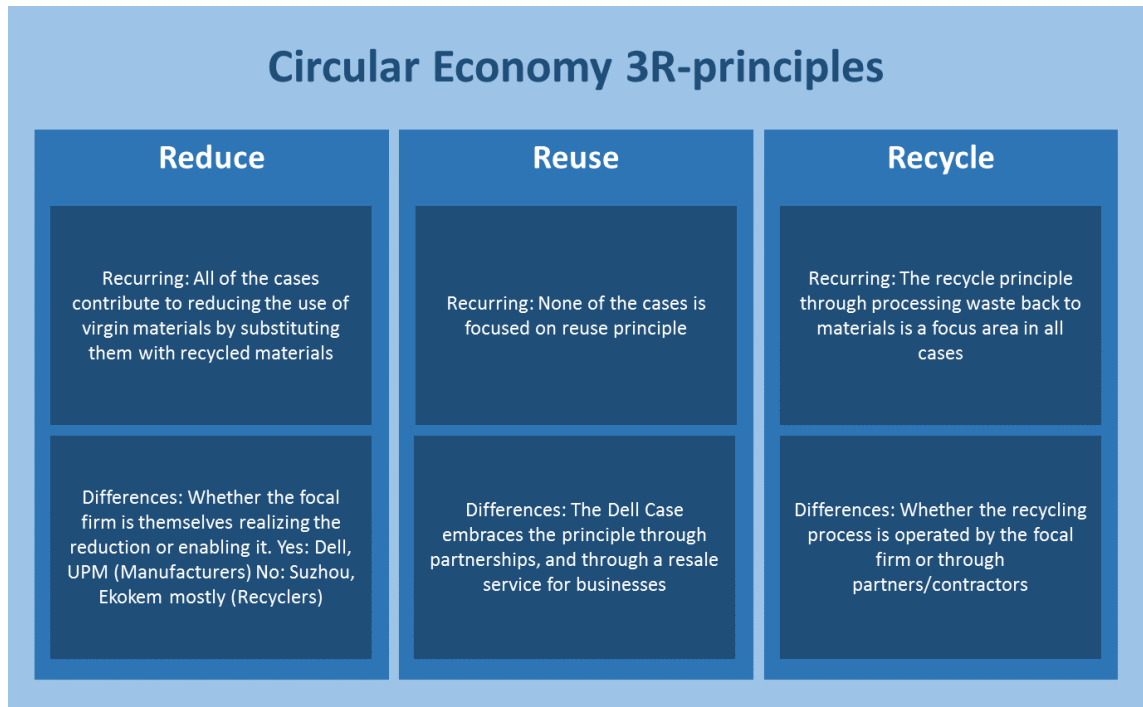
Some significance of the importance of the service offerings revenue can be seen when comparing the Suzhou and Ekokem cases. In Suzhou, the actors that produce recycled plastics are unable to collect gate fees, and are very tightly squeezed between the need to produce cheap recycled plastics while covering costs and profits with just the product. Ekokem however has the possibility to charge gate fees, shielding the business model from depending only on the revenue of the sold products, which is vulnerable to the prices of materials from virgin sources.

The *economics of the business* analyzed in the cases are mainly highlighting the significance of the perceived *cheapness of recycled materials*. The cheapness of the recycled materials however has very different effects on the business model depending on whether the focal firm is providing recycled materials or is using recycled materials. The cheap recycled materials are increasing the potential for value capture for manufacturers using them. There were no identified notions of the products made from recycled materials being cheaper in either of the Dell and UPM cases, while both of the cases use the relative cheapness of recycled materials to rationalize implementing circular economy.

For the companies producing the recycled materials however, the cheapness of recycled materials creates a roof for the value capture potential from the recycled material sales. Thus it would be logical that especially these cases would implement both the product and service oriented offering components to circumvent this roof that puts pressure on the business model. However, as was seen in the Suzhou case, this is not necessarily possible, at least through traditional gate fees.

## 7.2 The appearance of the Reduce, Reuse, and Recycle principles

In this section the circular economy aspects of the cases are analyzed as a cross-case analysis. The method for the cross-case analysis is to identify patterns in how the cases embrace the 3R-principles of circular economy, the reduce, reuse, and the recycle principles. Both recurring themes and differences between cases are discussed. The main findings about how the cases embrace the circular economy are shown below in table 7.2.



**Table 7.2:** Patterns in how the business models in the cases embrace the 3R-principles

Across all of the cases, the *reduce principle can be identified*. However, it seems that the main method of embracing the reduce principle is through the *substitution of virgin materials with recycled materials*. Another way that the cases embrace the reduce principle is by reducing waste generated in their own operations by turning waste flows of production into resources. Substitution of virgin materials with recycled materials comes up in all of the cases. The company that is responsible for implementing the substitution is the focal firm in cases where the focal firm produces the end-product, cases UPM and Dell. In the cases where recycled material is sold to manufacturers, cases Suzhou and Ekokem, the choice of substituting virgin materials with recycled ones needs to be made by the potential customer of these companies.

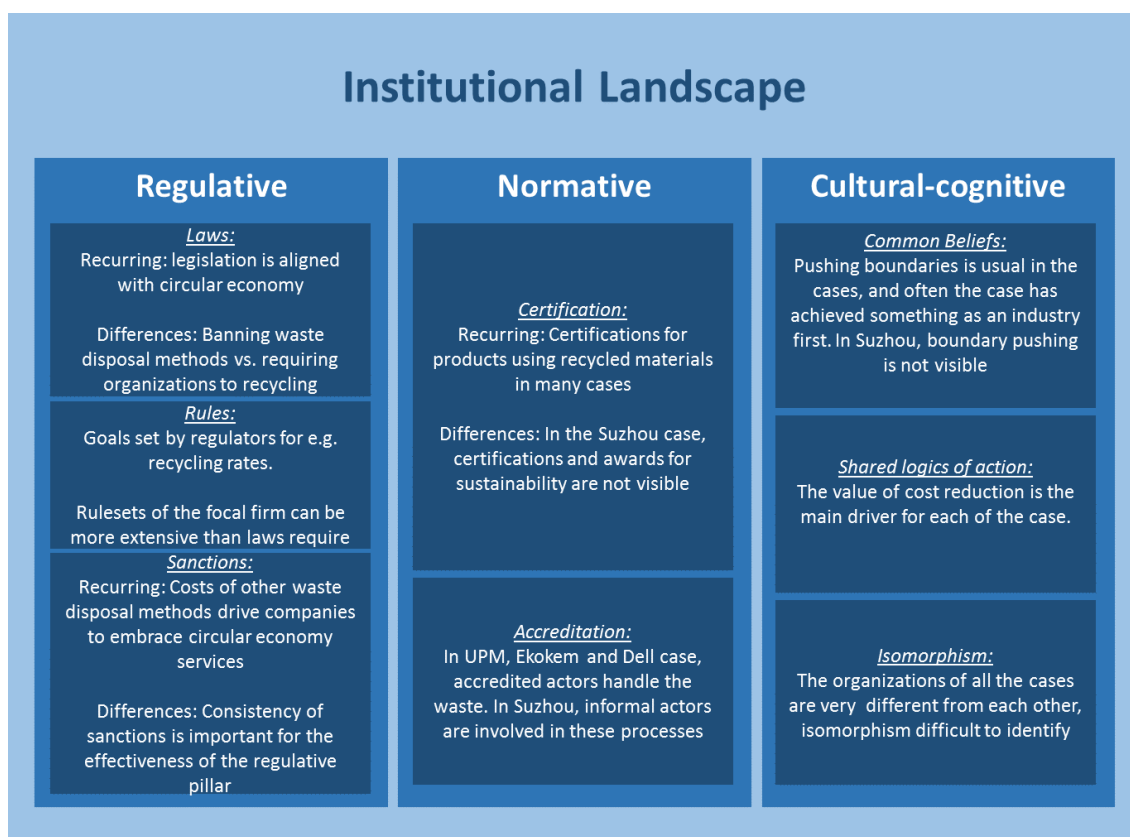
*The reuse principle is nearly unutilized in the cases.* This is especially true when reuse is perceived as reuse of products. While UPM is using waste streams from their manufacturing operations as a resource for the wood-plastic composite products and thus in a way embracing the reuse principle, product reuse and embracing the inner loops of the circular economy as illustrated by the Ellen MacArthur foundation appears only in the Dell case. What is rather striking is that even in the Dell case, only the business customer reuse and resale business is operated by Dell, and the consumer side of the reuse business is operated by a partner. This could imply that the reuse business is not perceived as being valuable enough to operate in. Compared to the arguments of for example the Ellen MacArthur Foundation and the European Commission, both of which expecting major benefits from increasing reuse (MacArthur 2013; European Commission 2015), these cases imply that the reuse principle is being underutilized.



As opposed to the underutilized reuse principle, the *recycle principle appears as the central principle being embraced by business models in the circular economy*. All of the cases are heavily focused on recycling, with all of them involving the processing of waste to either recycled material or products. Also the value capture mechanisms of all of the cases are heavily related to recycling, especially when considering what are the benefits of the circular economy in each case. In the UPM case, the ability *to reduce waste from the company's manufacturing operations by recycling it into a new product*, and thus reducing costs from waste and turning waste into a revenue source, is at the heart of the case. In Ekokem and Suzhou, the business model is almost entirely focused on *recycling waste into recycled material*, with *Ekokem gaining significant portions of revenue from both the gate fees and sales of recycled materials*, and *Suzhou cases actors relying entirely on revenue from recycled materials*. In Dell's case, from the circular economy's perspective, the main reason for the closed-loop system as a whole, including the asset resale and recycling services, is the capability to acquire *cheap recycled material for new products*. Thus if the reuse principle appeared underutilized in the selected circular economy cases, the *recycling principle appears to be the go-to method of embracing the circular economy*.

### **7.3 Differences and recurring themes in the institutional landscapes of the chosen markets**

In this section, the institutional landscapes of the different cases, chosen from different geographical markets of Finland, EU, China, and the US, are analyzed. Like in the previous sections, the analysis will be done by identifying patterns of the appearance of indicators of the three pillars of institutions, the regulative, normative, and cultural-cognitive pillar, in the analyzed cases. The regulative pillar is discussed in the first part, followed by the normative pillar. In the last part of this section, the cultural-cognitive pillars indicators and their appearance across cases are analyzed. The main findings of this section are shown in table 7.3 below.



**Table 7.3:** *Patterns identified from the appearance of the indicators of institutional pillars in the analyzed institutional landscapes of the cases.*

*Regulative* pillar is present in all of the cases, highlighting the requirement of policy that supports the circular economy for business models that embrace it. However, the method of how the policies support the business model differ. For example, in the Ekokem case, the regulative pillar appears as being focused on waste management related issues. This is shown by directives that increase requirements for recycling rates, law that bans the landfilling of organic waste, and the upcoming requirement of recycling plastics packaging. In the Dell case however, the regulative pillar is showcased by laws that mandate producer's responsibility to offer recycling for sold equipment. This illustrates that while waste management focused regulative measures pressure waste management industry to take action, it is also very valuable to create policies that direct companies outside of the waste management industry to take part in advancing the circular economy.

The level of influence also varies and cannot only be analyzed with the amount of indicators of the regulative pillar. In some cases, the regulative pillar is influential. In the UPM case it is guiding the company towards efficient use of waste, in the Ekokem case it is motivating the company to create new business models for waste management, and in the Dell case directing the company to take responsibility of the waste generated by its products. However, in the Suzhou case, while legislation appears to be somewhat developed, the implementation of the regulations appears as lackluster, leading to the regulations consistently being disregarded by the actors in the case. This divide between the

effectiveness of the regulative pillar could be related to the level of sophistication of the waste management infrastructure in the geographical area, especially since the cases were focused on recycling. Also noticeable is that Dell, that appears to have the widest reaching circular economy business model from the selected cases, is doing the manufacturing of the products in China, i.e. in the same geographical market as the Suzhou case, which leads to questioning whether the recycling process in the Dell case is as robust as it seems.

The *Normative and the cultural-cognitive* pillars are also visible in all of the cases, and seem to guide the effectiveness of the *regulative* pillar's influence. While the indicators of these pillars are often less tangible and more difficult to identify, their support is very much a requirement for the business models success. If the normative pillar of the landscape is well aligned with the circular economy, the regulative pillars indicators are more likely to be followed.

This effect is illustrated in the Suzhou case. While in the UPM, Ekokem, and Dell case, all of which take place primarily in markets with highly developed waste management infrastructure, the circular economy is highly valued by all the stakeholders of the case, the Suzhou case differs in this aspect. In the Suzhou case, multiple actors, including the informal sector and the residents that are producing the waste, do not pursue sustainable recycling. One of the reasons for this is that a common belief in the area is that whether the waste is processed in the informal sector or the formal sector, the difference in the environmental performance is negligible. While the end-result is very cheap recycled material, the business model for the system is not robust, as many actors are operating at a loss, while the employees of the system achieve a very low income.

One aspect that is clearly visible in the analyzed cases is that they appear to push boundaries and the businesses have set their sights on breaking common beliefs of what a business can do. This mentality can be identified in the UPM, Ekokem, and Dell cases, all of which pride the business venture as achieving industry firsts, UPM's innovation allowing previously unrecyclable waste to be recycled, Ekokem's circular economy village being a unique combination of multiple waste treatment processes, and Dell achieving a third-party certification for a closed loop computer as first in the industry. Thus, it seems so that business models that embrace the circular economy are currently a field for pioneers.

## 8. CONCLUSIONS

This chapter concludes the study. The first section discusses whether the objectives for the study were met. This is done through evaluating the ability to answer the research questions of the study based on the research done. Following this, theoretical implications of the study on the fields of business models, circular economy, and institutional theory is discussed. After theoretical and managerial implications, the limitations of the study in terms of validity and reliability are examined. Lastly, proposals for future research are given.

### 8.1 Meeting the objectives

To increase knowledge on circular business models from the perspective of market differences, a multiple case study on business models identified as promoting circular economy, situated in different geographical locations, was conducted. The cases were studied through a combination of data from interviews and secondary sources such as news articles and company releases.

The first research question was: *With what kind of business models do circular economy driven business ventures operate with regards to value proposition, value creation and delivery, and value capture?* To answer this question, cases were analyzed with the business model framework created in this study. By dividing the business model into a set of components, patterns emerged on how the business models of the selected business ventures operated. The main findings answering this question were discussed in chapter 7.1. As a short summary, the main identified business model types are of a product centric approach, where the main component of the value proposition is a product that is a result of circular economy activities, and a material centric approach, where the main component of the value proposition is recycled material. Supporting the product or materials centric approach is often a service offering, which simultaneously acts as a revenue source and a source of suitable waste for the venture.

The second research question was: *How can business models advance the circular economy?* The methods of embracing the circular economy was examined through the 3R-principles of reduce, reuse, and recycle and their appearance in the business model cases. To summarize the results, it appears that the main method of advancing the circular economy currently is through increasing recycling, and subsequently reducing the use of virgin materials. The lack of embracing reuse as a central piece of the business model was apparent.

The third research question was: *How does the institutional landscape affect the business model?* The institutional landscape and its perceived effects on the business model

were analyzed in each case through systematically identifying indicators of the three pillars of institutions, the regulative, normative, and cultural-cognitive pillar. As a summary, the regulative pillars laws and rules were identified as being important in supporting the circular economy business models, especially through bringing stability to the landscape. Normative and cultural-cognitive pillar however appear as especially important in driving innovation in the business models and in creating value for the customer and the company from circular economy activities.

The objectives of the research were achieved as the explorative study was able to provide answers to the research questions. However, the circular economy and business models are both far reaching concepts, and areas of the concepts have received less attention in this study. Thus the research area is in need of further studies to augment the findings of this study.

## 8.2 Theoretical implications

This research focused on business models in the circular economy, as the business model perspective was found lacking in the existing circular economy research. The academic areas of business models, the circular economy, and the institutional theory were combined in this research, presenting potential for theoretical contributions to each of the areas from a new perspective.

The perspective of the business model concept being valuable as a conceptual tool (e.g. Osterwalder et al. 2005) was supported by this study. The created business model framework acted as the tool of analysis in this study. Throughout the research, it was apparent that the business models in each case fit well into the structure of the framework, providing clarity to the different aspects of the business model.

Surprisingly the results of this study are not entirely aligned with the circular economy literature. Among the cases analyzed in this study, the recycling principle was dominant when compared to the reduce and reuse principles, and acted as the main method of how the business model embraced circular economy in all cases. According to the literature on the circular economy, recycling should be less effective in increasing material efficiency and profitability than reduce and reuse principles (Stahel 2013; Reh 2013). Thus there is a clear disconnection between the studied implementations of the circular economy and the theoretical literature.

A recurring theme among the cases from the perspective of institutional theory was that the support of the regulative pillar was present in all cases, while the strength of the other pillars varied. based on the research in this study, the strength of the normative and cultural-cognitive pillars in the institutional landscape are equally important to the regulative pillars strength. This result is in line with the school of thought in institutional theory

literature that the regulative pillar alone is not capable of supporting sufficient change in the institutional landscape (Edelman et al. 1999; Scott 2008a).

### 8.3 Managerial implications

By studying business models in circular economy, a major objective of this study has been to identify opportunities in the field of circular economy. Based on the research, embracing circular economy has potential to help companies create more value to customers, and capture more value from their business ventures. The managerial suggestions are discussed in terms of the three components of the business model, but it is important to notice that the different components are most often intertwined.

The offerings in circular business models often comprise a service and a product component. This duality is important for two reasons. First, from a material flow stand point, the service offering is set up in a way that it enables the company to acquire suitable waste for recycling, thus reducing the complexity of the recycling process. Secondly, the service offering can be used to generate revenue, shielding the company from potential revenue fluctuations of the product offering. This second function appears as especially important for business models that offer recycled materials as their product for customers, as in these cases, a major part of the value proposition is the cheapness of the recycled materials in comparison to materials from virgin sources.

The implementation of the reuse principle in circular economy business models appears in a very interesting light in this study, as theory suggests it should be superior to recycling in terms of profitability. The case study results are not in line with this theory. The implementation of reuse should be less difficult than full recycling of materials and provide faster effect on increased business benefits, as the length of the loop the product needs to go through is significantly shorter. Thus, managers should direct effort into finding ways to embrace the reuse principle to accelerate moving to circular economy, as there is currently an observable void in the implementation of business models embracing the reuse principle.

A significant finding related to the value proposition in circular economy business models is that customers appear as not willing to pay extra for solely the sake of sustainability. Surprisingly, it seems that, in the case of recycled materials, the situation is the opposite. Due to the recycled materials being perceived as lower quality, customers expect lower prices for the recycled material. Thus, the increased value capture for companies embracing the circular economy needs to come from another source than increased prices. One example mentioned was the combination of a service and a product offering, where the service feeds material into the products manufacturing supply while generating revenue. Another identified source of value capture is better economics of the business. As use of recycled materials is cheaper, selling similar products at the same price leads to higher value capturing capability. However, as the principle of reuse was underutilized in the

studied cases, it is unclear whether embracing it could enable the ability to directly generate more revenue from a single product.

Effective partnerships with multiple actors are a requirement for a circular economy business model. In each of the analyzed cases, the focal actors had a network of partners that were crucial to the operation of the entire value creation system. For the focal firms that were focused on creating recycled materials, the importance of partnerships was showcased especially in the acquisition of waste, i.e. who is the waste to be recycled coming from. Also to ensure demand, identification of customers for the recycled materials is extremely important. For the focal firms that were focused on creating end-products for consumers, the importance of partnerships was more pronounced in the areas of how to take the suitable waste in, and how to divert the waste streams that the company cannot utilize to other uses.

Embracing circular economy business models requires the companies to rethink their position in their value network. Effectively, circular economy business models and their focal firms either organize or operate the looping of the flow of a product or material. What was previously waste, is reverted into material or products, and sold back to the market. The previously mentioned partnerships can help companies to achieve this, but it is necessary that companies that have plans to create circular economy business models understand the importance of creating channels for both the outgoing products and the incoming waste or used products.

## **8.4 Assessing the quality and limitations of the study**

In this study, to maintain construct validity, a literature review of the theoretical areas under research was conducted to create the framework for case analysis. In addition, triangulation of data from multiple sources was used to decrease the possibility of misinterpretations from a single data source. The interviewees were also allowed to review the study to ensure no misinterpretation were done based on the interviews. However, while the literature review for the creation of the analytical framework was done iteratively, it is possible that important aspects of any of the three theoretical areas might have gone unnoticed, thus limiting the construct validity of the study.

To address internal validity issues, the cases were systematically analyzed using the frameworks created based on existing literature. These frameworks were then used first in within case analyzes, followed by a cross-case analyses which used pattern matching for analysis. The case selection however imposes limitations on the effectiveness of this approach, as different cases were chosen to include multiple different types of cases, and not by using replication logic.

The external validity of the study is limited both due to the selection of case study as a research design, and due to the sampling methodology of the cases. This study includes a

cross-case analysis which analyses circular business models in different institutional landscapes, which can increase the generalizability of the study (Leonard-Barton 1990; Johnston et al. 1999). However, as the case selections cases were varied from multiple aspects and not chosen through replication logic, this effect is limited (Yin 2003). Thus, the findings of this study should be considered as a fruitful start for other more focused studies, as the multiple cases provide a robust basis by analyzing the subject of circular economy business models from through multiple different business model types and geographical areas.

Since the study derives its results from the analysis from four cases selected to showcase different types of circular economy business models, the overall generalizability of the study is lower than if replication logic was employed (Yin 2003). However, by selecting different types of cases, the study better reflects its objective of exploring business models in the circular economy, and as patterns were recognized although the cases were not selected with replication logic, the findings can be somewhat generalized to circular economy business models in general. More so, as the study analyzed only four cases, it is not possible to make sweeping conclusions that the findings of this study are definitive for any circular economy related business model.

Other issues limiting the reliability of this study can be traced to the theme interviews and the secondary data used. As the interviews of this study were conducted as theme interviews, there interviews had potential of being conducted little differently from interview to interview, especially as the researcher's experience of theme interviews was limited. Thus the interviews are a limiting factor for the reliability of the study. The collection of secondary data presents another issue for the reliability of the data. To reduce the effect, tools considered as valid for the type of secondary data collection done in this case, such as the LexisNexis search for news articles, were used.

## **8.5 Future research**

This thesis combined multiple theoretical areas into one study, and targeted especially the previously less researched subject of circular economy business models. By doing so, this study showcases multiple different directions for future research. These subjects for future research were identified both from areas that could not be covered due to the limited nature of the thesis, and from the findings of the study.

One of the most surprising and, based on previous literature, alarming findings of the study was the apparent underutilization of the reuse principle in the analyzed circular economy business models. To further validate this finding and provide explanation to why this might be the case would be an important research topic, so that the reasons behind the phenomenon can be addressed. Also empirical research is needed to bring clarity into what benefits companies can expect from embracing the reuse principle. Research on methodology of implementing reuse as a business model would also be valuable for



making it easier for companies to capture the additional value potential currently theorized but, according to the findings of this study, not utilized.

The case selection of this study, while aiming for variability in business models, were in the end biased towards implementing circular economy principles in the context of plastics waste. In the preliminary case selection phase, H&M and its' textile recycling efforts was identified as a potential case. As textiles are a large part of the global waste streams, circular economy business models in the textile and clothing industry would be an interesting and important topic to research.

Research about how to advance the circular economy has been focused on the regulative policies of different geographical areas. In this study, it was identified that while support of the regulative pillar is important, it alone is not enough for the success of circular economy business models. Thus, future research in this area should widen its scope to research to what extent normative and cultural-cognitive conditions in different geographical areas support or hinder the efforts implemented through regulative processes. Additionally, other than regulative methods for influencing the normative and cultural-cognitive conditions of the institutional landscape should be researched further.

This study included multiple cases about circular economy business models. However, there is still plenty of ground to cover in studying the structure of business models in the circular economy, as the circular economy is a very wide reaching concept. Most of the cases in this study revolved around subject of recycling, and especially the recycling of plastics. While plastics is an important waste stream from the perspective of sustainability due to its non-degrading quality, other material flows could very well prove more desirable for circular economy business models.

The rising prices of commodities have been a central argument for the circular economy, and this was confirmed in this study as actors providing or using recycled materials use the lower cost of recycled material as the main argument for using them. Low commodity prices thus increase pressure on the recyclers for being more cost efficient if they wish to operate profitably. One area that needs solutions is how can circular economy thrive in a low commodity price environment. Potentially this research could provide further motivation for increased reuse, or create solutions for more efficient recycling schemes.

Many of the challenges of the circular economy business models in this study were related to the acquisition of suitable waste into the recycling system. Also the complexity of waste and material flows was seen in the literature as one of the restricting factors for the advancement of the circular economy (Stahel 2013; Prendeville et al. 2014). Researching methods to circumvent this would also be an interesting area for future research. For example, in the preliminary case selection phase, a case of improving efficiency of waste management with digitalization was examined. Similar methods for circular economy

could potentially improve the efficiency of circular economy business models, while creating opportunities for embracing the circular economy through better knowledge of materials and products in use today.

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