Tampere University

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Strategic Development of Circular Economy Business in Industrial Firms

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ACADEMIC DISSERTATION
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PREFACE

The journey that materializes as this dissertation raises emotions that are impossible to entirely put into words. Rather than a research project, it truly has been a journey of exploration, discovery, and personal growth. As with any proper expedition, the journey has gone through peaks and valleys. There have been periods of delightful sunshine where it felt like I could go on for days without stopping and there have been periods of harsh rainstorms where it felt like I'd rather not even leave the tent. And of course, many days of typical Finnish weather in between, where most of the progress was made. Looking back, I'm thankful for each of those days, and especially for the people that I have had the privilege to share this journey with. Your support and company have allowed me to explore and discover. Without you, the journey would not have been the same.

Above all, I want to thank my supervisor Professor Leena Aarikka-Stenroos for the unwavering support throughout the journey from the very beginning. Your passion for research has been an inspiration, and without you I would have not dared nor have been able to to push for the higher peaks. Your ability to instill confidence has been irreplaceable on those stormy days. I'm thankful for the countless discussions we have had, discussions that have sometimes been about research, but luckily many times about something else entirely, I have learned so much from these. Importantly, you have also reminded me to enjoy the fruits of the labor. Thank you for sharing this journey with me.

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Throughout the journey, I've been blessed with having the chance to work with some exceptional co-authors and colleagues. Especially, I would like to thank Professor Saku Mäkinen, Associate Professor Joona Keränen, Professor Paavo Ritala, and Dr Ulla Saari for having had the opportunity to learn from you while co-authoring articles.

Working in the CITER research group has been exhilarating, and I want to thank each of you for all the time we've been able to spend together throughout these years. Lauri, thank you for being a friend throughout the process. No matter what the difficulty, I think we have been able to have a laugh about it. Jarmo, a brilliant mind, spending time with you always puts a smile on my face. Anil, your enthusiasm about things has meant a lot during these years. Linnea, Sami, Eerika, Jenni, Eeva, Johanna K., Johanna A., Jussi, Hai, and everyone else that I've yet to mention: our discussions have kept me inspired and smiling.

I'm grateful for having a group of great friends that have occasionally pulled me entirely away from this research. Without those moments, this dissertation would never have been finished. For my parents Arto and Kirsi, I'm thankful for instilling me with the sense of being able to learn and the willingness to keep learning, those have been the foundations of this dissertation. I also want to thank my sister Noora for her strong determination and character that have inspired me on this journey.

Finally, I want to thank my family for being the sunshine of my life. Annika, without your love, support, and encouragement, this project would not have been possible. I could not wish for a better partner in life. Above all, Isla, you have taught me so much about myself and what is important in such a short time, and your smile makes me instantly forget all doubts and fears. I eagerly look forward to the journeys that we will have the opportunity to share.

Tampere, March 2021
Valtteri Ranta

ABSTRACT

Industrial firms are increasingly seeking ways to develop business that improves their environmental sustainability while maintaining or improving their ability to create value and compete. The circular economy, which suggests that firms can improve both environmental and economic performance by maintaining the value of products and materials in circulation for longer while minimizing the generation of waste, has quickly gained the interest of businesses. To achieve these benefits, industrial firms need to implement circular economy principles by transforming existing or developing new business models. Meanwhile, by influencing what type of operations are valued by customers and supported by policymakers, the circular economy is also changing the environment in which industrial firms conduct business. Thus, the development of circular economy-aligned business that creates value is a strategic consideration for industrial firms.

This thesis aims to identify ways for industrial firms to strategically develop business that creates value in the market change surrounding the circular economy phenomenon. The extant literature on strategy has identified the potential of improving business sustainability for value creation but has lacked implementation methods for industrial firms towards this goal. Simultaneously, the extant literature on the circular economy has adopted strategic concepts such as the business model to explain how firms could adopt circular economy in their business. However, this research has focused on how to technically enable maintaining resource and product value through a business model, rather than on the ability of the business models to create economic value. Furthermore, the connection to the changing environment of businesses, important for making strategic decisions about adopting circular economy in industrial firms, has been lacking in circular economy research.

The present research focuses on this strategic perspective of value creation through circular economy. Circular economy can influence regulations and norms of what is valued from businesses; thus, the perspective of institutional theory about institutions that guide social behavior, and thus the ability of firms to create value, is adopted to understand the connection of circular economy implementations to the environment of industrial firms. The research was conducted as a literature review and three multiple-case studies using primarily document-based data about business

models and customer value propositions of industrial firms with circular economy implementations. The findings indicate that recycling is currently the most institutionally legitimate way to implement circular economy and the dominant way for industrial firms to capture value from the circular economy. However, the legitimacy of reusing and reducing is increasing comparatively, motivating industrial firms to focus on these implementations going forward. Within industrial firms' business models, four distinct value creation logics—resurrect, share, optimize, and replace value—were identified, each with key internal considerations for value creation. With regards to the institutional environment, institutional work towards improving the legitimacy of the business and thus value creation was identified in the customer value propositions of circular economy business models, with the approach to institutional work depending on the legitimacy of the underlying implementation. Thus, the findings imply that to develop business that creates value from circular economy, industrial firms need to identify a suitable value creation logic, identify the legitimacy of the developing business, and conduct institutional work to improve legitimacy to enable improved value creation.

The research contributes to strategy, circular economy, and institutional theory literature and has further practical implications. In terms of strategy literature, the research highlights the institutional environment's role in value creation, contributing to the emerging literature on institutional work to improve value creation. With regard to circular economy literature, the research identifies economic value creation aspects of circular economy business models by developing four central value creation logics. Also, it shows misalignment in the current institutional legitimacy of circular economy principles and their ability to improve environmental sustainability. For the institutional theory field, the research highlights that institutional work is not only separate actions towards the institutional environment but also embedded into a firm's business model. For managers, this research provides guidance for implementing circular economy aligned business by developing value creation logics to embrace based on the firm's existing strengths and highlighting the importance of institutional work for value creation in a changing institutional environment.

TIIVISTELMÄ

Teollisuusyritykset pyrkivät kasvavassa määrin kehittämään liiketoimintaansa ympäristöllisesti kestävämmäksi. Kehitettävän kestävän liiketoiminnan täytyy kuitenkin myös parantaa, tai vähintään ylläpitää, yrityksen kykyä luoda arvoa ja kilpailla. Kiertotalous onkin saavuttanut nopeasti yritysten huomion, luvaten tuotteiden ja materiaalien pitämisen käytössä ja arvokkaana pidempään sekä hukan ja jätteen vähentämisen mahdollistavan sekä ympäristöllistä että taloudellista suorituskykyä yrityksille. Saavuttaakseen nämä hyödyt, yritysten täytyy sisällyttää kiertotalouden periaatteita liiketoimintaansa, ja samalla uudistaa olemassa olevia tai kehittää täysin uusia liiketoimintamalleja. Samaan aikaan kiertotalouden mukainen ajattelu on muuttamassa teollisuusyritysten liiketoimintaympäristöä vaikuttamalla siihen, minkä tyyppistä liiketoimintaa asiakkaat ja päättäjät pitävät arvokkaana ja tukemisen arvoisena. Kiertotalouden mukaisen liiketoiminnan kehittäminen vaatiikin näin ollen strategista harkintaa.

Tämä tutkimus pyrkii tunnistamaan tapoja, joiden avulla teollisuusyritykset voivat strategisesti kehittää kiertotaloutta ympäröivässä markkinan muutoksessa arvoa luovaa liiketoimintaa. Liiketoiminnan ympäristöllisen kestävyyden parantamisen on aiemmassa strategiatutkimuksessa tunnistettu voivan parantaa myös sen kykyä luoda taloudellista arvoa. Aiempi strategiatutkimus ei kuitenkaan ole juurikaan tunnistanut tapoja, joilla teollisuusyritysten kannattaa lähteä parantamaan liiketoimintansa ympäristöllistä kestävyyttä. Kiertotalouden tutkimuskenttä taas on hyödyntänyt strategisia käsitteitä, kuten esimerkiksi liiketoimintamalleja, kuvatessaan tapoja, joilla yritykset voisivat hyödyntää kiertotaloutta liiketoiminnassaan. Tämä tutkimus on kuitenkin keskittynyt liiketoimintamallien kykyyn säilyttää materiaalit ja tuotteet käytössä pidempään teknisesti, ei niiden kykyyn tuottaa taloudellista arvoa yritykselle. Kiertotalouden tutkimus ei myöskään ole ottanut strategisesta näkökulmasta tärkeää liiketoimintaympäristössä tapahtuvaa muutosta huomioon liiketoimintamalleja käsitellessään.

Kiertotalous vaikuttaa liiketoimintaan erityisesti kehittyvän sääntelyn ja ympäristöllisemmiksi muuttuvien arvojen kautta. Näin ollen teollisuusyritysten kykyä luoda arvoa kiertotalouden mukaisella liiketoiminnalla liiketoimintaympäristössään tarkastellaan tässä tutkimuksessa instituutionaalisen teorian avulla.

Instituutionaalisen teorian mukaan sääntelystä, arvoista ja vakiintuneista ajatustavoista muodostuvat instituutiot ohjaavat kaikkea sosiaalista toimintaa, ja näin ollen myös liiketoiminnan kykyä luoda arvoa. Tutkimus toteutettiin kirjallisuuskatsauksena ja kolmena monitapaustutkimuksena käyttäen pääosin dokumenttipohjaista dataa kiertotalouden mukaista liiketoimintaa harjoittavien teollisuusyritysten liiketoimintamalleista ja asiakasarvoehdotelmista. Löydökset viittaavat siihen, että kierrätys on tällä hetkellä instituutionaalisesti legitiimein kiertotalouden periaate ja teollisuusyritysten pääasiallinen tapa hyötyä kiertotaloudesta taloudellisesti. Tuotteiden ja materiaalien vähentämisen sekä uudelleenkäytön periaatteiden legitimiteetti on kuitenkin kasvamassa suhteessa kierrätykseen, ohjaten teollisuusyrityksiä hyödyntämään tulevaisuudessa näitä periaatteita. Tutkimuksessa tunnistettiin neljä arvonluontilogiikkaa, arvon palauttaminen, jakaminen, optimointi ja korvaaminen, joita erilaisia resursseja omaavat yritykset hyödyntävät liiketoimintamalleissaan. Yritysten asiakasarvoehdotelmista tunnistettiin, että yritykset tekivät niiden kautta instituutionaalista työtä pyrkien muokkaamaan toimintansa legitimiteettiä ja arvonluontikykyä instituutionaalisessa ympäristössään. Löydökset viittaavat näin ollen siihen, että kehittääkseen arvoa luovaa kiertotalouden mukaista liiketoimintaa, teollisuusyritysten tulee tunnistaa niille soveltuva arvonluontilogiikka, kehitettävän liiketoiminnan nykyinen legitimiteetti, ja muokata legitimiteettiä arvonluonnin edistämiseksi.

Tutkimus tuo kontribuution strategian, kiertotalouden, ja instituutionaalisen teorian tutkimusalueisiin. Strategian näkökulmasta tutkimus korostaa instituutionaalisen ympäristön merkitystä liiketoiminnan arvon luonnille, ja tuo kontribuution erityisesti kehittyvään arvon luontia edistävän strategisen instituutionaalisen työn tutkimukseen. Kiertotalouden tutkimusalueeseen tutkimus tuo kontribuution tunnistamalla neljä kiertotalouden arvonluontilogiikkaa, jotka keskittyvät erityisesti taloudelliseen arvon luontiin. Lisäksi tutkimus näyttää, että kiertotalouden periaatteiden tämänhetkinen legitimiteetti on ristiriidassa periaatteiden kykyyn parantaa liiketoiminnan ympäristöllistä kestävyyttä. Instituutionaalisen teorian tutkimusalueeseen tutkimus tuo kontribuution näyttämällä, että instituutionaalinen työ sisältyy oleellisena osana yrityksen liiketoimintamalliin kiertotalouden markkinamuutoksessa. Yritysjohtajille tutkimus näyttää tapoja sisällyttää kiertotaloutta liiketoimintaan korostamalla yrityksen vahvuuksiin sopivan arvonluontilogiikan valintaa, sekä instituutionaalisen ympäristön merkitystä ja siihen kohdistettavan instituutionaalisen työn tarpeellisuutta arvonluonnin edistämiseksi.

CONTENTS

ORIGINAL PUBLICATIONS

I. Ranta, V., Aarikka-Stenroos, L., Ritala, P., & Mäkinen, S. J. (2018). Exploring institutional drivers and barriers of the circular economy: A cross-regional comparison of China, the US, and Europe. *Resources, Conservation & Recycling, 135,* 70-82. https://doi.org/10.1016/j.resconrec.2017.08.017

II. Ranta, V. & Saari, U. A. (2019). Circular economy: Enabling the transition towards sustainable consumption and production. In: W. Leal Filho, A. Azul, L. Brandli, P. G. Özuyar, & T. Wall (Eds.) *Responsible Consumption and Production. Encyclopedia of the UN Sustainable Development Goals*. Springer, Cham. https://doi.org/10.1007/978-3-319-71062-4_3-1

III. Ranta, V., Aarikka-Stenroos, L., & Mäkinen, S. J. (2018). Creating value in the circular economy: A structured multiple-case analysis of business models. *Journal of Cleaner Production, 201,* 988-1000. https://doi.org/10.1016/j.jclepro.2018.08.072

IV. Ranta, V., Keränen, J., & Aarikka-Stenroos, L. (2020). How B2B suppliers articulate value propositions in the circular economy: Four innovation-driven value creation logics. *Industrial Marketing Management*, *87,* 291-305. https://doi.org/10.1016/j.indmarman.2019.10.007

AUTHOR'S ROLE IN THE PUBLICATIONS

For publication I, the study's research design was developed by the thesis author, with the support of L.A.-S. and S.J.M. The thesis author carried out the literature review for the publication, collected and analyzed the data, and wrote the paper's first full draft, including developing findings, discussion, and conclusions. L.A.-S., P.R., and S.J.M provided input and comments to the draft, and the draft was then modified primarily by the thesis author. Feedback from the reviewers during the review process was jointly considered with the co-authors. During the review process, revisions were developed and implemented primarily by the thesis author, with support from the co-authors.

For publication II, the thesis author developed the idea and the research design for the publication. The literature review for the publication and the writing of the first draft was done jointly by the thesis author and U.A.S. In the review process, revisions were developed by the thesis author with input from U.A.S. and implemented by the thesis author in the final version of the publication.

For publication III, the study's research design was developed by the thesis author with the support of L.A.-S. and S.J.M. The thesis author carried out the literature review for the publication, collected and analyzed the data, and wrote the first draft, including developing findings, discussion, and conclusions. L.A.-S. and S.J.M. provided input to the first draft, and the draft was then modified primarily by the thesis author. The thesis author presented an early version of the manuscript at the ISPIM conference (ISPIM Innovation Summit, 4-7 December 2016, Kuala Lumpur, Malaysia), after which the thesis author further developed the publication with input from L.A-S. and S.J.M. During the review process, the publication was revised with the lead of the thesis author, who developed and implemented the revisions with input from L.A.-S. and S.J.M.

For publication IV, the study's research design was developed by the thesis author with the support of L.A.-S. The literature review for the publication was primarily done by the thesis author, with support from J.K. and L.A.-S. The thesis author collected and analyzed the data for the study, and then wrote the first draft for the publication with input from J.K. and L.A.-S. The thesis author presented early versions of the draft at the IMP conference (the 34th Annual IMP Conference, 4-7 September 2018, Marseille, France) and at the ANZMAC conference (ANZMAC Conference, 3-5 December 2018, Adelaide, Australia), after both of which the publication was further developed with the lead of the thesis author and input from J.K. and L.A.-S. During the review process, the revisions were developed jointly by the authors with the lead of the thesis author and implemented primarily by the thesis author with critical input from J.K. and L.A.-S.

1 INTRODUCTION

1.1 Motivation and background

Industrial firms are increasingly seeking ways to develop business that improves their environmental sustainability while maintaining or improving their ability to create value and compete (Kapitan et al., 2019; Mariadoss et al., 2011). The emerging circular economy (CE) concept, which refers to a regenerative economic system where the value of products and materials is maintained for as long as possible while minimizing waste (Kirchherr et al., 2017; Türkeli et al., 2018), has quickly gained the interest of businesses (Bocken et al., 2018; Tse et al., 2016) as a potential pathway towards the development of new business with improved environmental and economic performance (Türkeli et al., 2018). From a firm's strategic perspective, i.e. a long-term perspective towards the success or failure of a firm (Agarwal & Helfat, 2009), the emergence of the circular economy is, on the one hand, a potential opportunity for developing new, sustainable business through circular economy principles by adopting novel circular innovations (Prieto-Sandoval et al., 2018) and business models (Lüdeke-Freund et al., 2019), presenting novel resources and resource configurations with which to gain a competitive advantage in the market (Teece, 2010, 2018).

On the other hand, the circular economy has entered the agenda of policymakers in the development of policy frameworks towards more sustainable business (European Commission, 2015; McDowall et al., 2017; Yuan et al., 2006), while the perceptions of B2B customers are also changing towards increasingly valuing the sustainability efforts of suppliers (Gusmerotti et al., 2019; Kapitan et al., 2019). Thus, institutional environments, consisting of regulations, normative perceptions, and cultural-cognitive frames of mind facilitating people's actions, are being changed due to the emergence of circular economy (Scott, 2008a). This means that the emergence of the circular economy has implications for the existing strategic positions of firms through changes to the institutional environments where firms conduct business and the ability of the firms to create value through benefits that address the needs of their customers (Barney, 1991; Oliver, 1997; Teece et al., 1997). Thus, both the

business potential of implementing circular economy principles and the market transformation taking place pressuring towards improving business sustainability challenge industrial firms to develop business adhering to circular economy principles strategically. Otherwise said, the implementation of circular economy business requires strategic business development, where firms take a long-term perspective identifying whether their existing strategic positions might potentially decay, and thus development of new resources and capabilities is necessary (Agarwal & Helfat, 2009). in industrial firms

This strategic perspective on firms' development of circular economy business is currently missing from both strategy and circular economy literature. While environmental sustainability has been emphasized in strategy literature (Hart, 1995; Porter & Kramer, 2011), research in this field has focused on whether, rather than how, firms should take sustainability aspects into strategic consideration (Engert et al., 2016). Circular economy literature has adopted strategic concepts such as the business model, which describes how a firm creates, delivers, and captures value (Teece, 2010), but with a focus on gaining a holistic perspective towards improving the circularity of business rather than on value-creating benefits to customers emerging from the adoption of a circular economy-aligned business model (Bocken et al., 2016; Lüdeke-Freund et al., 2019; Pieroni et al., 2019). Developing new business aligned with circular economy principles is a strategic consideration for firms, and the adoption of the circular economy by industrial firms within global value chains determines the success of adopting the circular economy concept to improve the environmental sustainability of business (Charonis, 2012). Therefore, researching the strategic development of circular economy business in industrial firms, i.e. a perspective to adoption of circular economy in business as a factor for the long-term success or failure of the firm, is of utmost importance.

The ability to identify opportunities for a firm and seize opportunities through novel business models (i.e., dynamic capabilities) is crucial for creating value from the circular economy. In other words, the firm needs dynamic capabilities (Teece, 2018; Teece et al., 1997) for the successful implementation of circular economy business, making the change towards circular economy an issue of strategic value creation. However, the perspective of firms' ability to capture economic value for itself by improving its profitability through either reduced costs, improved revenues, or their combination (Bowman & Ambrosini, 2000), and thus attain competitive advantage from adopting circular economy principles, is missing from the strategy literature.

At the same time, research on circular economy has adopted the sustainable business model approach, focusing on how to achieve environmental, societal, and economic value (Lewandowski, 2016; Linder & Williander, 2017; Rizos et al., 2016; Weissbrod & Bocken, 2017). However, in firms, economic value remains a dominant decision criterion (Lieder & Rashid, 2016) and a measure of business strategy (Porter, 1996). Thus, taking an economic value creation perspective to the circular economy is drastically needed to identify how firms can strategically address the phenomenon. This perspective is also important from the environmental sustainability perspective since firms with a competitive disadvantage will not be able to gain market share. Thus, if circular economy principles do not enable economic value creation, their adoption will not impact the environmental sustainability of the global economy.

The adoption of circular economy by industrial firms is especially crucial regarding the circular economy's overall impact. The circular economy is a systemic phenomenon that requires the maintenance of the value of products and materials throughout the value chain (Ghisellini et al., 2016). While consumer-facing businesses are the most visible from the perspective of the public, the adoption of circular economy in only such businesses has only limited potential for enhancing the sustainability of the global economy, representing the final part of increasingly long supply chains through which raw materials are turned into consumer products (Geissdoerfer et al., 2018). The adoption of circular economy principles is also required in the upstream supply chain (Urbinati et al., 2017), towards which consumer-facing firms have limited power. Furthermore, most of the material flows that circular economy addresses take place in the industrial firms' domain, including manufacturing, construction, and logistics (Franco, 2017; Leising et al., 2018; Lieder & Rashid, 2016). Thus, a focus on industrial firms developing business from circular economy is crucial for the circular economy's overall success.

The potential for improving businesses' environmental sustainability is a central driving force behind the circular economy (Geissdoerfer et al., 2017). In a situation where a sustainability transition is urgently being called for by society (Köhler et al., 2019), implementing circular economy principles can improve value creation because it is positively perceived by a firm's customers and society, while also potentially improving the internal ability to create economic value. This can result from, for example, consumers preferring sustainably produced products, thus leading to B2B customers selecting their suppliers based on their adoption of environmental standards or from regulations that economically incentivize sustainable and block unsustainable activities. Thus, in the circular economy market transformation, the development of the institutional environment, i.e. the set of cognitive perceptions,

normative values, and regulatory instruments in a firm's environment (Scott, 1987, 2008a), influences the ability of different types of business activities to create value. As seen by the emerging legislation frameworks in the European Union designed around the circular economy and the adoption of circular economy as a guideline for economic development in China (McDowall et al., 2017), circular economy's emergence is changing the institutional environment of industrial firms globally. Thus, the strategic value creation potential of circular economy is a question of firms' adoption of circular economy principles in an economically viable way in the institutional environment where they operate (Oliver, 1997). Research on this issue is relevant for businesses, policymakers, and customers, with potential to identify value creating ways to adopt circular economy by firms, effective ways to advance circular economy by policymakers, and to showcase how institutional logics of customers can drive or inhibit a market transformation such as the circular economy.

1.2 Research rationale, research gaps, and positioning of the thesis

The institutional environment of a firm's business affects how its configuration of resources can attain it sustainable competitive advantage (Oliver, 1997; Peng et al., 2009). The circular economy introduces novel innovations in the form of, for example, technologies and business models (Bocken et al., 2016; de Jesus et al., 2016). The circular economy aligns with the societal need to improve business sustainability and is supported by policymakers' initiatives in places like the European Union and China (McDowall et al., 2017). Furthermore, B2B customers' perceptions are increasingly moving towards valuing environmentally sustainable business (Kapitan et al., 2019; Kumar & Christodoulopoulou, 2014). Thus, the circular economy is a strategic opportunity and issue for firms, as both the internal resource configurations of firms and their competitors and the external institutional environments where the firms operate are changing.

However, research on the circular economy phenomenon from the perspective of business strategy has only recently started to emerge in circular economy literature, and there is only limited empirical research on the topic (Pieroni et al., 2019; Türkeli et al., 2018). As a potential pathway towards environmentally sustainable, competitively viable business, *the missing understanding of a firm's value creation potential through circular economy in a changing institutional environment is an important gap to fill*. This gap inhibits industrial firms from strategically developing environmentally

sustainable business, an issue long called for in the strategic management literature (Hart, 1995), as it is not well understood how firms can improve value creation by implementing environmental sustainability (Engert et al., 2016). The novel opportunities from implementing circular economy principles and the changing institutional environment are identified as the primary considerations from the perspective of strategy in this thesis. Table 1 showcases the main research gaps identified in the main theoretical areas of the thesis.

Table 1. Research gaps identified within the theoretical areas of the thesis

Theoretical area	Literature stream	Key literature	Research gaps
Strategy	Environmental sustainability in business strategy	Hart, 1995; Varadarajan, 2010; Porter and Kramer, 2011; Engert, Rauter and Baumgartner, 2016	How to strategically develop industrial business where environmental sustainability of business is improved.
Circular economy	Business models for the circular economy	Bocken *et al.*, 2014; Lewandowski, 2016; Urbinati, Chiaroni and Chiesa, 2017; Lüdeke-Freund, Gold and Bocken, 2019	How industrial firms develop business that creates economic value from circular economy implementation.
Institutional theory	Institutional legitimacy and institutional work	Oliver, 1997; Scott, 2008a; Markard, Wirth and Truffer, 2016; Nenonen, Storbacka and Windahl, 2019	How firms develop value-creating business in a changing institutional environment

As the development of business that implements circular economy requires the adoption of innovations and novel business models (de Jesus *et al.*, 2016), a strategic long-term perspective is required for developing such business. In the strategy literature, the main gap within the literature stream that this thesis aims to fill is the lack of knowledge on how industrial firms can strategically develop business to create value from environmental sustainability. While calls for the sustainability perspective have long existed within strategy literature (see, e.g., Hart, 1995; Porter and Kramer, 2011), strategy research has overwhelmingly focused on discussing *whether* firms should even consider the environmental sustainability aspect, rather than *how* firms could consider environmental sustainability while developing business (Engert et al., 2016). These studies have, for example, analyzed how investors perceive sustainability reporting, i.e., whether sustainability reporting is valuable for a firm's market value (Durand et al., 2019), and whether a marketing strategy showcasing sustainability can be a source of competitive advantage (Varadarajan, 2010). However, these studies do not showcase how a firm can create value by developing

new business in a novel sustainability improving area such as the circular economy; instead, they focus on how presenting the firm's business as sustainable affects its competitive position. Furthermore, as in the B2B context of industrial firms, customers are deriving the sustainability needs for end-customers, leading to increasing evaluations of suppliers' environmental performance (Kapitan et al., 2019). Understanding how to develop a business where value is created with environmental sustainability is becoming especially important for industrial firms. Thus, understanding *how an industrial firm can create value in an environmentally sustainable way* is an important research gap.

As an innovation-driven phenomenon that requires firms to develop new business models to create value (Bocken et al., 2016; de Jesus et al., 2016), the circular economy provides a fruitful area to conduct research aimed at filling this gap. The research stream of dynamic capabilities (Teece et al., 1997) within the strategy literature discusses how firms identify and strategically seize changes in their environment, such as the change imposed by the circular economy. In both the strategy literature and the circular economy literature, the concept of the business model as a bridge between strategy and operations that describes how the firm creates, delivers, and captures value (Bocken et al., 2014; Teece, 2010), has been used to describe how firms could seize novel opportunities being introduced. In strategy literature, research has recently pointed out that dynamic capabilities have a role in the adoption of sustainability improvements in firms' business models (Inigo et al., 2017; Zhou et al., 2018), and that firms can improve financial performance by adopting sustainability-oriented strategies (Danso et al., 2019). However, research that would explicate how firms can seize competitive advantage from improved business sustainability through business models is still lacking (Engert et al., 2016).

In the circular economy research field, the adopted perspective to business models has been the sustainable business model (Bocken et al., 2014). The sustainable business model literature focuses on the business model's ability to holistically describe how a firm creates social, economic, and environmental value, known as the triple-bottom-line approach (Elkington, 1998). This differs from the focus of traditional business model research describing how a firm creates, delivers, and captures primarily economic value (Lozano, 2018; Schaltegger et al., 2016). Furthermore, the related circular economy business model literature, building on the sustainable business model literature, has primarily focused on how to enable the circularity of material flows within the business models, designing options that enable slowing, closing, or narrowing material flows (Bocken et al., 2016; Lewandowski, 2016; Rizos et al., 2016; Weissbrod & Bocken, 2017). Thus, *a gap exists*

between these two research streams to understand the economic value creation perspective of the circular economy business models by taking into account competitiveness and economic value creation perspectives in addition to the focus on adopting sustainability into the value creation system of a business model.

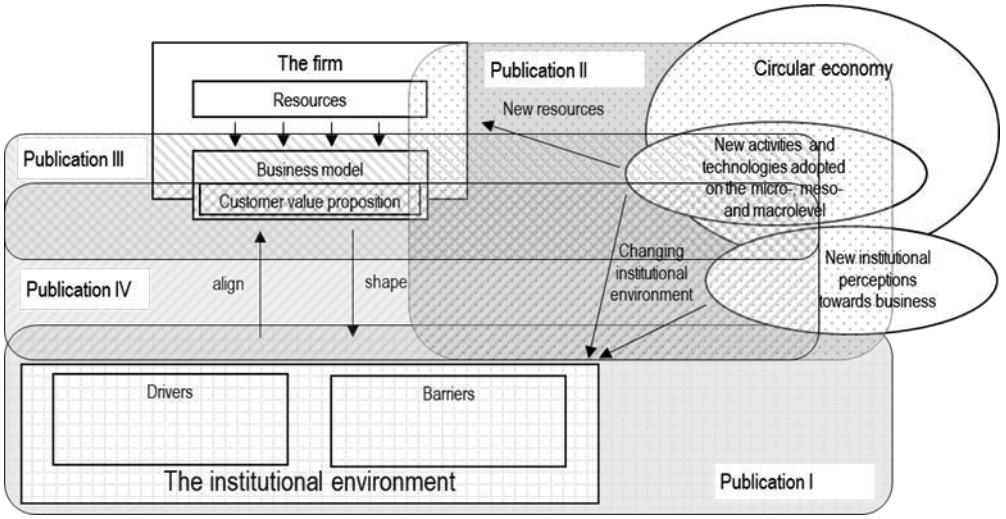
Finally, since from a strategic perspective, circular economy is a change in the institutional environment—implied by the sustainability connection of the phenomenon (Geissdoerfer et al., 2017), emerging related policy frameworks (McDowall et al., 2017), and the changing customer perceptions towards valuing sustainable business (Kapitan et al., 2019; Mariadoss et al., 2011)—an institutional theory perspective is essential for creating understanding towards the main research gap. Furthermore, there are research gaps at the intersections of institutional theory and both strategy and circular economy literature. First, the research gap between strategy and institutional theory is that *within strategy literature, understanding how a change in the institutional environment affects strategic aspects of a firm's business, such as its business model, is lacking*. The strategy field had adopted institutional theory as an important explainer of a firm's competitive importance in addition to industry positioning (Porter, 1980) and an advantageous resource configuration (Wernerfelt, 1984). However, existing research on the institution-based view (Oliver, 1997; Peng et al., 2009) has mostly focused on how firms need to take into account differing institutions between their home market and the market where they are expanding, suggesting strategic issues that need to be considered in such situations (Meyer et al., 2009).

Thus, the perspective of strategic business development in a transition such as the sustainability transition and the related circular economy has been missing in the field. It has only recently emerged (Chaney et al., 2019), along with the perspective that firms can conduct institutional work to influence changing institutional environments (Nenonen et al., 2019). Second, within the circular economy, there has been a lack of research on the *circular economy's institutional legitimacy*. In the wider sustainability transition research area, the concept of legitimacy has been central to understanding how, for example, new sustainable technologies gain acceptance and are adopted (Markard et al., 2012, 2016). However, within the circular economy research field, the focus of research discussing the desirability of the circular economy has been overwhelmingly focused on whether circular economy is, in fact, sustainable (Geissdoerfer et al., 2017; Hofmann, 2019; Manninen et al., 2018; Murray et al., 2015). Institutional theory suggests that legitimate concepts are adopted through institutional coercion—i.e., actors within the institutional environment conforming to cognitive, normative, and regulative institutions (Scott, 2008a)—and

through isomorphism, where actors adopt practices that seem valuable from other actors in the institutional environment (DiMaggio & Powell, 1983). Thus, the existing gap in understanding the *institutional legitimacy of circular economy business* is a major gap in the circular economy literature; and has the potential to reveal institutions that are both driving and inhibiting sustainability improvement from circular economy.

In this thesis, the focus is placed on how industrial firms can strategically develop business to create value in a change of institutional environments, such as the one taking place in connection to the circular economy. Thus, the thesis looks at circular economy as an opportunity for firms to create value by implementing environmental sustainability. The thesis takes an institutional perspective, as the circular economy-related change in the institutional environment of firms provides further explanation for how firms achieve competitive advantage from adopting circular economy (Oliver, 1997); the research also addresses the internal implementation of circular economy that results in new resources and resource configurations for firms (Teece, 2018). The theoretical focus areas of the research are shown in Figure 1.

Figure 1. The theoretical focus areas for the thesis and the focus areas of the appended publications



The theoretical positioning of the research is between firm strategy, circular economy, and institutional theory. Within the strategy literature, the key areas that the research positions into are how firms create value in their business activities. Thus, the thesis adopts the business model as a key concept that describes how a

firm creates, delivers, and captures value (Magretta, 2002; Teece, 2010) and connects the strategy and the business operations of a firm (Casadesus-Masanell & Ricart, 2010). Furthermore, the business model is suitable for identifying how a firm creates value in a changing market, such as the institutional change relating to the circular economy, as it is the result of a firm's dynamic capabilities for seizing opportunities in its business environment (Teece, 2018). Thus, a firm's business model should provide a condensed view of its strategic business development outcomes in a market change (Agarwal & Helfat, 2009).

The market change researched in the thesis is the emergence of the circular economy, and thus circular economy literature provides the second theoretical area of the thesis. Within the circular economy, theory on what the circular economy is, e.g., in the form of principles to which circular economy business should adhere to (Bocken et al., 2016; Kirchherr et al., 2017), is central to the thesis. The perspective of institutional theory is adopted to understand the potential for firms' value creation from circular economy as influenced by the external environment. Within institutional theory, the legitimacy (Ghaffari et al., 2019) of circular economy implementations through the three pillars of institutions—regulative, normative, and cultural-cognitive (Scott, 2008a)—and the institutional work that firms conduct regarding the institutional environment to enable value creation (Lawrence et al., 2013) are of particular importance to the thesis.

1.3 Research objective and questions

This thesis aims to identify ways for industrial firms to strategically develop business that creates value in the market change surrounding the emerging circular economy phenomenon. Fulfilling this objective is necessary for multiple reasons. First, from the perspective of an industrial firm, the shifting perceptions of the customers and other important stakeholders towards the need to improve the environmental sustainability of business is increasingly relevant. However, the current strategy literature has only recently started introducing the perspective of institutional legitimacy as a building block of competitive advantage (Chaney et al., 2019; Peng et al., 2009). Thus, an understanding of how the institutional perspective affects a firm's strategic concepts, such as its business model, has yet to emerge in the strategy literature. Also, even though the circular economy has emerged as a potential pathway towards achieving improved environmental sustainability in business, there is very little research about the circular economy from the perspective of firm

strategy (c.f. Pieroni, McAloone and Pigosso, 2019). From the perspective of an industrial firm, creating value through circular economy necessitates changes in business models and the adoption or creation of innovations (Bocken et al., 2016; de Jesus & Mendonça, 2018). Thus, the firm needs to make strategic investment and reconfiguration decisions, which necessitates that the firm understands how developing business aligned with circular economy can help it maintain or improve competitiveness.

Second, it is crucial for policymakers to understand how industrial firms develop their business to create value in an environmental sustainability change in the market. This is especially the case with the circular economy. While circular economy has attracted attention from policymakers as a framework for designing environmentally sustainable policy (McDowall et al., 2017), the actors that need to adopt circular economy principles in their operations are firms, especially industrial firms. This is because circular economy strives to replace the linear supply chain logic where raw materials are refined into products for consumers to use and then discarded as waste; to a circular logic where, in every part of the value chain, the preservation of the value already in a product or material takes precedence. Accordingly, products are designed for circularity, maintained and shared, and as a final step recycled as components and materials if no longer able to provide value as products (Ghisellini et al., 2016). While there are cases where firms have adopted circular economy, this adoption is not yet widespread (Bocken et al., 2017). Since the institutional theory perspective explicitly acknowledges the regulative pillar as an important part of institutional legitimacy, this thesis can also contribute to designing more effective policy for enabling circular economy, outside of the thus far technology-focused perspectives (Türkeli et al., 2018).

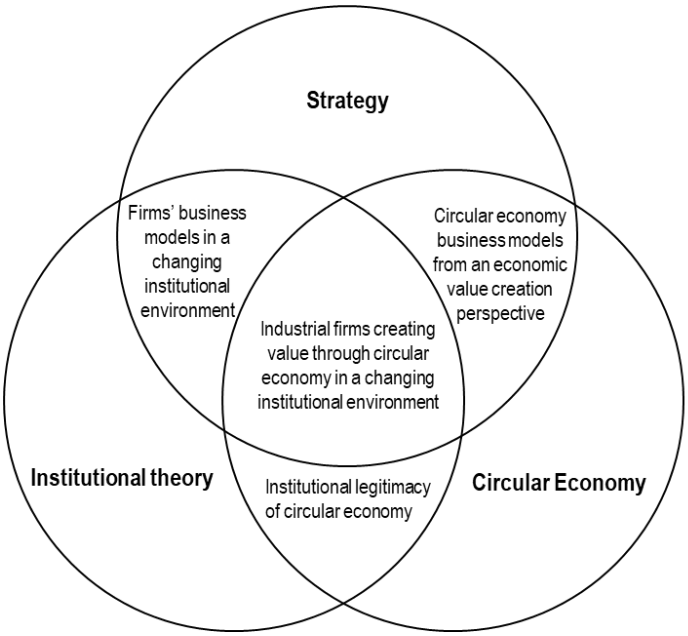
The combination of a strategic perspective to the circular economy phenomenon with an institutional theory lens is therefore fruitful for a better understanding of how firms can adopt circular economy to improve their business' sustainability while also gaining economic and competitive advantages. Thus, the main question to guide the overall research of this thesis is:

How can industrial firms create value through circular economy in a changing institutional environment?

This question combines three theoretical areas: strategy, circular economy, and institutional theory. The main research question is broad, and thus three sub-research questions focusing more specifically on the intersection of the three theoretical areas

guide the research of the thesis towards its goal. The focus areas of the main research question in the middle, and the sub-research questions at the cross-sections of each theoretical area, are shown in Figure 2.

Figure 2. Focus areas and theoretical positioning of the thesis



First, to set the basis for answering the main research question from the perspective of institutional environment towards industrial firms' value creation through circular economy, it is necessary to understand the institutional legitimacy (i.e., whether something is socially perceived as positive or accepted) of the circular economy principles. The alignment of circular economy with environmental sustainability does not directly imply that it would already have strong institutional support; and it might be that while on the surface level circular economy is desired, the institutional environment actually inhibits it through, for example, legislation barring the use of recycled materials (McDowall et al., 2017). As it is the legitimacy of circular economy principles that results in the perceptions towards circular economy business (Markard et al., 2016), it is legitimacy, not objective sustainability improvement, that is crucial to understanding value creation from circular economy implementation. Furthermore, as the legitimacy of business activities is not only a factor of regulative institutions, but also of the normative and cultural-cognitive pillars (Scott, 2008a), the emerging regulative frameworks around circular economy (European

Commission, 2015; Yuan et al., 2006) are not sufficient to understanding the institutional theory perspective on value creation through circular economy. Thus, the first sub-research question of the thesis is:

What is the institutional legitimacy of circular economy business?

The second sub-research question links the circular economy phenomenon, which focuses especially on principles that maintain the value of resources and products and keep them in circulation (Ghisellini et al., 2016), with the strategy theory focusing on how firms can gain a long-term competitive advantage that leads to superior business performance (Porter, 1996). Due to the operations-focused approach of circular economy research, the business model concept, which has its foundations in the strategy literature and acts as a bridge between the long-term strategy of a firm and its daily operations for value creation (Casadesus-Masanell & Ricart, 2010), is adopted to direct research on the link between strategy and circular economy. From the business model literature, the established three main building blocks of a business model—how the firm creates value with its resources, how it proposes that value to its customers and other stakeholders, and how it captures value for itself (Bocken et al., 2014; Osterwalder et al., 2005; Richardson, 2008)—are included to guide the research. Specifically, the second sub-research question is:

How do firms create, propose, and capture value in circular economy?

The third sub-research question links creating value through circular economy principles to institutional theory. Although the implementation of circular economy principles by itself has implications for industrial firms' business models, circular economy is also a part of the broader sustainability transition phenomenon. Thus, firms in the fields affected by circular economy, such as firms involved with manufacturing or selling products, operate in an institutional environment that is changing due to the emergence of the circular economy (Ghisellini et al., 2016; Markard et al., 2012; McDowall et al., 2017). Research on how this kind of change in the institutional environment affects value creation within industrial firms' business models is currently lacking, with only some research emerging very recently regarding firms' strategic responses towards the institutional environment (Chaney et al., 2019; Nenonen et al., 2020). The concepts of institutional legitimacy and institutional work are essential for understanding the effect of institutional change on value creation. For example, if the business of a firm is not perceived as legitimate

in its institutional environment, the firm can choose strategies for institutional work between better alignment to the institutional environment through changing its business towards legitimacy (DiMaggio & Powell, 1983; Markard et al., 2016), or through deliberately trying to affect the institutional environment through activities such as market-shaping (Chaney et al., 2019; Nenonen et al., 2019). The former strategy would improve the value creation potential of the firm's business by aligning the business towards what is perceived as valuable in the institutional environment, whereas the latter attempts to improve the value creation potential of the firm's business by improving its legitimacy in the institutional environment. In other words, the institutional environment, and especially changes in it, should prompt changes in the value creation strategies of firms. To address this perspective, the third sub-research question is:

How does the institutional environment, changing due to circular economy, affect industrial firms' value creation?

The main research question combines the knowledge generated by answering the sub-research questions, simultaneously combining the three theoretical areas of strategy, circular economy, and institutional theory in the thesis.

1.4 Contribution of appended publications

To achieve the research objective, this thesis builds on four academic publications. Table 2 displays the research questions, research gaps, key literature, and the appended publications that contribute towards each research question. Since the three sub-research questions contribute to answering the main research question, each of the publications contributes to the thesis's main research gap. Furthermore, each of the research gaps has contributions from multiple publications appended to the thesis.

Table 2. Research questions, gaps, and publications

Research question	Research gap	Objective	Literature	Publications
Main RQ How can industrial firms create value through circular economy in a changing institutional environment?	Integration of a strategic perspective to the development of circular economy business models by industrial firms.	To improve understanding of the reasoning for firms to adopt circular economy practices into their business by identifying the strategic value creation potential of doing so.	(Ghisellini et al., 2016; Lüdeke-Freund et al., 2019; Payne et al., 2017; Scott, 2008a; Teece, 2007, 2010)	I, II, III, IV
Sub-RQ I What is the institutional legitimacy of circular economy?	Understanding the legitimacy of circular economy principles in the extant institutional environments, in addition to the objective sustainability impacts of the principles.	To showcase the institutional legitimacy of circular economy business and identify potential needs for aligning or shaping the institutional environment for firms.	(Ghisellini et al., 2016; Markard et al., 2012, 2016; McDowall et al., 2017; Scott, 2008a)	I, II
Sub-RQ II How do firms create, propose, and capture value in the circular economy	The creation and capture of economic value from developing sustainable business through circular economy principles.	To understand how firms can create economic value by implementing circular economy activities in their business models.	(Bocken et al., 2014, 2016; Payne et al., 2017; Richardson, 2008; Teece, 2010)	II, III, IV
Sub-RQ III How does the institutional environment, changing due to circular economy, affect industrial firms' value creation?	In addition to regulation, the normative and cultural-cognitive perceptions towards circular economy implementations, and the effect of the holistic institutional environment on business models of industrial firms implementing circular economy.	To improve understanding of the relation between a firm's value creation and the institutional environment in the circular economy.	(DiMaggio & Powell, 1983; Ghisellini et al., 2016; Nenonen et al., 2019; Oliver, 1997; Scott, 2008a; Teece, 2007)	I, III, IV

Publication I focuses on the institutional environment of the circular economy. As its key findings, publication I showcases, through a multiple-case study, that institutional environments differ between geographical markets, impacting the implementations of circular economy; and that across the studied institutional environments, circular economy activities that relate to recycling, instead of reusing or reducing (Ghisellini et al., 2016), had the most institutional support. In other words, although from the perspective of the business-oriented circular economy literature, the reuse and reduce activities have the highest potential for improved

business performance (Ellen MacArthur Foundation, 2015b), the traditional recycling activities are still the most legitimate ways to implement circular economy. These findings contribute to sub-question I, displaying the institutional legitimacy of circular economy business; and sub-question III, showcasing that recycling activities are more aligned with institutional environments generally across geographical markets, while reusing and reducing are not as legitimate.

Publication II focuses on the circular economy, and identifies what constitutes a circular economy. This publication adopts a multilevel perspective. It discusses circular economy implementation at the micro or firm and consumer level, the meso or regional and business network level, and the macro or national level through a literature review. The publication's key findings are that the circular economy introduces new activities and changes institutions at the macro and meso levels; at the micro level, new business models are crucial for industrial firms to create economic benefits from the phenomenon. Thus, the publication contributes to answering sub-question I, the institutional legitimacy situation of the circular economy, and sub-question II, introducing potential methods that firms can employ to create value from the circular economy.

Publication III moves the focus to the firm perspective of creating value through circular economy. Through a multiple-case study, the publication discusses how firms create and capture value for themselves with business models that adopt circular economy principles, specifically looking at the 3R principles of reduce, reuse, and recycle (Ghisellini et al., 2016). Key findings of the study are that the recycling-focused business models capture value primarily from cost savings related to waste management fees and through increased revenues from the sale of recycled materials. However, like the studies focusing on institutional environment, the role of the reduce and reuse principles in the value creation and capture of circular economy business models is lacking. Thus, the publication contributes primarily towards sub-question II, displaying ways to create economic value from the circular economy, but also towards sub-question III, providing a business model perspective that supports the effect of higher legitimacy of recycling activities compared to other circular economy activities in the current institutional environment of industrial firms.

Publication IV continues further into value creation by firms implementing circular economy principles. Publication IV focuses on the customer value propositions of circular economy firms, thus identifying what the firms perceive as the value they can create and deliver to customers by implementing circular economy in their business. Since publications I and III were limited by their smaller number

of cases, the sample size of cases is also increased in order to capture a more holistic view of businesses adopting different circular economy principles in addition to the recycling principle. In total, 74 documented customer value propositions of different B2B-focused firms are analyzed in the study. Key findings are that the studied firms employ four value creation logics—resurrect value, optimize value, share value, and replace value—to create value for customers. The logics have implications for what value is proposed, how, and to whom. Thus, publication IV contributes especially towards sub-question II. Also, publication IV contributes towards sub-question III by displaying that the firms also propose value towards stakeholders other than direct customers, with varying degrees of this broader stakeholder perspective depending on the value creation logic. This implies that firms need to do more institutional work, depending on the legitimacy of the value creation logic employed in their business model.

1.5 Research process and dissertation structure

The research process of the thesis can be divided into three phases. The first phase (2016–2017) involved the first exploration of the institutional environment in which firms in the circular economy operate and their business models regarding this institutional environment. This research phase was conducted as part of the ARVI (Material Value Chains) project funded by the Finnish Innovation Fund (TEKES). The data collection in the first phase consisted of semi-structured qualitative interviews and collection of document data such as news articles using LexisNexis, and company documents from the case firms' websites and directly from the case firms. The first phase resulted in publication I, focusing on the institutional legitimacy of circular economy principles in different geographical regions; and publication III, focusing on the creation and capture of economic value within business models that implement circular economy principles.

The second phase of the research (2017–2019) further studied the circular economy and the environment in which firms operate through a literature review exploring circular economy implementations. Literature was reviewed to capture an overall picture of the circular economy and what it entails from different perspectives. The multilevel perspective of macro, meso, and micro levels was chosen to identify what implementations and supporting activities are emerging around the circular economy at the level of national policymaking (i.e., the macro level), in regional and business networks (i.e., the meso level), and in firms and

customers (i.e., the micro level). This phase resulted in publication II, describing the circular economy from a multilevel perspective.

In the third phase of the research (2018–2019), a data-driven explorative multiple-case study was conducted to identify how firms perceive themselves creating value through their circular economy implementations. This phase of the research was conducted as part of the CICAT2025: From Innovation to Business Ecosystems project, funded by the Strategic Research Council of the Academy of Finland. To supplement the business model perspective employed in publication III, the focus was placed on the customer value propositions of firms with circular economy principles implemented in their business models. An extensive set of circular economy cases describing the value these firms deliver in their business models (i.e., their customer value propositions), collected by the Finnish Independence Fund (SITRA), were used as data for the study. From a complete set of over 100 documented cases, 74 B2B-focused cases were selected to reflect the industrial focus of the circular economy (Ghisellini et al., 2016). Phase three of the study resulted in publication IV, which identifies four innovation-driven value creation logics that have implications on what value, to whom, and how the B2B firms in the circular economy communicate in their customer value propositions. Thus, the research in phase three complemented the research done in earlier phases, strengthening the ability to answer the thesis's main research gap.

This dissertation is organized as follows. First, this Introduction has presented the thesis's motivation and background, its research rationale, and the existing research gaps. It has discussed the theoretical positioning, research objective, and research questions raised by the thesis. Finally, it has also highlighted the contribution of the appended publications and the research process of the thesis. The second chapter, Theoretical Background, presents the thesis's underlying theories in more detail, reviewing the literature on strategy, circular economy, and institutional theory. Third, the Methodology chapter details the research design, research context, and data collection and analysis methods used in the thesis research. Fourth, the Findings chapter summarizes key findings from the original publications. Fifth, the Discussion and Conclusions chapter first links the findings of the original publications to the sub-research questions, and finally to the main research question of the thesis; it then presents the theoretical contributions, the managerial contributions, the quality and the limitations of the thesis research, and highlights potential avenues for future research.

2 THEORETICAL BACKGROUND

This thesis aims to identify ways for industrial firms to strategically develop business that creates value within the ongoing market changes surrounding the emerging circular economy phenomenon. To achieve this objective, this thesis is theoretically positioned between strategy literature, circular economy literature, and institutional theory literature. In this chapter, these theoretical areas are reviewed to highlight their contribution to the thesis. A list of key concepts from the theoretical areas, with definitions used in the thesis, is presented as a concise reference in Appendix A.

2.1 Strategy perspective to value creation by firms

To create value from implementing a concept such as the circular economy, which involves innovations from both the technology and business model perspectives, firms need to plan for the long-term effects of adopting the concept. Strategy research focuses on these long-term value-creating issues, identifying why and how the economic performance of firms differs (Porter, 1996; Wernerfelt, 1984). Strategic management in a firm serves to identify the development guidelines leading to a position where it can create value in a superior way compared to its competitors (Agarwal & Helfat, 2009; Porter, 1980). When it attains such positioning, the firm is said to have a competitive advantage, which leads to higher profits compared to its competitors. The focus of strategic management, and a central concept of strategy research, is why and how firms gain and hold a position where they can create and capture superior value compared to their competitors. From the perspective of value creation, strategy focuses on how the firm can appropriate value back to itself (Bowman & Ambrosini, 2000), and thus the strategic perspective is crucial to understand the adoption of circular economy by industrial firms. In this thesis, the main concepts from strategy literature adopted in the research were the business model and the customer value proposition, both focusing primarily on value creation and capture, and described in depth in sections 2.1.1 and 2.1.2. Table 3 displays the foundations for these concepts and the development of the value creation perspective in the strategy literature.

Table 3. Streams in strategy literature leading to business model and customer value proposition concepts

Strategy stream	Perspective to value creation	Main concepts	Key literature
Industry-based perspective	Strategic positioning compared to competitors enables a firm to create value more effectively, leading to competitive advantage and superior profits.	Five forces, general strategies	(Porter, 1980, 1996; Porter & Millar, 1985)
Resource-based view	The firm creates value from the resources it possesses. Firms with VRIO resources can create superior value compared to competitors.	Valuable, rare, imperfectly imitable, and organizationally enabled (VRIO) resources	(Amit & Schoemaker, 1993; Barney, 1991; Wernerfelt, 1984)
Dynamic capabilities	Firms that can identify emerging opportunities and threats and develop resources and resource configurations to seize the opportunities and neutralize threats can create superior value over time.	Sensing, seizing, and transforming capabilities	(Helfat & Peteraf, 2003; Teece, 2007; Teece et al., 1997)
Business models	The business model describes how the firm creates value for customers and captures value as profit, encapsulating the resource configuration the firm uses to create value.	Component-based business model view, activity-based business model view	(Chesbrough & Rosenbloom, 2002; Teece, 2010; Zott & Amit, 2010)
Customer value propositions	The value the firm creates for customers and other stakeholders with its business model as the central organizing principle for the firm.	Value dimensions of benefits, recipients of value	(Anderson et al., 2006; Lanning & Michaels, 1988; Payne et al., 2017)

Early strategy literature placed focus on industry factors, as empirical evidence highlighted differences in profits between industries. This industry-based perspective has been highly influential, leading to strategic management frameworks such as Porter's Five Forces (Porter, 1980). In addition to identifying desirable industries to partake in, this stream highlights the importance of strategic positioning within an industry, introducing generic strategies (cost leadership, differentiation, and focus strategy) that can be used to gain competitive advantage (Porter, 1980). Also, in strategic positioning, a firm seeks a strategic fit within its activities and the external environment, and makes trade-offs based on the strategic fit analysis of what it should and should not pursue as a general guideline (Porter, 1996).

However, the strategic positioning-focused industry-based perspective does not focus on how individual firms within an industry can achieve and hold competitive advantage outside of the very simplified generic strategies. Addressing this issue, the

firm's resource-based view (RBV) (Wernerfelt, 1984) has evolved into a dominant perspective within strategy literature. RBV turned the focus of strategic management more towards the internals of the firm, towards the resources the firm holds (Penrose, 1959). According to RBV, the reason for performance differences between firms is the heterogeneous resources held by firms compared to each other, with certain resource bases providing a competitive advantage (Barney, 1991). Thus, specific focus is paid to the resources themselves as sources of sustained competitive advantage.

For a resource to have the potential to create a competitive advantage, it needs to be valuable and rare. A valuable resource needs to be able to either exploit opportunities or neutralize threats in the firm's environment. Thus, the RBV does not look entirely inward towards the firm, as it links to the external environment through the definition of a valuable resource. A resource also needs to be rare to have the potential for competitive advantage since if other firms also hold the valuable resource, no performance difference would arise from the resource, and thus no competitive advantage would emerge. However, a valuable and rare resource only provides a temporary competitive advantage, undermined as soon as another firm can copy or attain the resource. For sustained competitive advantage, the resource must also be imperfectly imitable, i.e., it cannot be copied or substituted by another firm. Finally, the resource needs to be organizationally enabled for the firm to leverage the resource for opportunity exploitation or threat neutralization (Barney, 2002). Together, these four criteria create the VRIO (valuable, rare, imperfectly imitable, and organizationally enabled) framework used to analyze a firm's resource base (Barney & Hesterly, 2019).

A deficiency of the RBV itself is that it takes a static perspective towards the firm's environment. That the firm can hold sustained competitive advantage as long as others are unable to imitate the resource implies that the resources remain valuable over time. However, changes in the external environment occur, affecting the value of resources (Helfat et al., 2007). To sustain a competitive advantage, the firm needs to be able to modify its resource base to match opportunities and threats emerging in the environment. To address this issue, dynamic capabilities (Teece et al., 1997) are perceived as an important extension of the RBV that allows RBV to be used in a changing market setting (Barney et al., 2011).

Dynamic capabilities also focus on the firm rather than the firm's environment, describing capabilities that the firm uses to attain and generate new resources and modify its existing resource base (Teece et al., 1997). Thus, dynamic capabilities focus on extending the long-term aspect of sustained competitive advantage over

time while accounting for changes in the firm's environment. As Teece (2007, p. 1320) describes, "*the ambition of the dynamic capabilities framework is nothing less than to explain the sources of enterprise-level competitive advantage over time, and provide guidance to managers for avoiding the zero-profit condition that results when homogeneous firms compete in perfectly competitive markets.*" Dynamic capabilities can be divided into three types depending on their relationship to the firm and its environment: sensing capabilities that focus on the firm's capability to identify emerging opportunities and threats in its environment, seizing capabilities that focus on designing and refining business models that enable exploitation and neutralization of the opportunities and threats in the environment, and transforming capabilities that focus on realigning existing organizational structures that can inhibit sensing and seizing capabilities (Teece, 2007, 2018).

Empirical studies have shown that dynamic capabilities play a role in the adoption of sustainability improvements in business. Through a survey of 222 Chinese firms, Zhou et al. (2018) identified that firms with developed dynamic capabilities (i.e., sensing, seizing, and reconfiguring capabilities) were more likely to voluntarily adopt the Chinese national Emission Trading Scheme, which was used as a proxy for willingness to adopt sustainable innovation in the study. Furthermore, by studying business model innovation for sustainability in eight case companies, Inigo et al. (2017) identified dynamic capabilities required from firms for evolutionary and radical business model innovation. For example, for evolutionary innovation, active stakeholder dialogue is necessary for sensing sustainability opportunities, while for radical innovation, a pro-active trend-searching approach is necessary, extending beyond the firm's traditional stakeholder groups.

The firm's response to changes in its environment materializes in the business model it employs, reflecting a resource configuration the firm perceives as creating superior value in the environment, leading to competitive advantage (Teece, 2018). However, the business model as a concept and what it constitutes has been blamed for ambiguity (Massa et al., 2017) and, partly due to its origins in explaining the emergence of internet businesses at the turn of the 2000s (Amit & Zott, 2001; Gordijn & Akkermans, 2001; Timmers, 1998), has been used often as a buzzword in practice (Magretta, 2002). To define what the business model constitutes in this thesis, a more detailed review of the business model concept is provided next.

2.1.1 Business model approach

The business model concept has gained popularity in the managerial and academic business literature as a concept describing how a firm creates value while capturing part of the value for itself (Teece, 2010). It has especially been used as a concept for taking a holistic perspective on how the firm creates value while developing new business (Blank, 2013; Teece, 2018). However, the concept's meaning remains ambiguous, which has raised concerns about its usefulness in academic research (Mäkinen & Seppänen, 2007; Massa et al., 2017). As a single view of what the business model is does not exist, clearly defining the business model concept is essential when using it in a research setting (Zott & Amit, 2013). At its heart, the business model is a story of how a business works (Magretta, 2002), or more specifically, how a business creates value (Teece, 2010). During its lifetime, the concept has evolved through multiple stages, resulting in multiple streams that partly agree and partly disagree on the details of the concept.

The business model is widely agreed upon to be closely linked to firm strategy (Casadesus-Masanell & Ricart, 2010; Teece, 2010; Zott & Amit, 2013). Describing how the firm creates value, the business model reflects its strategy, translating it into business activities or business tactics, as described by Casadesus-Masanell and Ricart (2010). A firm's existing business model can act similarly to strategy, where business opportunities are evaluated based on how they fit the firm's business model, as exemplified by Chesbrough and Rosenbloom (2002) and their research on innovation activity at Xerox PARC. Innovations that did not fit the firm's business model were frequently spun off as separate companies to avoid misalignment of business models. The business model has been identified as a construct for strategic analysis (Zott & Amit, 2013), benefitting from describing the system of how the firm creates value through business operations (Casadesus-Masanell & Ricart, 2010; Osterwalder et al., 2005; Richardson, 2008), that can be identified; while a firm's strategy provides higher-level guidelines that are harder to observe (Porter, 1996). In general, the business model describes how the firm executes its strategy (Richardson, 2008), and thus can also act as a unit of analysis for analyzing the strategic activities of firms.

Another widely agreed upon aspect of the business model is that it is a conceptual model of how the firm does business, i.e., that it can be used as a tool to simplify the complex value-creating activities of a firm into a cognitively manageable form (Osterwalder et al., 2005; Richardson, 2008; Zott & Amit, 2010). This property of the business model concept has been a cornerstone for making the concept a

practical tool for managers (Blank, 2013; Osterwalder & Pigneur, 2006), and as a way to operationalize strategy and business research (Zott & Amit, 2013). The business model's ability to simplify the value-creating system of a firm improves communication between managers while developing business models, or between managers and investors in venture proposals, as the business model acts as a boundary object between people (Doganova & Eyquem-Renault, 2009). In both managerial and academic literature, this property is used to showcase examples of certain types of business models, for example, in the form of archetypes of sustainable business models (Bocken et al., 2014). Accordingly, business models are not necessarily objective facts, but rather the subjective perceptions of the business model's designer, often the managers of the firm in a business setting, or the researchers mapping the business in an academic setting (Doganova & Eyquem-Renault, 2009).

Different views on the construction of the business model conceptualization exist. Two main approaches for business model conceptualization can be identified in the business model literature: the activity-based business model conceptualizations (e.g., Zott and Amit, 2010) and component-based business model conceptualizations (e.g., Osterwalder, Pigneur and Tucci, 2005). In the activity-based business model conceptualization, the business model is an activity system depicting who does what and how in order for customer value to emerge and economic value to accumulate for the focal firm and its partners (Zott & Amit, 2010, 2013). The activity system conceptualization highlights the system-level aspects of the business model, emphasizing activities required from the focal firm and its partners. While conceptually focusing on the system-level aspects, the activity system perspective to the business model is still centered on the firm. However, it supports an ecosystem perspective (Zott & Amit, 2013) to identify the activities required to deliver a value proposition to the market (Adner, 2017). As an example of the activity-based conceptualization, Table 4 displays the activity system design framework by Zott and Amit (2010).

Table 4. An activity system design framework by Zott and Amit (2010)

The framework provides insight by:	
Giving Business Model Design *a language, concepts, and tools*	
Highlighting Business Model Design as a *key managerial/entrepreneurial task*	
Emphasizing *system-level design* over partial optimization	
Design Elements	
Content	*What* activities should be performed
Structure	*How* should they be linked and sequenced?
Governance	*Who* should perform them, and *Where?*
Design Themes	
Novelty	*Adopt innovative* content, structure, or governance
Lock-In	*Build in elements to retain business model stakeholders, e.g., customers*
Complementaries	*Bundle activities* to generate more value
Efficiency	Reorganize activities *to reduce transaction costs*

The component-based business model conceptualization highlights that the business model consists of components, or building blocks, that are aligned and, when combined, depict the firm's value creation system (Morris et al., 2005; Osterwalder et al., 2005). This approach simplifies the business model to selected key business model areas, which managers and entrepreneurs should focus on while analyzing or developing their business model (Johnson et al., 2008). The component-based business model brings more structure to the conceptualization through the pre-identified components in the business model framework (Doganova & Eyquem-Renault, 2009). An example of an early component-based business model conceptualization is the one introduced by Osterwalder, Pigneur, and Tucci (2005), that has later been refined to the business model canvas, a managerial tool that, while not exceptionally grounded theoretically, has attracted popularity in business development globally (Osterwalder & Pigneur, 2006). Another example of a component-based business model approach, focusing mainly on entrepreneurs' business models, is the business model framework by Morris et al. (2005) that poses six questions that an entrepreneur's business model should be able to answer. The entrepreneur's business model framework by Morris et al. (2005) is shown in Table 5.

Table 5. Six questions that underlie a business model by Morris et al. (2005, p. 730)

Component 1 (factors related to the offering): How do we create value?
Component 2 (market factors): Who do we create value for?
Component 3 (internal capability factors): What is our source of competence?
Component 4 (competitive strategy factors): How do we competitively position ourselves?
Component 5 (economic factors): How we make money?
Component 6 (personal/investor factors): What are our time, scope, and size ambitions?

Due to the structure it provides for business model conceptualization, the component-based business model approach has been more popular in the business model literature than the activity-system based approach, especially in domain-specific research fields such as sustainability (e.g., Bocken et al., 2014; Lüdeke-freund et al., 2018). Furthermore, the component-based business model approach is more encompassing. It often includes activities within the selected components (see, e.g., Richardson, 2008) or as specific components themselves, as in the business model canvas and its key activities component. Thus, in this thesis, the business model is seen through the component-based business model approach and is defined as *the set of components in the firm's business venture that connects the customer value of the venture with the firm's ability to generate profit*.

However, the set of components varies between different authors in the business model literature. To maintain the usability of the business model as a unit of analysis, it is important to also determine the business model components identified as parts of the business model in this thesis (Zott & Amit, 2013). To determine the business model components, selected earlier literature was reviewed to identify common components, displayed in Table 6.

Table 6. Business Model components and subcomponents in selected literature

Author(s)	Components	Sub-components
Linder & Cantrell, 2000	Value proposition, value delivery, financial structure	**Value proposition:** customer, customer needs, products, services and experiences, channels, pricing **Value delivery:** execution, distinctive capabilities **Financial Structure:** How is our financial structure distinctive?
Morris et al., 2005	Offering, market, internal capabilities, competitive strategy, economic factors, personal/investor factors	**Offering:** product/service type, value creation and delivery **Market:** type of organization, geographical market size, customer position in the value chain, market segment, transactional/relational market **Internal capabilities (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 **Competitive strategy (select one or more):** Image of operations, product or service quality/selection/features/availability/innovation leadership
Osterwalder et al., 2005	Product, customer interface, infrastructure management, financial aspects	**Product:** value proposition **Customer interface:** target customer, distribution channel, relationship **Infrastructure management:** value configuration, core competency, partner network **Financial aspects:** cost structure, revenue model
Johnson et al., 2008	Customer value proposition, profit formula, key resources, key processes	**Customer value proposition:** A way to help customers get an important job done **Profit formula:** Revenue model, cost structure, margin model, resource velocity **Key resources:** Key assets that create value for the customer and the company **Key processes:** 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	**Value proposition:** Offering, target customer, basic strategy to win customers and gain competitive advantage **Value creation & delivery system:** Resources and capabilities, the value chain, activity system, business processes, links to suppliers, partners, and customers **Value capture:** Revenue sources, economics of the business

A common pattern in component-based business model conceptualizations is to divide the business model into main components, describing the value proposition, the value capture system, and the value creation and delivery system of the business model. In this thesis, these three main components of value proposition, value creation and delivery, and value capture are chosen, closely reflecting the business model components proposed by Richardson (2008). These highlight the primary function of the business model as per the definition used in this thesis: identifying the customer value in the value proposition component, identifying the firm's ability to generate profit from the business in the value capture component, and connecting these through the firm's activities and resources in the value creation and delivery system.

The conceptualization for the business model defined in this chapter provides a framework for identifying how firms can create value in the circular economy's changing environment. Although business models play a key role in seizing opportunities in a changing market (Teece, 2018), and the component-based business model conceptualization allows mapping the business models of firms in the market change to identify what kinds of business models they employ, the component-based business model concept itself is inward-looking, focusing on the focal firm instead of the effects of change in the firm's environment (Zott & Amit, 2013). The most outward-looking component of the business model is the value proposition, which identifies what value and to whom the firm's business model creates (Teece, 2010). Thus, to understand strategic value creation in a changing market, the value proposition literature is next reviewed in more depth.

2.1.2 Customer value propositions focusing on the value created in the business model

Customer value propositions are the central part of the business model of a firm, usually described as the starting point for designing a business model as they describe the value that the firm's business model will create, setting the foundation for any value capture possible (Johnson et al., 2008; Zott & Amit, 2010). However, customer value propositions do not originate from business model literature or strategy literature but have their own rich theory behind them, particularly in marketing literature (Payne et al., 2017).

The customer value proposition is a strategic concept, described as the principle around which the firm should organize its business (Payne et al., 2017). The

customer value proposition as a central organizing principle has also been described in the business model literature (Ehret et al., 2013; Johnson et al., 2008), where the business model is described as being designed around delivering the value proposition to customers. This strategic organizing perspective is rooted in the view that competitive advantage emerges from fulfilling customer needs better than competitors, leading to customers choosing the firm over the competition and to increased market share and superior economic performance for the firm (Slater, 1997). Thus, identifying and delivering superior customer value is crucial for the competitiveness of the firm.

The customer value proposition describes the value the firm proposes that its offering creates for the beneficiaries of the business (Ballantyne et al., 2011). Thus, like the business model, the customer value proposition is not an objective measurement of the value created but rather a subjective view described from the firm's point of view. Precedents of the customer value proposition include the unique selling proposition (Reeves, 1961), which highlights the difference of the firm's offering compared to the competition; and the core benefits proposition (Hauser, 1980), which highlights the benefits that the offering provides, building on these concepts and highlighting the need to organize the business around these propositions.

Initially, the concept was used to direct production-oriented firms to pay attention to their customers, improving their customer orientation and directing them to summarize why the customer should purchase their offering (Lanning & Michaels, 1988). Accordingly, the customer value proposition has evolved to have a role in the value creation process by acting as the firm's invitation for its customer to engage with the firm and create value through the integration of resources (Ballantyne et al., 2011; Payne & Frow, 2014). Thus, the customer value proposition should be an intentionally defined and articulated message towards the customers and other stakeholders that the firm needs to engage in the value creation process. Crucial aspects of successful customer value propositions are how the customer value propositions are identified, to whom they are directed, and what they contain.

Three perspectives, a supplier-determined, a transitional, and a mutually determined perspective, exist regarding the identification of the customer value proposition (Payne et al., 2017). The supplier-determined perspective is the dominant perspective in business model literature. From this perspective, the supplier predefines the customer value proposition, delivers it through the business model, and communicates it to the customer (Golub et al., 2000; Rintamäki et al., 2007). In the transitional perspective, more emphasis is placed on the value that

emerges during the customer's engagement with the offering, for example, through experiences (Morgan and Rao, 2003; Smith and Wheeler, 2002). The firm needs to engage in a more in-depth dialogue with customers to identify how value emerges during usage (Payne et al., 2017). However, the customer value proposition remains supplier-determined and directed towards customers. The mutually determined perspective adopts the view that value is not created by the firm and then delivered to the customer, but instead, that value is co-created by multiple stakeholders, including the customer and other stakeholders (Payne et al., 2017). Thus, the customer value proposition is also co-created, no longer directional from the supplier firm towards the customer, but rather containing reciprocal proposals of benefits between the suppliers and customers (Ballantyne, 2003).

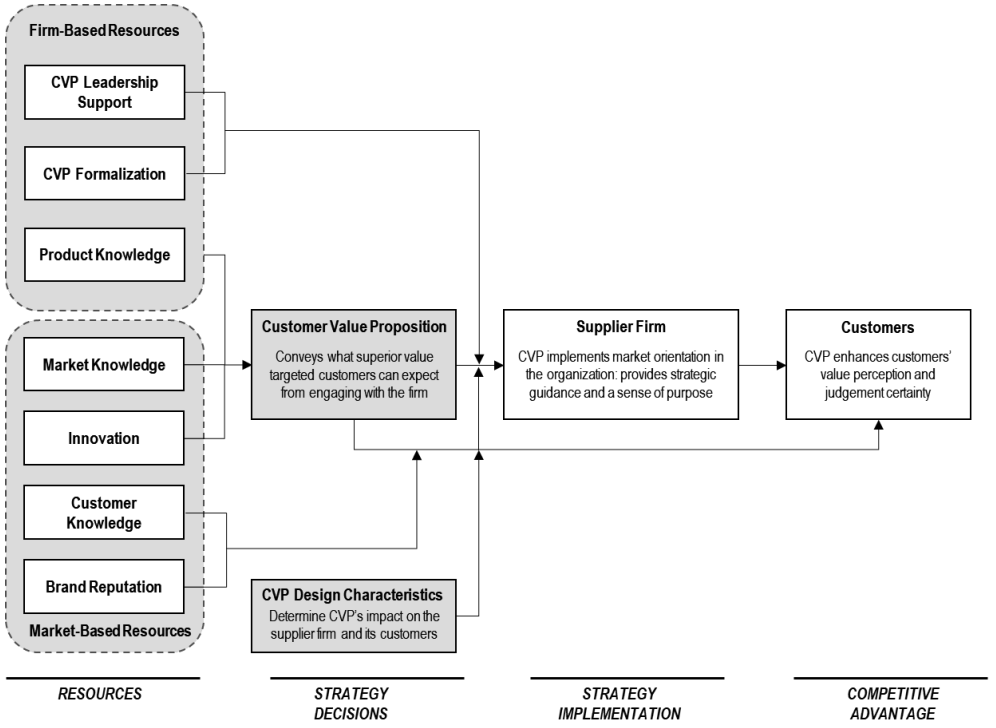
Regarding the recipients of the customer value proposition, customer value propositions were originally directed explicitly towards target customers to invite the customer to engage with the firm's offering (Anderson et al., 2006). While the target customer remains the central and most important focus group of the customer value proposition (Eggert et al., 2018), there are increasing calls towards customer value propositions that articulate value towards a broader stakeholder audience, for example, employees, suppliers, partners, shareholders, or policymakers (Chandler & Lusch, 2015; Frow et al., 2014). Motivating this broader stakeholder perspective is the ability of stakeholder actors to participate in the value creation process. Especially in an industrial B2B context, firms need the support of partners to create value (Frow et al., 2014), and thus, communication of the benefits of the focal firm's business can improve the ability to create superior value for the end customer.

Regarding the content of the customer value proposition, at the core of the customer value proposition are usually the types of value that customers are proposed to receive. Initially, the communicated benefits in customer value propositions were primarily economic, especially in the B2B context (Anderson et al., 2006). Developing the types of values that the customers might further receive, Rintamäki et al. (2007) developed a categorization of four types of value that the customer could receive: economic, functional, emotional, and symbolic. In this categorization, economic value refers to aspects such as price and the ratio between quality and price, mainly referring to the monetary value of the offering. Functional value describes aspects such as convenience and performance of the offering. Emotional value describes the offerings' ability to arouse feelings or affective states through e.g. visual, auditory, olfactory, sensory, and gustatory clues. Finally, symbolic value describes the offerings' ability to support self-expressive aspects of consumption, i.e., the customer communicates to others underlying meanings

through engaging with the firm's offering (Rintamäki et al., 2007). Further widening the type of value communicated in customer value propositions, recent contributions in the field have highlighted the potential for communicating sustainability aspects in customer value propositions, as identified by Patala et al. (2016) in their analysis of the offerings of a metallurgical and an automotive manufacturing firm, and wider societal benefits emerging from the offering of the firm (Keränen, 2017; Porter & Kramer, 2011).

Overall, the decisions around formulating and communicating the customer value proposition act as a strategic tool for organizing a firm's business. Here, the properties presented earlier matter. For example, highlighting a broader value perspective in the customer value proposition should lead the firm's organization to deliver the broader value and thus be reflected in its business activities. Figure 3 presents a strategic perspective on the customer value proposition by Payne et al. (2017).

Figure 3. Antecedents and consequences of the customer value proposition (CVP) by Payne et al. (2017, p. 475).



As displayed in the framework, the customer value proposition is a strategic decision and a result of the firm identifying value creation opportunities from its environment through market knowledge and innovation resources. This perspective is aligned with the concept of the business model as a result of the firm's seizing capabilities (Teece, 2018). Therefore, analyzing firms' customer value propositions offers the potential for a more in-depth analysis of how firms are strategically responding to market changes related to the circular economy.

2.2 Circular economy for sustainable value creation

As a potential pathway towards developing more sustainable industrial business (Ghisellini et al., 2016), the circular economy has rapidly gained interest from businesses (Ellen MacArthur Foundation, 2015b), researchers (Türkeli et al., 2018), and policymakers (McDowall et al., 2017). The circular economy is thus both answering the calls from strategy literature towards providing methods for implementing sustainability into business (Engert et al., 2016) and creating change that affects the strategic positions of firms in their environment (Helfat & Peteraf, 2003). Thus, the circular economy-induced transformation is a particularly interesting phenomenon from the perspective of strategic business development.

Circular economy is most commonly referred to as a regenerative system where the value of products and materials is maintained for as long as possible while minimizing waste and employing renewable energy (Kirchherr et al., 2017; Türkeli et al., 2018). The circular economy draws from earlier literature on industrial ecology, industrial symbiosis, cradle-to-cradle design, and product-service systems (Homrich et al., 2018). It includes the fundamental ideas that natural resources available to human consumption are finite, and thus that industrial firms need to minimize the extraction of natural resources and resource leakage from the system as waste to have longevity (Ghisellini et al., 2016). This fundamental idea draws from the "Spaceship Earth" conceptualization by Boulding (1966), which emphasizes Earth's closed-system nature. This basis for circular economy has linked the concept to both sustainability transition as a potential pathway towards more sustainable industrial business (Geissdoerfer et al., 2017), and to the ability to better create value through maintenance of value within the system and improved resource efficiency (Preston, 2012). This leads to potential business benefits through reduced costs and improved revenues (Ellen MacArthur Foundation, 2015b; Linder & Williander, 2017). Thus, the circular economy market change is being driven by a sustainability-focused

perspective and a business-value-focused perspective, with objectives that are often, but not always, aligned (Hofmann, 2019).

In the circular economy market transformation, firms face two challenges to gaining economic benefits from the concept. On the one hand, there is increasing pressure to move towards sustainable business. Especially in terms of policy, this pressure is increasingly explicitly aligned with the adoption of the circular economy concept (McDowall et al., 2017). Also, industrial firms' customers are expecting industrial suppliers to focus on the sustainability aspects of their business (Kapitan et al., 2019; Mariadoss et al., 2011), and the circular economy provides industrial firms a pathway towards attaining this focus. On the other hand, even without external pressure, circular economy carries economic benefits if successfully adopted, and these benefits can be expected to increase as the sustainability issues that the circular economy addresses continue to worsen (Ferasso et al., 2020).

From the value creation perspective, scholars in the circular economy field have adopted the business model concept from strategy literature to describe implementing circular economy in a business context (Ferasso et al., 2020). Within the business models for circular economy literature, three perspectives towards implementing circular economy into business can be identified. These approaches and their perspective towards implementing circular economy for value creation are displayed in Table 7.

Table 7. Streams in the business models for circular economy literature

Stream	Perspective to value creation from CE	Key literature
Strategies, patterns, and components	Implementation of circular economy principles within the components of the business model improves the value creation potential of the business model as an entity.	(Bocken et al., 2016, 2018; Lüdeke-Freund et al., 2019; Manninen et al., 2018)
Managerial practices	The implementation of circular economy into business requires certain managerial practices in order to create value	(Centobelli et al., 2020; Ünal, Urbinati, Chiaroni, et al., 2019; Urbinati et al., 2017)
Product-service systems	Circular economy improves value creation through increasing focus on service-based business models	(Alcayaga et al., 2019; Tukker, 2015)

The product-service systems stream also extends outside of the circular economy literature but has seen adoption within the circular economy literature due to its relative maturity compared to circular economy-focused business model literature (see, e.g., Tukker and Tischner, 2006). Within this research stream, Bressanelli et al.

(2018) conducted a qualitative case study of a household appliance retailer's adoption of a product-service system and showcased how adopting different service business models contributes towards circular economy. Specifically, they showed that usage-focused and result-focused service business models, where the provider retains product ownership, were more effective in enabling the closing of resource loops and increasing resource efficiency, while a product-focused service business model was only able to extend the lifespan of a product by offering after-sales services such as repairs and maintenance.

However, due to its specificity to the service business model approach, the product-service system stream does not cover the whole of the circular economy phenomenon (Blomsma & Brennan, 2017). The other approaches are consistent with the component-based (Morris et al., 2005; Richardson, 2008) and activity-based (Zott & Amit, 2010) conceptualizations of business models identified from the strategy literature. The managerial practices stream's perspective is that certain activities and managerial practices are important for implementing circular economy in a way that creates value in business, thus adopting the activity-system perspective. For example, Ünal et al. (2019) conducted a qualitative single-case study in an Italian company from the office supply sector, fully operating based on circular economy principles. Through analysis of the firms within the circular economy business model, they identified that specifically, three types of managerial practices are important in circular economy business model: practices towards the value network of the company, e.g., building trust-based collaborations and leveraging skills and resources in the value network to achieve circular goals; practices towards the customer, e.g., effective storytelling of circular economy achievements to create customer attachment; and practices that showcase commitment to circular economy within the firm. Also focusing on managerial practices, Urbinati et al. (2017) conducted a multiple-case study of 24 firms that have adopted circular economy principles in their business. The study identified a taxonomy of linear, upstream circular, downstream circular, and fully circular business models, depending on whether the managerial practices towards circular economy focused on the value network of the firm (meaning that the firm was upstream circular), the customers of the firm (meaning that the firm was downstream circular), or both (meaning that the firm was fully circular in their business model).

In the strategies, patterns, and components stream, the perspective is that to create value, implementation of circular economy principles within a business model has to lead to benefits in individual business model components (Lewandowski, 2016) or in the business model as a holistic pattern of components (Lüdeke-Freund

et al., 2019). Empirical studies from the strategies, patterns, and components perspective usually focus on how implementing circular economy affects pre-defined parts of the firm's business model. Studies in this stream have also focused on delivering tools to facilitate the adoption of circular economy business models in firms. For example, Manninen et al. (2018) conducted a multiple-case study of three firms with circular economy business models, developing a framework that could strengthen firms' environmental value propositions through improved verification of the sustainability impacts of the business model. In an action research study in eight case companies, Bocken et al. (2018) developed a Circular Business Experiment cycle tool, with which firms could ensure that they reached sustainability goals by adopting circular economy business models. Thus, the strategies, patterns, and components stream has been the most focused on facilitating the adoption of circular economy within firms. However, the perspective has been mostly on ensuring that environmental benefits are reached, even if it means forgoing opportunities for economic value creation emerging in the process (Bocken et al., 2018).

This thesis adopts the component-based business model and therefore follows the strategies, patterns, and components stream of business models for circular economy literature. Within this stream, it is crucial to understand the principles of circular economy in order to study their implementation within business model components for value creation (Lüdeke-Freund et al., 2019). Thus, the next section reviews the central principles related to circular economy.

2.2.1 Circular economy principles: R-principles and resource flow strategies

A primary objective of circular economy is to keep products and materials in circulation. Thus, closing material and product supply chains into loops is a central idea of circular economy, emphasizing its main difference from the currently dominant linear economy. In a linear economy, natural resources are extracted as raw materials, refined into products, sold to customers, and used until they become waste. Thus, a linear economy proceeds in a take, make, and dispose process, putting an excessive strain on the natural environment through resource extraction and waste accumulation. In the circular economy, loops are introduced to reduce the necessity of both extracting resources and generating waste (Stahel, 2010, 2013). However, the concept of a loop is abstract, and thus more precise descriptions have

been developed within the circular economy research field (Bocken et al., 2016; Ghisellini et al., 2016). Two of the most widely used conceptualizations, the 3R principles of reduce, reuse, and recycle (Ghisellini et al., 2016), and the resource flow strategies of closing, narrowing, and slowing resource flows (Bocken et al., 2016; Lüdeke-Freund et al., 2019), are described as complementing each other as different principles to the circular economy.

First, the 3R principles are one of the most widely used concepts to describe the implementation of circular economy (Ghisellini et al., 2016; Kirchherr et al., 2017). The 3R principles originate from the waste management hierarchy adopted in places like the European Union (The European Parliament and the Council of the European Union, 2008), preceding the circular economy concept itself. The *reduce principle* refers to the overall reduction of the usage of material or products. From the perspective of value creation, reducing refers to generating the same value with a reduced amount of materials, thus directly reducing the material intensity of value creation (Su et al., 2013). The reduce principle itself does not describe a loop but highlights the inherent negative environmental effects of products and materials as potential polluters in production, use, and disposal, and the effectiveness of reducing their amount to improve sustainability. The *reuse principle* refers to returning products into circulation either in the original intended use or in some lower value-creating form. Also, reuse can take place on the product level, but also partially as components of the product (Castellani et al., 2015). Reusing requires, for example, reverse logistics to return the product for reuse and potential remanufacturing or maintenance activities for restoring the product to a form that is again valuable for end-users (Prendeville et al., 2014). The *recycle principle* refers to returning products and materials into circulation as processed materials. Compared to reusing, the recycling loop is more removed from the user, and the resources are returned into a more primitive form. Thus, processing and logistics are needed to bring the product back into a value-creating state. (Stahel, 2013) The 3R principles form a hierarchy, where reduction is preferred as the most energy-conserving method, and reuse is preferred over recycling as it requires less energy and is thus less environmentally harmful (Korhonen et al., 2018; Prendeville et al., 2014).

With only two separate loops and the reduce principle as a pre-loop activity, the 3R principles communicate the fundamentals of the loop conceptualization in the circular economy. The most value-preserving and energy-efficient internal loops are preferred to keep products and materials in circulation, while outer loops prevent leakage of resources from circulation and create value when the inner loops are no longer feasible. The circular economy literature has expanded on the 3R principles,

and, for example, conceptualizations of up to 9R principles have been introduced (Kirchherr et al., 2017). Also, some authors have adopted the grey literature-originated conceptualization developed by the Ellen MacArthur Foundation, also described as "the butterfly concept," where technical and nutrient cycles are separated into their own loops, and more refinement is introduced to the technical cycles in the form of product sharing, maintenance, and remanufacturing. However, the basic approach of multiple cascading loops stays the same in each of these conceptualizations (Kirchherr et al., 2017; Nußholz, 2018).

Another approach to the loop conceptualization of the circular economy is the resource flow strategies of closing, narrowing, and slowing resource flows, introduced by Bocken et al. (2016). The resource flow strategies describe different approaches to the loops themselves. The *closing loop strategy* is similar to the reuse and recycle principles, calling for diverting products and materials from becoming waste and returning them into circulation. The *narrowing loop strategy* is similar to the reduce principle of the 3R principles, calling for reducing the volume of products and materials in the circulation, i.e., narrowing the resource flow. The *slowing loop strategy* highlights that each loop can be made longer, which will then reduce the impact of, for example, the materials needed for a product. The idea is that customers need to replace longer life-cycle products less frequently, reducing the overall volume of their production. (Bocken et al., 2016). While the 3R principles and similar hierarchy-focused loop conceptualizations rarely explicitly highlight the slowing of resource loops, the notion of lengthening product life-cycle—for example, through maintenance—is often included as its own loops in the respective models. For example, in the 9R-principles framework, the principles of reuse, repair, refurbish, and remanufacture all describe ways for slowing the resource loop of a product (Kirchherr et al., 2017).

2.2.2 Multilevel perspective towards systemic circular economy implementation

The 3R principles and the resource flow strategies describe what kinds of changes and activities need to be adopted in the circular economy to maintain the value of products and materials. These principles focus heavily on the material flow and supply chain aspects of business, and thus on implementing circular economy mainly from the perspective of industrial firms doing the final implementation of circular economy into business (Franco, 2017). However, industrial firms also face pressure

from other stakeholders towards implementing circular economy, as exemplified by policymakers in the EU and China (McDowall et al., 2017). To achieve the circular economy's sustainability benefits, adopting circular economy principles by a single firm is not enough to minimize resource extraction and waste accumulation; instead, the adoption needs to be systemic (Charonis, 2012). Furthermore, closing loops on materials and products is not feasible by a single firm in today's specialized, core competency-focused industrial firms with long supply chains. (Ghisellini et al., 2016) Thus, a system-level perspective is necessary for the effective implementation of circular economy. Circular economy research has increasingly adopted the multilevel perspective to address this requirement, discussing macro-, meso-, and micro-level activities that enable circular economy market transformation (Kirchherr et al., 2017). As these perspectives display the sources of the change to the environment in which industrial firms conduct business, the multilevel perspective on circular economy implementation is briefly reviewed next.

A *micro-level perspective* of the circular economy refers to circular economy implementations done by individual firm-level actors (Kirchherr et al., 2017). Thus, they are the closest to adopting circular economy principles, translating to implementing at least some of the principles concretely in business (Franco, 2017). In industrial firms, ways to implement circular economy principles can be, e.g., designing products in a way that the 3R principles can effectively be followed hierarchically (Braungart et al., 2007; Lieder & Rashid, 2016; Moreno et al., 2016); adoption of circular supply chains and take-back systems (Franco, 2017; Lewandowski, 2016); and the implementation of circular economy business models (Centobelli et al., 2020; Geissdoerfer et al., 2018; Linder & Williander, 2017). On the micro level, the customers also have a key role in circular economy implementation, as their needs for circular economy aligned business ultimately determine business success (Camacho-Otero et al., 2018).

A *meso-level perspective* of the circular economy refers to implementation on the regional and business network level, driving towards effective implementation of circular economy principles in a contained group of actors. (Feng & Yan, 2007; Geng et al., 2009) The focus of meso-level implementation is to minimize the generation of waste and the need to extract natural resources by the combined group of the firms within the meso-level network (Saavedra et al., 2018). On the meso level, industrial symbiosis has been one method of achieving this goal that takes place through the sharing of resources (Jacobsen, 2006) and the use of byproducts between the firms in the network (Mathews & Tan, 2011). The economic benefits of using byproducts among firms can quickly be negated through costs from logistics

and needed refinement. Thus, one of the requirements for the economic feasibility of meso-level implementations is often the co-location of the facilities of the firms (de Oliveira et al., 2018). However, to achieve systemic circular economy adoption, meso-level implementations outside regional cases are also necessary. For example, implementing circular economy principles within supply chains is becoming an important topic in circular economy research (Genovese et al., 2017; Nandi et al., 2020; Winkler, 2011).

A *macro-level perspective* of the circular economy affects the entire economic system, driving a transformation of the economic system from linear towards circular (Yuan et al., 2006). In practice, macro-level activities towards systemic change are driven by policymaking that enables and supports the implementation of circular economy principles to drive economic actors to widely adopt circular economy practices (Ghisellini et al., 2016). The most prolific macro-level activities taking place towards the circular economy have been the adoption of the concept as a development strategy by China (Mathews & Tan, 2011; Yuan et al., 2006), and the action plans towards the implementation of circular economy in the European Union (European Commission, 2015). Overall, the macro-level activities give regulative frameworks within which firms maneuver, and which can make the implementation of circular economy more desirable economically, if for example, the usage of recycled materials is incentivized, or government-supported industrial symbiosis projects make the use of byproducts by different industrial firms economically feasible (Mathews & Tan, 2016). However, macro-level activities can also hinder the systemic move towards circular economy if the focus of the policies introduced is not well aligned with circular economy principles (Ragossnig & Schneider, 2019).

From the circular economy perspective, industrial firms need to consider the circular economy's principles and the supporting and inhibiting activities across the multilevel perspective while developing circular economy aligned business. Through business models (Lüdeke-Freund et al., 2019) and customer value propositions (Lieder et al., 2018), the firm can identify economically beneficial ways to implement circular economy that allows improved value creation for customers and improved value capture for the firm. However, to gain a sustainable competitive advantage from the transformation, instead of temporary tactical or technical advantages diminished as the circular economy moves forward, industrial firms need to identify changes emerging in the values held by the firm's customers and stakeholders (Oliver, 1997). To address this environment-facing side of business development for the circular economy-induced market transformation, the institutional theory

research field describes ways to address how a changing institutional environment can affect the pathways towards creating value.

2.3 Role of the institutional environment in value creation

While the circular economy is already interesting from a business development perspective due to its promise of business improvements through promoting systemic efficiency (Ghisellini et al., 2016), it is also connected to the requirement for improving the sustainability of business (Geissdoerfer et al., 2017; Murray et al., 2015). Thus, the ability to create value through the implementation of circular economy cannot entirely be understood by analyzing the improvements of the business model gained from a technical or an economic perspective. Strategic decisions on whether to implement circular economy must also identify the developing perceptions towards the current ways of doing business and the circular economy proposed alternative (Kapitan et al., 2019; Mariadoss et al., 2011). If perceived negatively by potential customers or banned through regulation, even technically feasible and economically efficient business models cannot maintain competitiveness (Rugman & Verbeke, 1998; Slater, 1997). Thus, the institutional environment where the firm operates needs to be considered while developing business from circular economy.

Institutional theory focuses on explaining why humans act in specific ways in a social setting. Institutional theory suggests that people follow institutions, i.e., formal and informal rules, when engaging in social interactions (Scott, 1987). The institutions manifest themselves as desirable or non-desirable actions based on whether the actions are aligned with the institutions established in a particular environment, called the institutional environment. People within the institutional environment strive towards acting under the established institutions to be accepted by other social actors. (Scott, 2008a) Actions that are aligned with the established institutions are considered legitimate, and the influence of the institutions driving people towards these legitimate actions lead to people, and organizations that consist of groups of people, acting in similar ways due to their embeddedness in the same institutional environments, a phenomenon called isomorphism in the institutional theory literature (DiMaggio & Powell, 1983). Considering that actions with legitimacy are institutionally valued positively, and actions without legitimacy are institutionally valued neutrally at best and negatively at worst (DiMaggio & Powell,

1983), the institutional environment has a role in the potential of a firm's business to create value.

As circular economy transformation is still emerging (Ghisellini et al., 2016), the institutional environment is developing globally. From a strategic perspective, two general approaches towards acting in such a developing institutional environment are aligning to the institutional environment, thus acting in a way the market perceives as legitimate at the moment; or influencing the development of the institutional environment (Markard et al., 2016), to shape it towards where the legitimacy of the firm's business improves, potentially leading to competitive advantage (Chaney et al., 2019; Oliver, 1997). To further discuss these perspectives, this chapter reviews what the institutional environment comprises and the literature on strategies towards aligning to and shaping the institutional environment to create value.

2.3.1 The pillars of institutions

To recognize what institutions consist of, the framework of regulative, normative, and cultural-cognitive pillars of institutions has become established in the institutional theory literature (DiMaggio & Powell, 1983; Scott, 2008a; Suchman, 1995). By containing a set of rules, norms, and beliefs, these pillars of institutions regulate social behavior both consciously and unconsciously, becoming visible in the activities, resources, and relationships of social actors, including individuals and organizations (Scott, 2008a). The pillars evolve from conscious, deliberate, and coercive institutions of the regulative pillar; to the values-based institutions of the normative pillar; to the often unconscious, taken-for-granted institutions of the cultural-cognitive pillar. The main features of each of Scott's (2008) pillars of institutions are displayed in Table 8.

Table 8. The Pillars of Institutions by Scott (2008a, p. 51)

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

The regulative pillar consists of formal and informal laws and rules (Scott, 2008b). As the most visible and explicit pillar, research on institutions' effects is often focused on the construction and influence of the regulative pillar on social behavior (Scott, 2008a). While formal law is a prime example of the regulative pillar, regulative institutions can also be informal, combining written laws and rules with unwritten codes of conduct that actors consciously know should be followed (North, 1990). The mechanism through which regulative institutions influence the institutional environment actors is coercive, relying on force and sanctions (Scott, 2008a). The sanctions can be both negative penalties for not following the behavior mandated by the institution, such as a fine for breaking a law; and positive incentives linked with mandated behavior, such as a discount for customers that follow specific rulesets set by a firm (Milgrom & Roberts, 1992). While relying on coercive power as its mechanism of influence on the institutional environment, the regulative pillar is built on a normative framework that supports the desirability of the laws and rules, thus creating the basis for the legitimacy of the regulative pillar (Scott, 1987).

The normative pillar is based on values and norms and is thus considerably more abstract and subjective than the regulative pillar (Scott, 2008a). The normative pillar focuses on the perception of appropriate behavior, describing what kind of behavior is preferred or desired (the values in the normative pillar) and the ways things should be done (the norms of the normative pillar). Together, norms define the legitimate methods of pursuing values in the institutional environment. (Suchman, 1995). While norms and values themselves can be difficult to identify in an institutional

environment, they are indicated by certifications and accreditations given to actors that are aligned with the normative pillar (DiMaggio & Powell, 1983). Such accreditations and certifications are often visible in sustainable business, where coercive laws and rules do not mandate, for example, the use of recycled materials, but products made with such materials can be given certifications that indicate to the market that the product is produced more sustainably.

The cultural-cognitive pillar focuses on the ways actors perceive the world, depicting the common frames of reference adopted in the institutional environment (Scott, 2008a). The basis of the concept of the cultural-cognitive pillar is the thinking that an individual's cognitive representation of the world, i.e., the meanings they attribute to gestures or words, affects the way the individual acts. Thus, people with different cognitive representations act differently while in a similar situation. (D'Andrade, 1984) As the cultural-cognitive institutions originate from common cognitive representations of the world in an institutional environment, individuals often do not consciously identify this pillar's influence, especially within their own institutional environment. Instead, behavior aligned with the cultural-cognitive pillar is simply seen as "the way things are done" (Scott, 2008a, p. 58) and is taken for granted (Järvenpää, 2009). Followingly, cultural-cognitive institutions can be difficult to identify and are indicated by common beliefs, shared logics of action, and isomorphism (Scott, 2008a). While common beliefs and shared logics of action are indicated on an individual level, where deviating from these can lead to an individual being perceived as incompetent or uninformed (Jepperson & Swidler, 1994; Scott, 2008a), isomorphism can be identified on an organizational level. While an organization's form, according to organizational studies, results from environmental needs and competitive pressures (Hannan & Freeman, 1989), organizational forms often follow the same structures within the same field. In institutional theory literature, this similarity of organizational form has been accredited to following common beliefs of suitable organizational structures within an institutional environment, thus leading to isomorphism between organizational forms (DiMaggio & Powell, 1983), instead of competitive differentiation as highlighted by strategy literature (Porter, 1996).

Through these three institutional pillars, institutions influence social behavior and interactions. As business is also social interaction, it is also governed by the institutions, and researchers have adopted institutional theory in the analysis of business performance (Peng et al., 2009) and organizational behavior, such as the implementation of corporate social responsibility (Brammer et al., 2012). From the perspective of developing value-creating business, the relationship between the

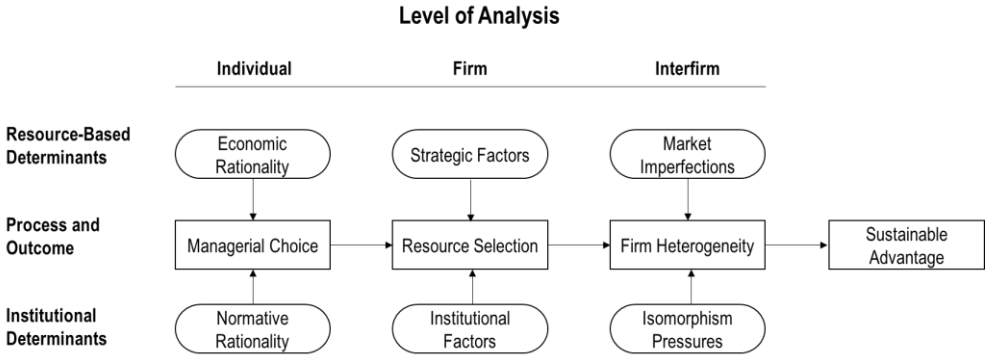
firm's business model and how it fits the institutional environment in which the firm operates is an important issue, as acting against the institutional environment is perceived undesirable and reduces potential customers' willingness to engage in business with the firm (Vargo & Lusch, 2016). With regard to the circular economy, the concepts of emergence and adoption are still ongoing and in an early phase (Bocken et al., 2017), and the institutions regarding the phenomenon are still developing. For example, legislation regarding waste is being reevaluated to allow materials to circulate (Levänen, 2015), and normative perceptions towards second-hand and shared use of products are becoming more positive in comparison to the acquisition of new products for one's own use (e.g., Belk, 2014; Lieder *et al.*, 2018). Thus, firms developing new business in the circular economy transformation face the challenge of balancing between aligning to the current institutional environment to act legitimately (Peng et al., 2009) and the potential for shaping the developing institutional environment in a way that is beneficial for the strategic positioning of the business of the firm (Chaney et al., 2019). These two approaches are reviewed next.

2.3.2 Aligning to the institutional environment to create value

Institutional theory has been adopted to help understand the strategic implications of the environment where a firm does business in with increased depth compared to just perceiving the environment as a context for the study (Oliver, 1997). Institutional theory in extant strategy literature is mostly used to support the established industry-based (Porter, 1980) and resource-based views (Barney, 1991), neither of which considers the broader social aspects of the business environment central to sustained competitive advantage (Peng et al., 2009). Strategy researchers employing institutional theory highlight that even if firms perfectly follow the implications of the industry-based and resource-based views, they still need to consider the 'rules of the game' or risk negative societal perceptions and legal action against them for not doing so (Meyer et al., 2009; Peng et al., 2009). With regard to industrial firms, B2B customers are already increasingly demanding sustainability from suppliers, anticipating the trend towards sustainability being important in the institutional environment to continue to strengthen (Kapitan et al., 2019; Mariadoss et al., 2011). Thus, firms need to identify the institutional environment in which they conduct business and align their strategy to it to be considered legitimate (Meyer et al., 2009).

The basis for adopting an institutional perspective in strategy literature was the phenomenon of isomorphism, i.e., the similarity of organizational structures and forms between firms in the same field (DiMaggio & Powell, 1983). Both industry-based and resource-based views of strategy highlight the importance of firm heterogeneity as the basis for the emergence of competitive advantage and the ability to generate rents, i.e., to generate profits from a firm's resources (Barney, 1991; Porter, 1980). Although the aim of selection and accumulation of resources is economic rationality, differences between firms emerge due to the bounded rationality of strategic managers and imperfections of the resource market from which firms acquire strategic resources; this contributes to some firms holding a competitive advantage over others (Amit & Schoemaker, 1993). However, the phenomenon of isomorphism shows that the resource selection and accumulation of firms are also suspect to normative rationality in addition to economic rationality; managers make decisions under social influence and the pressure of conforming to social expectations in the institutional environment, leading to similar as opposed to diversified resource bases of firms (DiMaggio & Powell, 1983). Thus, the firm's institutional environment has a role in resource selection and accumulation and the emergence of competitive advantage for firms (Oliver, 1997). The framework by Oliver (1997) illustrating the process by which institutions affect strategy is displayed in Figure 4.

Figure 4. Sustainable advantage: Determinants of the process by Oliver (1997, p. 699).



Thus, the adoption of institutional theory in strategy initially focused on making the normative rationality visible in strategy literature while still perceiving the firm's institutional environment as mainly static, out of the firm's influence. Creating superior value in an institutional environment and achieving a competitive advantage

thus requires measures to identify and analyze the institutional environment and align the firm's resources accordingly. (Oliver, 1997; Peng et al., 2009). For example, Oliver (1997), analyzing the implications of institutional theory on strategic management, proposed that in addition to resource capital, i.e., value-enhancing assets and competencies, firms need institutional capital, a context that enhances the optimal use of value resource capital, both within and outside of the firm. Further integrating institutional theory with strategy, Peng et al. (2009) propose an institution-based view as a third dimension of strategic analysis, in addition to industry-based (Porter, 1980) and resource-based views (Barney, 1991; Wernerfelt, 1984); highlighting that to ensure good performance, firms need to do due diligence regarding the institutional environment, especially in the case of emerging and new markets. Overall, the alignment perspective to integrating strategy and institutional theory focuses on identifying institutional constraints and drivers, both within the firm and external to the firm; managing the internal institutions, i.e., company culture (Oliver, 1997), to avoid suboptimal use of resource capital due to institutional issues such as stagnation to taken-for-granted activities; and aligning to the external institutional environment to avoid illegitimacy of business (Peng et al., 2009) while maintaining competitive advantage by creating differentiation from other firms (Oliver, 1997). The institutions in the environment also change over time, thus requiring the firm to stay informed about potential changes to the legitimacy of their business to maintain alignment (Markard et al., 2016).

2.3.3 Shaping the institutional environment to create value

While the alignment perspective of the institutional theory in strategic management has focused primarily on identification (sensing the institutional environment) and aligning to it (seizing its opportunities with the firm's resources) (Peng et al., 2009; Teece, 2007), development in the institutional theory literature itself has adopted a more active role for the firms in the institutional environment. It has done so by emphasizing that firms have agency within the institutional environment (DiMaggio, 1988). Thus, firms themselves conduct institutional work where they create, maintain, and change institutions (Hampel et al., 2017; Lawrence et al., 2013). The ability to conduct institutional work, and thus shape the institutional environment of the market where a firm operates, implies that the firm is not limited to the current institutional environment but can influence it towards better strategic outcomes. This identification of the importance of institutional environment for value creation,

and the ability to influence the institutional environment through deliberate action, has been recently taken up, especially in marketing literature (e.g., Chaney, Carrillat and Zouari, 2019; Nenonen, Storbacka and Windahl, 2019; Slimane *et al.*, 2019).

Recently, marketing literature has moved towards conceptualizing value creation as a phenomenon that takes place in a systemic context, rather than in supplier-customer dyads; and that in this systemic context, value is co-created by multiple actors rather than created by the supplier and delivered to the customer (Vargo & Lusch, 2004). In this systemic perspective of value creation, system-level rules for valuing activities have become an important concept, and marketing literature has adopted institutional theory to explain these rules (Vargo & Lusch, 2016, 2017). In other words, current marketing literature views institutions as important determinants of the emergence of value in markets. Following this logic, Nenonen, Storbacka, and Windahl (2019) categorize market-shaping capabilities placing great emphasis on capabilities that allow firms to reform institutions. Linking the market-shaping capabilities to dynamic capabilities, capabilities to reform institutions are categorized as triggering capabilities: activities that firms carry out to directly trigger a change in the market by generating new resource linkages. Specifically, firms can reform institutions by influencing representations in the market; for example, by influencing terminology used or how media portrays the market, or by influencing the norms of the market by influencing industry associations to promote relevant themes in the market or by influencing policymakers and thus the formal rules and laws governing the market. (Nenonen et al., 2019) From the perspective of the three pillars of institutions (Scott, 2008a), firms can thus shape the market's institutional environment by primarily influencing the ways-of-thinking of the cultural-cognitive pillar by influencing representations, and the coercive rules of the game of the regulative pillar through by norms. Both approaches influence the things considered valuable of the normative pillar.

In addition to showcasing that firms shape markets by reforming institutions, Nenonen, Storbacka, and Windahl (2019) highlight that market shaping does have broader consequences in the market than just improving the focal firms' ability to create value. It also improves the market stakeholders' overall ability to create value, thus "increasing the size of the pie" by growing the market's overall size and profitability. Furthermore, to successfully pursue market shaping, firms need to understand how value creation occurs in the larger system in which the firm is embedded and identify the institutional arrangements that govern behavior in this system. (Nenonen et al., 2019) This broader perspective allows firms to avoid "the new marketing myopia," where an overly narrow view is placed on customer needs

in business development, disregarding the role of other stakeholders and a wider perspective of customer values for value creation in the market (Smith et al., 2010).

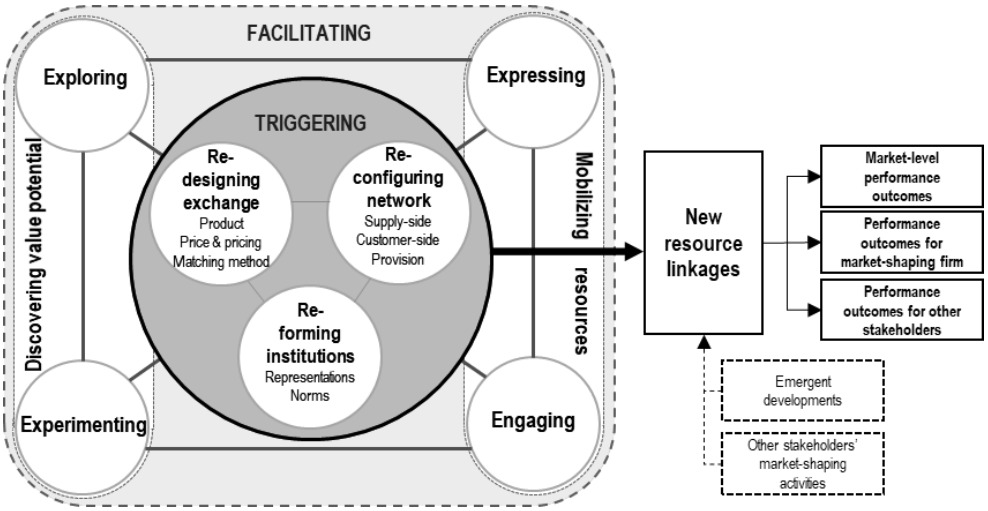
Taking a more firm-centric perspective, Chaney, Carrillat, and Zouari (2019) introduce institutional orientation as a strategic orientation for firms, focusing on shaping the institutional environment to allow the firm to achieve superior performance with its resource base. Compared to institutional work (Lawrence et al., 2013) as temporary, context-specific, and opportunistic, taking place only when the firm identifies a specific need for it (e.g., Palmer, Medway and Warnaby, 2017), institutional orientation is a strategic, long-term, embedded institution within the firm itself towards analyzing and influencing the firm's institutional environment. Institutional orientation entails three key dimensions: institutional customers, institutional embeddedness, and market legitimacy. The key institutional customers concept refers to firms focusing on customers with the most influence and power in the institutional environment. Institutional embeddedness refers to a firm's understanding of its institutional environment and its ability to influence it. Finally, market legitimacy is the image and reputation of the firm in the institutional environment. These dimensions are connected; for example, serving key institutional customers well strengthens institutional embeddedness, as the customer influences the environment on behalf of the firm and subsequently grants the firm market legitimacy. Firms that develop these dimensions can be considered institutionally oriented (Chaney et al., 2019).

Both the institutional orientation approach (Chaney et al., 2019) and the market-shaping approach (Nenonen et al., 2019) include institutional work towards not only aligning to institutional environments, but distinctly shaping the institutional environment as important strategic actions towards improving value creation. Although both introduce institutional theory into strategic business development and the approaches share key similarities, there are also distinct differences in the fundamentals of these approaches to shaping the institutional environment. In terms of the differences, the institutional orientation approach builds on strategic orientation, specifically market orientation (Narver & Slater, 1990), that builds on the view of the ability to create superior customer value compared to competitors as the basis of competitive advantage (Porter, 1980). Extending from market orientation, the institutional orientation approach argues that in addition to taking into account customers and competitors, the importance of institutional legitimacy necessitates industrial firms to account for a broader range of institutional actors "to establish the condition for market success" (Chaney et al., 2019, p. 248).

The institutional orientation approach also adopts institutional theory both in explaining the necessity of a broader stakeholder perspective and in explaining the orientation itself as institutions inhabited by individuals in the organization (Hallett & Ventresca, 2006), thus becoming part of the organizational culture itself (Homburg & Pflesser, 2000). This institutionalization of the institutional orientation leads to institutional work being conducted continuously in an organization, rather than when perceived as necessary (Chaney et al., 2019). The market-shaping approach builds on resource-based theory (Barney, 1991) and dynamic capabilities (Teece et al., 1997), framing that value is created when resources are combined in novel ways (Penrose, 1959). The key to value creation is the ability to create, access, deploy, combine, and exchange resources (Lippman & Rumelt, 2003).

Furthermore, market shaping adopts the view that value is co-created together by many stakeholders in the market (Tantalo & Priem, 2016; Vargo & Lusch, 2016), and thus resource linkages of a multitude of stakeholders in the market are necessary for value creation (Kozlenkova et al., 2014). Consequently, the adoption of institutional theory in the marketing shaping approach comes from institutions' role as moderators of social behavior, for example, the linking of resources, in an institutional environment (Vargo & Lusch, 2016). Thus, institutional work in the market-shaping approach is not focused on beneficial outcomes for the focal firm alone, but rather on enabling improved value creation in the market as a system (Nenonen et al., 2019). Also, while institutional orientation is strictly focused on institutional work, suggesting combination with other strategic orientations such as market orientation to improve business performance (Chaney et al., 2019), the capabilities for reforming institutions are only a subset of the entire range of market-shaping capabilities, including capabilities for redesigning exchange and reconfiguring network (Nenonen et al., 2019). To illustrate, the market-shaping framework of Nenonen, Storbacka, and Windahl (2019) is displayed in Figure 5.

Figure 5. Market-shaping capabilities and outcomes by Nenonen, Storbacka, and Windahl (2019, p. 623).



The institutional orientation and market-shaping approaches also have similarities. First, both of them link to shaping the institutional environment being a strategic concern for the organization, with the market-shaping approach discussing reforming institutions as a dynamic capability (Teece, 2007) for enabling linking resources in the market where the firm operates (Nenonen et al., 2019); and the institutional orientation approach discussing it as a strategic orientation guiding the everyday actions of individuals within a firm (Chaney et al., 2019). Both approaches also highlight that firms need to widen the number of stakeholders they aim to influence to include, for example, policymakers and industry associations in addition to customers, aligning directly with the idea of creating shared value, i.e., value for multiple stakeholders (Porter & Kramer, 2011). In other words, firms need to display the value of their business to not only their customers but also the institutional actors in the institutional environment that can significantly contribute to the legitimacy of the firm's business (Chaney et al., 2019), thus improving the value created with the firm's offering in the market (Nenonen et al., 2019).

3 METHODOLOGY

3.1 Pragmatic worldview and a qualitative research approach

The research conducted in this thesis subscribes to a pragmatic worldview for research. The thesis research focuses on developing an understanding of how industrial firms can develop business that creates value in the market change on-going around the emerging circular economy phenomenon. This focus is motivated by issues identified in the extant literature, such as the need to improve the environmental sustainability of business (Hart, 1995), the lack of implementation methods for sustainability in business from a strategic perspective (Engert et al., 2016), and the lack of an economic value creation perspective in the circular economy literature relevant for the first two issues (Bocken et al., 2016; Ferasso et al., 2020; Lewandowski, 2016). Thus, a pragmatic worldview for research is suitable, as attention is placed on applications and solutions to problems (Patton, 2015). Furthermore, the search for understanding how industrial firms can develop business that improves both environmental sustainability and economic value creation is well aligned with the pragmatic worldview, which Cherryholmes (1992, p. 13) describes as being focused on "values and visions of human action and interaction" and conditioned by "where we want to go in the broadest of senses" in its choices of what to research.

The research of the thesis follows a qualitative research approach. From the pragmatic worldview, the research approach's choice should be determined by the research problem and question at hand (Rossman & Wilson, 1985). Considering the research problem, the strategic development of business to create value through circular economy is a novel research topic with minimal extant literature, especially at the start of the thesis research project. Only a few studies adopted a business perspective towards implementing circular economy (e.g., Bocken et al., 2016; Lewandowski, 2016). The perspective of a business model implementation leading to improved value creation and capture, and thus improved economic value, was missing and continues to be a deficiency in the circular economy business literature (Ferasso et al., 2020). In strategic management literature, the concept of institutional work has been identified but remains unexplored in the context of a transforming

institutional environment (Peng et al., 2009). The lack of research on the research problem calls for exploration to generate understanding, and for this purpose, a qualitative research approach is best suitable (Creswell & Creswell, 2018). Considering the research question, this thesis's primary research question is, "How can industrial firms create value through circular economy in a changing institutional environment?" A qualitative research approach is also best suited for addressing "How" types of research questions (Yin, 2003), further solidifying the selection of a qualitative approach for conducting this thesis's research.

3.2 Multiple case study research design

The research design of multiple case studies of circular economy implementations from multiple viewpoints towards how they create value in the changing institutional environment of the circular economy phenomenon was chosen within the qualitative research approach. Case studies are suitable for exploring and generating theory for a contemporary phenomenon (Eisenhardt & Graebner, 2007; Yin, 2003), such as the circular economy that has emerged very recently (Ghisellini et al., 2016). Furthermore, as the circular economy concept contains a variety of principles of implementation (Blomsma & Brennan, 2017), exploring the circular economy as a way to implement sustainability in business in a way that improves environmental sustainability while creating economic value (Engert et al., 2016) calls for a multiple case study design (Yin, 2003). Single case studies would inevitably lack the ability to explore the strategic development of circular economy business widely. The choice of a multiple case study research design also has other benefits for the quality of the research, as it allows theoretical sampling for different types of circular economy business under the circular economy concept (Patton, 1990) while also enabling replication logic between cases to take place. Research on multiple cases allowed theoretical sampling (Patton, 1990) for different types of circular economy businesses under the circular economy umbrella (Blomsma & Brennan, 2017) while also enabling replication between cases to take place, thus improving the otherwise limited generalizability of a qualitative case study (Yin, 2003).

In each of the thesis's empirical studies, a case represents a business model of a focal firm, within which the circular economy has been implemented. Thus, the cases do not represent the entire business of the firms (see Appendix A for the definition of a business model). This distinction is necessary as, due to the novelty of the circular economy concept, the implementation of circular economy has often only

been done in a part of the industrial firm's business portfolio. As larger firms employ multiple business models for their business portfolio (Hacklin et al., 2018), limiting the case to a single business model where circular economy has been implemented, instead of covering the entire business of the firm, allows for a specific focus on the economic value creation potential of the circular economy implementation. Furthermore, a focus on the case, i.e., the business model of a circular economy implementation, differs slightly between the empirical studies. In publications III and IV, the focus is directly on the business models of circular economy implementations by focal firms. Meanwhile, in publication I, the institutional legitimacy of circular economy implementation is the focus, and thus the case also covers external perspectives towards the case. However, the case still represents a business model of a circular economy implementation by a focal firm.

Ontologically, the research subscribes to the perspective of subjectivism. Ontology discusses the nature of reality, and ranges between the approaches of objectivism and subjectivism. In the research of social phenomena, such as business, the objectivistic ontology states that external to social actors, social entities exist in a reality that can be studied. In contrast, subjectivism states that the social actors themselves construct the reality where social entities exist, and thus no external reality of social phenomena exists (Saunders et al., 2009). The ontological position of subjectivism is explicit in the application of institutional theory and institutional work to the study, as the "reality" of the value of a circular economy model is determined in the minds of the people in that context, collectively forming the institutional environment. The concept of an institutional environment as something that can be identified collectively could be perceived as challenging the subjectivist ontology. However, the environment does not exist independently of the minds of the people in the environment, and changing perceptions by individuals in the environment do change the institutional environment as well (Bitektine & Haack, 2015). Thus, the legitimacy provided by the institutional environment is not objective but subjective, as it is reduced from the minds of the individuals in the environment.

This research follows an interpretivist epistemology, as aligned with the ontological position of subjectivism. Epistemology discusses what knowledge is and what is understood as truth (Bryman & Bell, 2015). The interpretivist epistemology denies the perspective of positivism, i.e., that the researcher is concerned with facts that are independent of, and thus not affected by, the researcher's own experiences and perspectives (Remenyi et al., 1998). Thus, it is accepted that the experiences and the role of the research will inevitably influence the interpretations of the researcher and thus affect the results identified in the study (Lincoln et al., 2011). Thus, for the

utility of the findings and implications for industrial firms' managers, the researcher's embeddedness in the context of the research subjects is an aspect important as per the pragmatic viewpoint of the research (Cherryholmes, 1992). During the thesis research, the researcher's ability to interpret the results in a way that is useful for the research subjects within businesses was improved through deep collaboration with firms in the circular economy within and outside of the research project. The interpretivist epistemology is also visible in, for example, that the customer value propositions of firms are studied to identify what kind of value the firms perceive they can deliver to customers, acknowledging that the value propositions are indeed the firms' managers' interpretations of their environment.

3.3 Research context of industrial firms with circular economy implementations

Publications I, III, and IV were conducted as empirical studies following the research strategy described, while publication II was conducted as a literature review. Each of the publications took a different perspective towards strategic value creation of industrial firms in the circular economy and had differing research contexts, although all focused on cases of organizations applying circular economy principles. This chapter describes the research context of each empirical research-based publication of the thesis.

Publications I and III shared a research context and were conducted simultaneously. The research context in these studies focused on a cross-regional comparison of institutional environments of different types of circular economy implementations in publication I and the business models of different types of circular economy implementations in publication III. The publications shared the United States, China, and Europe as the regions under comparison. These three were identified through extant research as a maximum variation sample for implementing circular economy; China as a forerunner in implementing circular economy early on (Yuan et al., 2006), Europe as a region with a more recent embracing for the CE concept, with an increasing amount of policy support (European Commission, 2015), and the US with a very recent identification for the concept primarily through business benefits (Esposito et al., 2015). Within these regions, publication I studied the institutional environments' support towards different circular economy implementations. Two types of circular economy implementations were identified for each region in publication I. In circular economy, the role of an integrator, who

captures resources at the end of their lifecycle for further use; and the role of a manufacturer, who uses the captured resources again in an offering, are two crucial roles (Ghisellini et al., 2016). Therefore, cases of these two types were used as criteria for case sampling. In publication III, the focus was primarily on comparing different types of circular economy implementations and their respective business models. Thus, in publication III, four cases in total were studied, focusing particularly on the case's functionality to draw relevant findings on their business models, but without replicating cases between regions. Of the four selected cases for publication III, two cases were headquartered in Finland, with one operating globally and the other one primarily in Finland; one case was headquartered in the US with global operations; another case operated in China in the Suzhou region.

In publication IV, the research focus was on the customer value propositions of B2B firms' circular economy business models. For this study, a different research context was selected. To capture the wide variety of circular economy activities (Blomsma & Brennan, 2017) through theoretical sampling (Patton, 1990), while capturing multiple similar cases to enable replication logic (Yin, 1994), the multiple case study design for publication IV focused on selecting a wide range of cases, leading to a total of 74 cases in total. The cases were customer value proposition descriptions by firms headquartered in Finland. The cases selected contained both firms operating only in Finland, firms operating in a broader but contained geographical area, and firms operating globally. Furthermore, all cases in publication IV were B2B firms, to emphasize the customer value propositions of industrial firms implementing circular economy.

3.4 Use of document-based data supplemented by interviews

The main body of data used in the research of this thesis consists of secondary document-based data instead of primary data such as interviews. Document-based data is especially suitable for qualitative case studies, as it enables effectively gathering a broad coverage of data to provide details and context about a case (Yin, 1994). The use of document-based data was chosen first and foremost to enable gathering evidence on a wide range of different cases with varying circular economy implementations. This was deemed necessary due to the breadth of the circular economy concept (Blomsma & Brennan, 2017), which contains multiple implementation principles (Kirchherr et al., 2017) and types of business models (Lüdeke-Freund et al., 2019). Thus, to identify ways for industrial firms to

strategically develop business to create value in the market change surrounding the emerging circular economy phenomenon, it was decided that an exploration of the full range of circular economy implementations and respective business models is preferable to conducting a study on only a few implementations and related business models. The use of secondary document-based data enables data collection from a wide range of cases more efficiently, as the data already exists, and thus resources otherwise used in data collection can be used in data analysis (Saunders et al., 2009).

Document-based data has been described as social facts, produced, shared, and used in socially organized ways (Atkinson & Coffey, 2004). Furthermore, as document-based data is not collected, but rather selected, during the research process, the data itself is unaffected by the research process and potential biases introduced by the researcher (Bowen, 2009). Thus, document-based data offers advantages, especially for the studies of publication I, focusing on the institutional legitimacy of the cases, and publication IV, focusing on the customer value propositions of the cases. In publication I, the approach of using document-based data allowed the collection of a wide range of public commentaries in the form of, for example, news articles, editorials, and industry reports about the cases. This allowed for the analysis of the cases' institutional environment with a breadth that would not have been possible if using primary data sources, especially in cases from the United States or China. In publication IV, the analyzed documents presented documented customer value propositions by the firms themselves, thus allowing direct analysis of the documented customer value proposition and how they were articulated. Such relatively unbiased data towards the articulation of the customer value proposition would have been difficult to gather through interviews, where the questions probed would have inevitably affected the results (Creswell, 2013).

However, as a wide range of document-based data is readily available, an issue of the use of document-based data is ensuring the quality of the data used (Bowen, 2009). The data collection of document-based data has been described instead as a process of data sampling (Saunders et al., 2009), as the data itself already exists and does not need to be collected in the sense of primary data. To ensure data quality without compromising the ability to gather a breadth of data, we adopted data collection procedures from other studies where document-based data had been used as the main data source (see, e.g., Adams et al., 2009; Urbinati et al., 2017). Specifically, in publications I and III, we used the LexisNexis search engine as an established source of archived documents to improve the data's quality and reliability. A multi-sourced dataset could be collected through LexisNexis, containing, for example, new articles, press releases, reports, statistics, and studies

from industry and professionally oriented journals. In publication IV, we used a case compilation documented and made publicly available by the Finnish Independence Fund (SITRA), a well-recognized expert organization in Finland that has been active in creating awareness about the circular economy.

Another issue with using already published document-based data is that such documents have not been authored with the guidance of the research questions of the research project, as is the case with for example interviews conducted in a research project (Bowen, 2009). Instead, the author of the document decides on what to include in a document based on the purpose and the expected reader of the document, who then brings their own prior assumptions and cultural understandings into the interpretation of the document. (Coffey, 2014) The author and the expected reader are thus relevant for how the document describes reality. Furthermore, based on the motives of the author, documents such as news reports and company reports do not simply report on topics in the outside world, but rather highlight some aspects while obscuring others (Hodgetts & Chamberlain, 2014). Documents as data also tend to record presence of things and events in the world as opposed to the absence of things and events (Bowen, 2009). Thus, access through LexisNexis to a multi-sourced dataset with documents with a variety of types of authors and readers is important for the quality of the research.

In publications I and III, supplementary semi-structured interviews were also conducted to collect primary data for cases. Semi-structured interviews are often in the role of the main body of data used in qualitative case studies, as they can be used to go deep into the cases by probing emerging themes (Yin, 1994). In this research, however, the semi-structured interviews were mainly used to provide data triangulation (Miles & Huberman, 1994) to further complement and validate the document-based data collected. Therefore, a primary role of the supplementary interviews was to further ensure that the data collected through the LexisNexis search engine was reliable and could be trusted to be used across the cases; thus, they covered the key topics of the studies and were compared with the content of the document-based data.

3.5 Data collection, analysis, and quality of the research

In this chapter, the data collection methods, the data, and the data analysis methods for each thesis publication are described. The research design, research approach case sample, and data collected for each publication are described in Table 9.

Table 9. Research design and data collected for thesis publications

	Research design	Research approach	Sampling logic	Data collected
Publication I: Institutional drivers and barriers	Multiple case study	Deductive	Six cases from three regions. Maximum variation sampling for selecting regions and cases within regions. Replication logic used between regions.	92 news articles, 32 editorials, 173 company releases, 92 other company materials, 10 research articles, 2 supplementary interviews
Publication II: Multilevel perspective towards CE	Literature review	Deductive	Macro-, meso-, and micro-level implementations of circular economy.	48 research articles
Publication III: Business models in CE	Multiple case study	Deductive	Four cases from three regions. Maximum variation sampling across geographical regions. Extreme case sampling selecting notably functional cases, theoretical sampling to include production and waste management cases.	76 news articles, 30 editorials, 10 research articles, 161 company releases, 78 other company materials, 2 supplementary interviews
Publication IV: Customer value propositions in CE	Multiple case study	Abductive	Purposive, maximum variation sampling for revelatory and information-rich cases in terms of customer value propositions in CE. Limited to B2B context	74 documented customer value proposition descriptions

The research for publications I and III followed a qualitative multiple case study design. For the selection of the cases for both publications, purposeful, theoretical sampling procedures were followed, with a focus on maximum variation for regions and replication logic for cases between regions in publication I; and a maximum variation sampling for regions and an extreme case logic to pick functional cases beyond pilot cases, identified in collaboration with experts in the field, in publication III (Patton, 1990). The case selection process proceeded in two phases. In the first phase, ten cases were identified for analysis for publication I, and nine cases identified for analysis for publication III. In the second phase, these were narrowed down to six cases for publication I and four cases for publication III following an evaluation of the value of each case option for the research agenda (Eisenhardt & Graebner, 2007) based on CE aspects and data availability. The final case selection for publication III included Dell, a US-based company using closed-loop plastics;

Suzhou, a case of a recycling system for household waste in China; UPM, a Finnish-based, globally operating company using their own waste stream for a new product; and Ekokem, a waste management firm with a CE Village waste utilization concept in Finland. For publication III, these cases were further supplemented with Huawei, a firm based in China with a CE recycling system for electronics, and Republic Services, a waste management firm conducting recyclables separation and processing in the US.

The main data used in publications I and III consists of document-based data collected from secondary sources, a valid source of main data in case studies when a broad range of publicly available data is used (e.g., Rusko, 2011; Ritala, Golnam and Wegmann, 2014). To ensure that a broad range of data was used, the news search engine LexisNexis was chosen as the primary tool for collecting the data, as it has a global news article search function and has been identified in previous studies as a reliable data source (Adams et al., 2009; Moynihan et al., 2000; Zahra & Nielsen, 2002). For each case, searches were conducted in LexisNexis between July and September 2016, using search terms derived from the cases. Search terms such as "Dell Optiplex" and "Dell Reconnect" were used to search for information on the Dell case, as those offerings had been identified as central components of the case. The LexisNexis-sourced data was complemented with news articles from other established sources, corporate annual reports, investor relations presentations, and product details from the firms themselves. Where academic research had been published on the case, academic articles were also used as material for the case study. The collection of document-based data proceeded simultaneously with data analysis until new findings towards the analysis frameworks no longer emerged to ensure that data saturation was reached (Corbin & Strauss, 2014). The document-based data was supplemented with two semi-structured theme interviews conducted in June 2016 for the cases based in Europe, both of which lasted on average 50 minutes and were recorded and transcribed. Altogether, the data set for publication I comprised 401 documents, and for publication III, it comprised 357 documents.

In publication I, a structured form of data analysis was employed, using Excel spreadsheets to identify indicators of institutional pillars from the case material of each case. A pattern-matching method, where a theoretical framework is used to identify empirical patterns from data (Saunders et al., 2009), was used, thus following a deductive approach to the use of theory (Creswell, 2013). Manifestations of the indicators of the institutional pillars presented in Table 8 in section 2.3.1 of this thesis were sought from the data. As an example, a law or rule that mentioned restricting (or promoting) the case in some way was listed in the regulatory pillar of the case as

a barrier (or a driver) for the CE in the institutional environment of the case. Specifically, determining whether an institutional indicator was a driver or a barrier for CE, its influence on the 3R principles (reduce, reuse, recycle) in either supporting or inhibiting them was assessed. For example, a product receiving multiple awards in competitions for using recycled materials was identified as a normative indicator and a driver due to supporting recycling. Researcher triangulation (Flick, 2004) was used, with the authors each conducting analysis, comparing assessment, and reaching agreement on the findings. Furthermore, the analysis included within-case analyses and a cross-case analysis to improve the generalizability of the study (Eisenhardt & Graebner, 2007; Yin, 1994). First, a within-case analysis for each of the cases was conducted by identifying institutional drivers and barriers within each case. These analyses were then followed with a cross-case analysis, pattern-matching the cases from each region. The drivers and barriers identified were grouped, identifying institutional drivers and barriers that appear as similar or distinct across the institutional environments based on the six cases.

For publication I, the characteristic of media and company reports to highlight some aspects of the world while obscuring others (Hodgetts & Chamberlain, 2014) and the bias of document-based data in general towards presence of things instead of absence (Bowen, 2009) are especially relevant. Institutional drivers and barriers are connected to cultural and political issues which could amplify authors motives to highlight positive aspects while obscuring negatives (Hodgetts & Chamberlain, 2014). Institutional drivers and barriers can also be the result of the absence of institutions as well as their existence. Thus, there could be institutional drivers and barriers for circular economy that were not identified because they were obscured by the authors of the documents, potential example being previous failures in implementing of circular economy business models in firms. There could also be institutional drivers or barriers to circular economy which are drivers and barriers because they are absent, potential examples being a cultural-cognitive barrier from an absence of a clear understanding of the meaning of circular economy in the public, or a regulative barrier from an absence of certain legislations not yet implemented or even identified. To address these limitations of document-based data, the analysis for publication I focused on the identification of institutional indicators present in the within-case analysis phase (Coffey, 2014). Furthermore, comparisons of cases and regions enabled identification of drivers and barriers resulting from absence of institutional indicators if such indicators were identified as present in other cases. Thus, the cross-case analysis helped to alleviate the issue of being able to identify

institutional drivers and barriers resulting from absence rather than presence of institutional indicators.

In publication III, the data analysis was again conducted in two phases, involving a within-case analysis and a cross-case analysis to generalize the study results to theory (Eisenhardt & Graebner, 2007; Yin, 1994). The within-case analysis focused on identifying and classifying the business model and 3R-principle elements from each case's dataset. In the analysis process, the data was written up as a case study structured around the business model and 3R-principle frameworks (Eisenhardt, 1989, p. 540). Again, a deductive approach to theory was adopted, as frameworks identified from previous literature were used to improve the internal validity of the analysis and the generalization of findings against existing theory (Yin, 1994). An Excel spreadsheet was used for centralized storage of data, thus improving data management and enabling cross-examination of multiple sources, which improved the findings' reliability. The data were manually traced for references to the elements during the identification and classification of the business model and 3R-principle elements. For example, data referring to a product or service offered to customers was referenced to the "offering" component of the business model framework during the analysis of the data. Thus, as the result of the within-case analysis, the references mentioning the business model components and the 3R principles in the case data were retraced and written up against the frameworks synthesized from the extant literature. In the second phase of analysis, a cross-case analysis of the cases was conducted. In the cross-case analysis, a tactic of comparing the similarities and differences of the cases and identifying emergent patterns to generate theory was employed. In both phases of the analysis, researcher triangulation was used to improve the reliability of the analysis (Flick, 2004). Together with the case-sampling procedure used, the cross-case analysis improved our results' external validity, enabling us to draw broader conclusions from the findings (Eisenhardt, 1989).

Publication II was conducted as a literature review to synthesize literature on the circular economy for a book chapter, describing the main methods towards the implementation of circular economy on the micro (firm) level, meso (interfirm and regional) level, and macro (national or higher) level (Kirchherr et al., 2017), mapping methods for the implementation identified in the extant CE literature on these different levels. The literature review was conducted using keyword searches and snowball sampling following references of the identified publications. However, the literature did not follow the specific process of a systematic literature review (Tranfield et al., 2003). In total, 48 research articles describing activities on different levels were used in publication II.

For publication IV, the focus of the research was on the customer value propositions of industrial firms with a CE offering. A purposive, maximum variation sampling strategy was used (Patton, 1990) to select particularly revelatory and information-rich cases to facilitate theory development (Eisenhardt, 1989). A publicly available case compilation documented by the Finnish Independence Fund (SITRA), a recognized, independent expert organization in Finland focused on driving awareness about the CE, was identified as a suitable dataset, containing a wide range of exemplary, highly innovative, frontrunner firms articulating customer value propositions across offering types, firm sizes, and industries from Finland. Thus, the dataset facilitates rich theory development through maximum variation and extreme case logic and potentially improves generalizability by replicating similar cases (Eisenhardt & Graebner, 2007; Yin, 1994). In total, SITRA's CE case repository includes 102 documented descriptions, collected and compiled by SITRA based on interviews where the firm's business model and how their offering creates value to customers, other stakeholders, and the firm itself are emphasized. Given the focus of the research on industrial firms, 74 documented CVP descriptions from offerings in a B2B context were selected for analysis in the research. The documented CVPs were accessed in April 2018 and saved in a database for further analysis. The material for analysis was 148 pages of single-paged text in total length.

The data analysis for publication IV focused on understanding the architecture and the forms of innovation behind the customer value propositions that the case firms had formulated for their circular economy offerings. In publication IV, a three-stage data analysis procedure was used. First, in within-case analyses, theoretical coding (Saldaña, 2015) was used to identify customer value proposition design elements and forms of innovation in each case. In this stage, the thesis author initially coded 30 cases, after which emerging codes were jointly discussed, and a final coding protocol was agreed upon. The thesis author then recoded all 74 cases with the final coding protocol, with frequent checks from the other authors. ATLAS.ti software and Excel spreadsheets were used to facilitate data analysis, data categorization, and comparison of cases, leading to the development of theory emerging from empirical data (Bazeley & Jackson, 2013). Second, cross-case analysis (Corbin & Strauss, 2014) was employed to compare identified elements from each customer value proposition and identify emerging categories of customer value propositions sharing similar elements. During the analysis process, emerging categories were simultaneously contrasted with extant circular economy and customer value proposition literature (e.g., Bocken et al., 2016; Payne, Frow and Eggert, 2017). Thus, the analytical strategy used was iterative and abductive, allowing theory-driven insights to emerge towards

a theory that matches the observed reality in the cases (Dubois & Gadde, 2014). Third, to ensure that data saturation had been reached (Corbin & Strauss, 2014), focused coding (Saldaña, 2015) was used to identify customer value proposition design elements and specific innovation forms typically underlying the identified value creation logics. After each of the phases of initial coding, the within-case analysis using the final coding protocol, and the cross-case analysis, researcher triangulation took place through joint discussion and agreement on the findings, improving the reliability of the findings (Flick, 2004).

4 FINDINGS

4.1 Institutional support for circular economy activities

4.1.1 Purpose and background of publication I

Publication I focused on identifying institutional drivers and barriers for circular economy activities. While previous literature had identified that societal support, such as legislative and financial subsidies, and broader institutional issues, such as norms and cultural aspects, are important in shaping the transformation towards circular economy (Levänen, 2015), most of the extant CE literature focused on technical issues for CE (Geng et al., 2009; Mathews & Tan, 2011). CE literature has also been criticized for excluding societal factors (Murray et al., 2015). Thus, an institutional theory thus far lacking from the CE literature, was deemed important for researching the CE transformation. To do this, a multiple-case study with six cases from three geographical regions, with a manufacturer and integrator case from each, was conducted. To reach the objective of the thesis, this publication focused on identifying the institutional legitimacy of circular economy in the three geographical areas, identifying unifying aspects and differences between them, and thus building the basis for understanding how the legitimacy affects industrial firms' value creation in the institutional environment in which the firms develop their business.

4.1.2 Institutional drivers and barriers within CE cases

For each of the cases, institutional indicators were identified and categorized as drivers or barriers based on whether they supported or inhibited the 3R principles of reduce, reuse, and recycle. Huawei was the manufacturer case in the Chinese institutional environment. For Huawei, the primary identified institutional driver was pressure from the privately held firm's company stakeholders. The acknowledgment of scarce natural resources by company stakeholders had led to focusing on

improving material efficiency, and thus *cultural-cognitive pressure* was the primary driving institutional pillar in the case. In terms of institutional barriers, the incentives for increasing the reuse of products were low, with an institutional focus on pressuring the firm to recycle certain products. Suzhou was the integrator case from China, and regulative institutions appeared at first to be major drivers for circular economy in the case, due to high-level laws such as the Circular Economy Promotion Law, enforced in 2009. However, while analyzing the case, the implementation and enforcement of the high-level legislation were identified as ineffective. Instead, there was a large motive for informal workers to recycle materials as a means of income, raising a *normative* barrier for implementing a more effective recycling system as it could strip thousands of people from access to necessary income (Fei et al., 2016).

In the Dell case, the manufacturer case in the US institutional environment, the key institutional driver was the *regulative* requirement by individual states to arrange the recycling of end-of-life products for free. Another driver was the acknowledgment of cost savings from using recycled materials in products. As this driver is linked to the market-based cost of recycled materials, this was also identified as a *regulative* driver. The institutional barriers identified in the Dell case were *cultural-cognitive*, specifically the view that products made sustainably offer a worse price-to-performance ratio. The comparatively high *normative value of recycling* was also identified as a barrier to other circular economy principles, as reducing and reusing did not have similar certifications and sustainability awards linked to them as recycling had. In the integrator case from the US institutional environment, Republic Services, the CE initiative's main driver is a mix of *normative and cultural-cognitive* aspects. Recycling is valued to the extent that a waste management firm has to arrange recycling services to be competitive. However, it was identified that in the case, recycling did not provide economic benefits for the integrator, as processing costs exceeded the value of recycled materials. A main contributor to the high processing costs was the low level of source separation of recyclables, leading to separation processing requirements in a facility. Thus, the cultural-cognitive concept of a single recyclables bin was identified as a barrier for the CE in the case.

The manufacturer case from the European institutional environment was UPM Profi, a biocomposite deck product UPM produces from waste generated using the firm's label, i.e., wine bottle label, products. A key objective set at the firm was improving the utilization of waste and sidestreams in the firm's production, which was categorized as a *cultural-cognitive driver* for the case. The requirement for firms to properly dispose of their label waste was seen as a *regulatory driver* for the case, as it created a business case for reducing the waste disposal costs of the firm's customers

through a recycling service for label waste. *Normative drivers* were also identified for recycling in the case, as the company had been recognized through multiple awards for the biocomposite products. A *cultural-cognitive* linking with wood products was identified as an institutional barrier, leading to the products being disposed of through incineration rather than recycled into new Profi products. In the case of Ekokem and their CE Village concept, *the regulative institutional pillar* was a major driver, exemplified by ban on landfilling waste with over 10% organic material content and a 65% recycling target set for municipal waste. It was also identified that the recycling targets of the CE village were *normatively* driven. As a *cultural-cognitive* barrier for implementation of CE in the case, the use of tried and tested technologies was already in use elsewhere in Europe, reducing the potential to use groundbreaking technologies.

4.1.3 General institutional drivers and barriers for the circular economy

Through a cross-case analysis of the cases, general institutional drivers and barriers from each of the institutional pillars were identified, displayed in Table 10. With regard to the thesis, the general drivers and barriers provide a more general understanding of the institutional legitimacy of circular economy in the institutional environments in which industrial firms develop business.

Table 10. General institutional driver and barriers for the CE across institutional environments (adapted from publication I)

	Regulative	**Normative**	**Cultural-cognitive**
General institutional drivers	*Manufacturer:* Mandates for producer responsibility	*Manufacturer:* Use of recycled materials awarded	*Manufacturer:* Stakeholder pressure towards sustainable consumption in privately held firms
	Integrator: Landfilling limited heavily through regulatory measures	*Integrator:* Recycling services preferred over other waste management practices	*Integrator:* Central role of integrators in CE acknowledged
General institutional barriers	*Manufacturer:* Regulatory support toward increasing reuse activities low	*Manufacturer:* Lack of indications for normative support for CE outside recycling	*Manufacturer:* Customers prefer new products
	Integrator: Inconsistent regulation and its enforcement in China and the US	*Integrator:* Reuse of materials considered as waste lacks normative support	*Integrator:* Low perceived role in activities of reuse and reduce

In terms of the *regulatory drivers*, each of the environments displayed a hierarchical structure for regulation, where high-level directives guided region-specific legislation with a focus on improving the utilization rates of waste. However, while supporting recycling, current regulation offers very little support for the reduce, and especially reuse, aspects; thus, this could also be perceived as a *regulatory barrier* for the most effective circular economy implementation. Concerning the *normative pillar*, it was clear that landfilling was avoided compared to other waste management ways, thus especially supporting recycling. However, again like the regulatory pillar, very little normative support was identified, especially for reuse. In terms of the *cultural-cognitive pillar*, a major barrier to reuse seems to be customers' preference for new products. Overall, the emphasis on recycling as a form of CE was identified as a general barrier to the overall implementation of circular economy. The emphasis concurrently resonates with a lack of institutional support for reusing and reducing, which are more desirable CE activities from an efficiency and sustainability standpoint.

4.1.4 Contribution of publication I

The research conducted in publication I contributed primarily towards understanding the institutional legitimacy of circular economy, and thus to the circular economy and the institutional theory literature fields. Our findings showed that while the regulative pillar has influence, CE as a concept had regulative support in each of the cases. Rather, it was normative and cultural-cognitive institutions that strongly influenced the implementation of CE generally across all institutional environments studied. This finding is supported by the institutional theory literature, which highlights that the regulative pillar alone cannot drive a transformation such as the CE (Scott, 2008a).

In terms of the legitimacy of the different CE principles, it was apparent that recycling had the highest institutional legitimacy, to the point that implementations for reducing and, especially, reusing might be hindered due to the high legitimacy of recycling. This is an issue for both the system-level transformation towards the circular economy and the implementation of effective CE business models in firms, as recycling has been identified as less efficient in retaining the value of products and materials compared to reusing and reducing (Kirchherr et al., 2017). By aligning to institutional environment pressure towards recycling, firms might be leaving economic and environmental potential untapped. Thus, the publication also helped

identify how the institutional environment affects industrial firms' value creation from circular economy.

4.2 Circular economy implementation from a multilevel perspective

4.2.1 Purpose and background of publication II

Publication II aimed to further elaborate on the different kinds of circular economy implementation currently taking place both within firms (on the micro level), between firms (on the meso level), and nationally and globally outside of firms' control (on the macro level). A literature review was conducted to explore what the circular economy transformation constitutes of on different levels. Regarding the goal of the thesis, publication II contributed further towards identifying the legitimacy of ways to implement circular economy, and also the direction in which institutional legitimacy of circular economy implementations is moving by identifying contemporary implementation methods for enabling circular economy on the levels above individual firms, as they build institutional pressure towards adopting the concept. Also, by identifying how firms are striving towards implementing circular economy on the micro level, publication II contributes towards identifying how firms address creating value through circular economy in the changing institutional environment.

4.2.2 Support for implementation of circular economy outside of the firm

The macro and meso levels discuss how circular economy is being implemented outside of the firm's borders. From the macro level, policymaking and urban and regional support for circular economy were identified as the main support for implementing circular economy in industrial firms. With regard to policymaking, the high-level policy frameworks in China and the EU were identified as major driving forces towards the implementation of circular economy in these areas. However, the way circular economy implementation is supported in policy differed between these two areas, with China focusing on reducing the environmental impact of manufacturing by promoting cleaner production, reducing waste and pollution from

manufacturing, and improving waste in municipal and industrial settings (Geng et al., 2009; Mathews & Tan, 2011); and the EU focusing on circular economy as an engine for growth through innovations and business models based on, for example, product-service systems (McDowall et al., 2017; Tukker, 2015). However, the existing indicators for circular economy in the EU remain focused on the rate of production inputs from recycled materials, and thus the policy implementation does not yet support inner loops, such as the reuse principle, to a great extent (McDowall et al., 2017).

The smart city concept was identified as an enabler of circular economy in an urban context. In a smart city, cities' efficiency and livability are improved through smart technologies and data use. Combined with the concept of urban metabolism focusing on the material flows within an urban area, the smart city concept has the potential to support circular economy within cities. (Liu & Peng, 2014) For example, a smart city can enable circular economy through the use of shared resources such as city bikes, platforms (Lyons et al., 2018), the ability to produce resources such as food within a short distance of consumption (Li et al., 2017), and the ability to optimize waste management through the use of Internet-of-Things technologies in waste management infrastructure (Liu & Peng, 2014).

At the meso level, industrial symbiosis and circular supply chains were identified as the primary implementations towards circular economy. In an industrial symbiosis, multiple industrial firms collaborate to achieve an advantage over other firms through synergies in the use of materials, energy, water, and byproducts (Chertow & Ehrenfeld, 2012; Saavedra et al., 2018). A barrier for establishing industrial symbiosis is that the synergies often cross industry lines, and thus industrial firms in one industry might not be able to identify potential benefits for byproducts in another industry (Boons et al., 2011; Jacobsen, 2006). Identified approaches to solving this issue are the top-down approach, where the development of industrial symbiosis is facilitated by an external, often public organization that facilitates information exchange (Mathews & Tan, 2011); and the use of Internet-of-Things technologies to allow data-driven identification of industrial symbiosis potential. However, to facilitate information exchange, trust needs to be established between industrial firms, and for this, the top-down approach has thus far been identified as more effective than the technology approach. (Tseng et al., 2018). Industrial symbiosis is often limited to collocated firms due to logistics costs overcoming synergies between firms (Boons et al., 2011). In situations where firms are not collocated, the adoption of circular supply chains has the potential to move the circular economy further, especially in the case of closed-loop supply chains, where

a single product stays within a cascading loop system, enabling maintenance (Cannella et al., 2016), remanufacturing (Larsen et al., 2018), and proper recycling to take place through the use of reverse logistics (Govindan et al., 2015). The implementation of closed-loop supply chains most often involves a group of partners, each contributing to a specific part of the cascading loop system to maintain effective value creation of the system (Govindan et al., 2015).

4.2.3 Firm-level trends to circular economy implementation

At the micro level, i.e., the firm level, the main activities discussed in publication II were circular design, remanufacturing, and circular business models, each taking a slightly different perspective to the requirements to implement circular economy at the firm level. The basis of circular design is that when designing the product, designers should assume that the product will not become waste but will instead be reused in some form after or during its lifecycle (den Hollander et al., 2017). One of the guiding principles for circular design is the inertia principle presented by Stahel (2010), which states that what is not broken should not be repaired, what can be repaired should not be remanufactured, and what can be remanufactured should not be recycled. This principle is aligned with the cascading of the 3R principles, where reducing is preferred to reusing, which itself is preferred to recycling. However, it focuses more on maintaining the value of the product by doing only what is essential for maintaining functionality while preserving the integrity of the product (den Hollander et al., 2017). With the inertia principle in mind, the reusing, repairing, remanufacturing, and recycling that will take place during the full life cycle of the product needs to be already considered at the design phase, with an effect on the materials, maintainability, and assembly of the products (Lieder & Rashid, 2016), enabling lengthening of product life cycles and minimizing materials wasted at the end of the life cycle (Mendoza et al., 2018).

Remanufacturing was identified as an important firm-level activity that has significant potential for economic and environmental benefits while not being explicitly acknowledged in the waste hierarchy-based reduce, reuse, recycle principles. As a process, remanufacturing involves the restoration of used products for a new product life cycle, including multiple phases of processing and ending in testing to verify that the remanufactured product meets the required standard set; for example, that the remanufactured product qualifies for the same warranty as a new product (Wei et al., 2015). Highlighting the potential of implementing

remanufacturing, previous research has shown that it can reduce requirements for materials up to 90% compared to new production while also having significantly lower energy needs (Matsumoto et al., 2016).

The implementation of business models for the circular economy was identified as an important activity for moving towards circular economy on a firm level. Most business models are optimized for linear economy, incentivizing firms to grow by selling more products and de-incentivizing the extension of product life cycles. Thus, to shift the business's economic incentives so that they align with the circular economy, implementing an aligned business model is a requirement (Linder & Williander, 2017). Designing a circular business model requires assessing the value proposition, value creation and delivery system, and the value capture model to enable the extension of the useful life of products and components and closing material loops (Nußholz, 2017). Multiple approaches to presenting circular economy business models appear in the literature. One example is a component-based approach like the ReSOLVE framework, with business model types of regenerate, share, optimize, loop, virtualize, and exchange (de Sousa Jabbour et al., 2018). Another is the circular business model canvas with an added component of a take-back system (Lewandowski, 2016), highlighting options for firms looking to implement circular economy into their business. Another approach is to adopt a product-service system business model, where services complement extant products; this helps separate the incentive to grow through increasing product sales by adding the potential to grow through increasing service sales (Tukker, 2015).

4.2.4 Contribution of publication II

Through a literature review, publication II provided a broader perspective on the circular economy implementations compared to the 3R-principle framework adopted in publication I. The contribution of this approach was two-fold. First, by identifying activities taking place on the macro and meso levels, publication II contributed to showcasing what kinds of activities are being supported in the CE transformation on the levels above the firm level. From a top-down perspective, these activities can be seen as inflicting institutional pressure on individual firms (North, 1990). For example, it was identified that at the regulative institutional level, more focus is placed on pollution and waste in the Chinese institutional environment, as opposed to the growth and economic benefits of CE in the institutional environment of the EU. On the meso level, industrial symbiosis and

circular supply chains were identified as central activities linked to CE, both focusing mainly on improving recycling and waste prevention in material flows and thus supporting the findings of publication I on the relative lack of institutional support, especially for the reuse principle.

At the firm level, activities in focus in the circular economy were identified as circular product design and remanufacturing, and ultimately the use of new circular business models that support the value creation and capture of economic value from the implementation of circular economy activities. These findings guided research for publications III and IV to focus especially on circular economy business models as the method for creating economic value and as the bridge between strategic change towards circular economy and the implementation of circular economy activities in the firm's operations. Also, the findings of publication II about circular economy activities highlighted across the multilevel perspective can be thought of as cultural-cognitive perceptions towards what circular economy is, and thus what the implementation of circular economy entails for firms. Thus, again, the findings solidified that on the meso and macro levels, the institutional environment's pressure seems to focus on improving recycling rates at the moment of the research. At the micro level, however, it was identified that business models supporting the reuse principle increasingly do have legitimacy at the firm level as a way to reach economic and environmental gains. Furthermore, it has been shown in previous literature that the institutional legitimacy of activities, such as those that promise improved sustainability, is not constant but rather dynamic (Markard et al., 2016). Thus, the perspective is on whether industrial firms with different types of CE business models—ones with recycling-focused versus reuse or reduce-focused business models—need to conduct institutional work in order to legitimize their business model and improve value creation (Chaney et al., 2019; Storbacka & Nenonen, 2011). This perspective was further explored in publication IV, while publication III focused on the ability to capture value from CE principles in a business model.

4.3 Business models for firms' value capture in the circular economy

4.3.1 Purpose and background of publication III

In publication III, the focus of the research shifted towards the strategic value creation activities of firms in the circular economy. The aim of publication III was to identify how firms create and capture value in their business models while implementing the 3R principles of CE. In previous CE literature, business models had been identified as a useful concept for discussing the implementation of CE into business while adopting a focus on the sustainability aspects of such models (Lewandowski, 2016; Linder & Williander, 2017; Rizos et al., 2016). However, a research gap remained for a predominantly economic value-based perspective, which is crucial for the adoption of circular economy aligned business models by industrial firms (Lieder & Rashid, 2016). Thus, a multiple-case study of four cases—UPM, Ekokem, Suzhou, and Dell—with different CE business models was conducted, and the contribution of CE principles to the value creation and capture of the business model was studied.

4.3.2 Business models of the case firms

The business model in the UPM case revolves around wood-plastic composite products called Profi, which uses label waste produced by the firm's customers as materials. Thus, the business model enables the firm to capture value from new cycles of the same materials used to produce the labels previously sold to customers. The business model combines a waste management service that the firm provides for its label customers and the Profi product offering made from the label waste procured through the service. Thus, at least two rounds of revenue can be acquired from the materials used originally for the label products: one from the sales of the labels, and the second from the sales of the Profi products, with a potential third round of revenue from the waste management service provided for the customers. The primary CE principle enabling improved value capture of the business model is recycling, as the label waste is recycled into a new product, and this recycling capability enables the waste management service.

The Ekokem case displays the business model of the CE Village concept, being an example of creating value capture mechanisms to support increased recycling capability. In this case, the firm has moved from being primarily a waste management operator to producing products from recycled materials. Thus, the firm has diversified its revenue sources in the business model by producing both recycled products and waste management services. The two revenue streams complement each other, as the waste management service provides a steadier, more established revenue source, while the recycled products compete in the markets with other products, including those made from virgin sourced materials. Again, in the Ekokem case, the main CE principle that contributes to value creation and capture is recycling, as the recycling capability also enables the implementation of multiple revenue streams in this case.

The case of Suzhou describes the state of the municipal recycling system in the city and the business model of the operators in the system. In this case, the informal sector controls a significant portion of both the flow of the recyclables towards processing plants and also the cash flow from the sales of the recyclables. Due to this property, the business model of the operators in the Suzhou case contains only a single source of revenue, which comes from the sales of recycled materials, as the processing plants need to purchase the recyclables from the collectors rather than being able to collect a waste management fee for taking in the recyclables for processing. Thus, in the Suzhou case, the recycling operators need to be very cost-efficient in processing the materials in order to compete, leading to low average income for employees and the use of low-level technology with reduced ability to adhere to environmental considerations. Again, in the Suzhou case, the main CE principle contributing to value creation and capture is recycling. The entire system is structured around collecting and separating recyclables primarily by the informal sector and processing the recyclables into recycled materials by the recycling facility operators.

The Dell case was again a more product-oriented case, with the business model analysis focusing on the use of recycled materials in the firm's products. From the analysis of the case, while the primary goal of the case is to enable a closed-loop system for end-of-life computer equipment, Dell's direct value capture mechanism is the ability to create cost savings while replacing virgin plastic materials with recycled plastics. This is apparent in the fact that Dell itself does not use other materials, such as metals, that can be extracted from end-of-life products, instead transferring these to recycling firms. Furthermore, while the reuse of end-of-life computers does occur in the case, the reuse part is operated by Goodwill, a non-

profit organization that has partnered with Dell to handle the identification and subsequent reuse of still usable computers. This suggests that while reusing is feasible, it does not create economic value to the extent that would merit Dell itself to operate reuse as a source of revenue. Instead, the case analysis showcases that Dell financially supports the reuse operations, and reusing does not contribute to value capture in this case but is a cost in the business model. Therefore, in this case also, recycling is the primary contributing circular economy principle to creating and capturing economic value.

4.3.3 The role of CE principles in the economic value creation of the business model

To summarize the findings from the cases with different business models, industries, and geographical areas, recurring themes for the 3R principle's ability to contribute to the business model's economic value creation were identified in a cross-case analysis. The recurring themes are displayed in Table 11, categorized according to the business model components analyzed in publication III. In particular, five key contributing themes were identified. First, the economic value from circular economy was achieved through recycling in each of the cases, reflected by either new revenue streams through sales of recycled products or material cost reductions from the use of recycled materials. Second, the analyzed business models included a take-back system that was effective in separating recyclables from other waste potentially mixed in with the recyclables. While the way the take-back system was structured differed significantly between the cases, having one in place was crucial for enabling economic value creation from recycling. Third, in the cases where the firm diversified to either waste management services or sales of recycled products, the new operation was organized separately from the existing business, leaving the original business mainly intact although circular economy principles were implemented. Fourth, the reuse principle was underutilized as a source of economic value. With only Dell including reuse activities in the business model, even then, it did not contribute to economic value capture. Fifth, while recycling dominated as the source of economic value and reusing was severely underutilized, the reduce principle acted as an incentive for the firms' customers to take part in the established take-back services. This was visible in the take-back services' ability to effectively reduce waste on the customer's end, leading to reduced waste management costs for the customer.

Table 11. Relations of 3R principles and business model components (adapted from publication III)

Business model component	**Reduce**	**Reuse**	**Recycle**
Offering	Reducing mixed waste by increasing source separation and increasing recycling.	Take-back services and sales of used and refurbished products.	Cheaper materials for manufacturing or sustainable, high-quality end products.
Target Customer	New target customers through take-back services.	Used products to consumers.	New target customers for recycled materials.
Resources and Capabilities	Capability to provide take-back services that are accessible to customers.	Capability to separate working products and components from waste and refurbish them for resale.	Capability to capture source-separated waste for efficient recycling.
Organization	Take-back of products and materials operated separately from product manufacturing, either through partners or by other business units.	Separating reusable products from materials and refurbishment organized together.	Use of recycled materials in producing products is positioned in a separate business unit from the recycling system.
Position in the Value Chain	Diverting waste to recycling in various parts of the value chain.	Early separation of reusable products from waste streams.	New position in the value chain, either in sales of new products from recycled materials or in waste management or take-back services.
Revenue sources		Refurbished reused products.	Sales of recycled materials or products made from recycled materials.
Economics of the business	Increasing source-separation, thus reducing mixed waste, reduces waste management costs.	The sales and refurbishing of used products are subsidized.	Recycled materials are cheaper than virgin materials.

Based on the findings, propositions for circular economy business models around the 3R principles were generated to highlight the implications of the findings further. First, it was identified that the cost efficiency of circular operations is the key proponent to successful circular economy business, as implied by the requirement for cost efficiency compared to virgin materials to achieve material cost savings with

recycled materials. It is also important for being able to compete with recycled materials in the markets if new revenue sources were added through recycled material sales. Second, take-back services act as enablers of closing material and product loops but need to be incentivized by reducing customers' total costs. This was also the case in Dell's reuse model, even when operated by a non-profit partner organization, and thus not only relevant to recycling cases. Third, circular economy business models require the firm to manage multiple positions in the value chain. In the cases, the firms often had to diversify their business with new customers to create value from circular economy principles economically. Thus, the firm needs to identify a wider group of customers' needs to enable creating value with both the take-back system and the end-products when the loop is closed. Fourth, the take-back system implementation can be successfully done in multiple ways. While the existence of the take-back system was identified as a necessity, the way it was organized (i.e., internally within the business unit, as a separate business unit, or through external partners) did not seem to be crucial from the economic value creation perspective as long as the take-back system was effective in taking in resources suitable for circulation, separated from non-suitable resources. Fifth, it seemed that recycling is easier to implement into a business model than reducing or reusing, as it had a smaller impact on the primary business model. In effect, while recycling requires replacing materials of original products with recycled ones, it demands less integration with the business model than reusing, where the entire product needs to be retrieved from the market in good condition.

4.3.4 Contribution of publication III

Publication III was the first of the thesis's publications to focus on the industrial firm's ability to create and capture economic value from the circular economy. The publication built on the findings of publications I and II by identifying recycling as the currently dominant pathway towards capturing economic value, aligned with the identification of the institutional environment's support for recycling activities compared to other circular economy principles. The identification of the separate organization of the part of the business implementing a take-back system, and the part of the business making use of the materials or products taken in through the take-back system, contributed to the extant circular economy business model literature (Bocken et al., 2016; Lewandowski, 2016). Contributing to creating value in the changing institutional environment, aspects of institutional work regarding the

quality of products were identified, suggesting that firms implementing circular economy need to change perceptions towards circular economy business models.

4.4 Customer value propositions in the circular economy

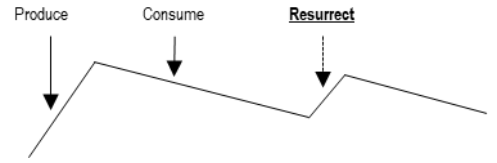
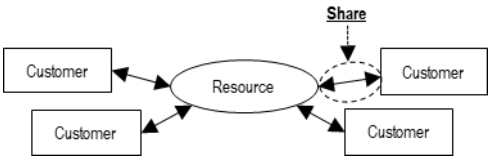
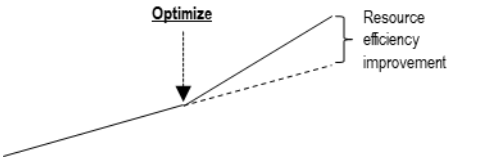
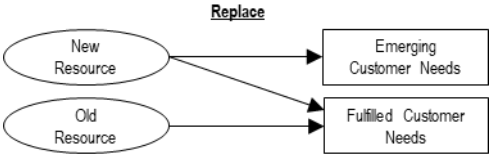
4.4.1 Purpose and background of publication IV

The focus of publication IV remains on the business models of industrial firms that have implemented CE principles into their business. The goal of publication IV was to showcase what kind of value firms perceive that their CE implementing offerings provide to customers and how the firms articulate this value in their customer value propositions. To achieve this goal, documented customer value propositions of 74 B2B cases from Finland were analyzed using a value proposition architecture framework synthesized from extant customer value proposition literature. With regard to the objective of the thesis, the role of the publication was to integrate the internal perspective towards value creation of industrial firms and the external perspective of the changing institutional environment, for which the analysis of customer value propositions as the interface of the firm's business model to its environment is suitable. Thus, publication IV contributes towards identifying how industrial firms create, propose, and capture value in the circular economy and how the changing institutional environment due to the circular economy affects the value creation of industrial firms.

4.4.2 Value creation logics for CE business models

Four distinct value creation logics were identified during the analysis of the customer value proposition cases. These value creation logics, namely resurrect, share, optimize, and replace value, are displayed visually in Table 12.

Table 12. Value creation logics in circular economy business models (adapted from publication IV)

Value creation logic	Defining characteristics	Core principle visualized
Resurrect	Resurrecting the diminished value of resources and returning them to the market	
Share	Sharing the value of a single resource among multiple customers	
Optimize	Optimizing the value of a resource for a single customer	
Replace	Replacing traditional resources with new, higher-value resources	

The *resurrect value logic* focuses on innovative ways to reuse and recycle used and end-of-life resources. In this logic, the supplier's ability to cost-efficiently regenerate the value of resources is crucial, and thus the cost-efficiency of processes is important for value creation. The *share value logic* emphasizes the use of shared resources between multiple customers, focusing on reusing resources. Important considerations for value creation include the ability to enable customers to move from ownership to the use of shared resources, for example, by delivering resources to the right place at the right time or by facilitating peer-to-peer exchange through a platform. The *optimize value logic* focuses on the ability to optimize the use of resources so that a customer can draw more value from a single resource. To create value, the supplier must have a good understanding of the customer's processes, as value creation relies on the ability to implement process improvements for the customer. Finally, the *replace value logic* focuses on replacing resources that are inherently identified as unsustainable with novel, sustainable alternatives. Understanding the

implications for customers of switching from using traditional resources to novel resources, i.e., how compatible the replacing resources are with the customer's existing processes, is crucial to creating value with this logic. Furthermore, as this logic relies on improved sustainability, the sustainability improvements provided by the replacing resource need also to be well understood.

4.4.3 How industrial firms articulate the value of their CE business model based on the value creation logic

After identifying the value creation logics from the data, a framework of a customer value proposition architecture was used to analyze how industrial firms articulate the value of their offerings built on the value creation logics. In Table 13, key aspects of the design of customer value propositions identified from the extensive set of customer value propositions for the different value creation logics are displayed.

Table 13. CVP design elements of the value creation logics in CE (adapted from publication IV)

	Resurrect value	**Share value**	**Optimize value**	**Replace value**
Illustrative cases from data	*Fortum:* Recycled plastic products from waste *Pa-Ri Materia:* Refurbished furniture *Neste:* Biofuel from bio-waste	*Ekorent:* A digital platform for leasing shared vehicles *Maapörssi:* A digital platform for exchanging surplus soil	*Fluid Intelligence:* Oil monitoring and maintenance as a service *Lindström:* Management and leasing of work clothing as a service *Valtavalo:* LED lighting as a service	*Spinnova:* Cellulose to replace cotton in textiles *CrossLam:* Wood to replace concrete in building materials
Benefits	Economic & Environmental Equal product quality for a lower price, more efficient resource usage, waste recycling	Economic & Functional Improved utility, flexible access & usage	Economic, Functional, & Environmental Lower/no investment cost, improved efficiency, decreased environmental impact	Functional, Social, & Environmental Better quality and functionality, ethical and health benefits, reduced environmental impact
Recipients	Direct customers, supply chains	(Resource) users	Direct customers	Direct customers, end-users, society
Perspective	Supplier-determined and unidirectional	Transitional	Mutually-determined and reciprocal	Transitional

Customer value propositions for resurrecting value creation logic tend to emphasize economic and environmental benefits, focusing on the message that recycled or otherwise refurbished products are less expensive and have equal, or at the very least sufficient, quality compared to new products. This message combats the institutional perception that recycled materials are of a lesser quality compared to new materials. These customer value propositions are directed to the customers and to the customers of supply chain partners, as they can influence the selection of materials upstream in the supply chain. The perspective of the customer value propositions for resurrecting value is supplier-determined, as value creation processes are primarily seen as taking place within the supplier's domain, with the customer receiving a product that they use.

Customer value propositions for the share value creation logic typically emphasize economic and functional benefits. The key message is that utility, usability, and accessibility of resources are improved if the resources are shared between users instead of being utilized by a single user. This is suggested to lead to lower upfront costs, more convenient use of resources, and increased utility in the form of higher quality products being used. Thus, the main institutional perception that these suppliers try to shape is that ownership of products is more convenient than using shared resources. The customer value propositions are directed towards the potential users of the shared resources. In terms of their perspective, customer value propositions for the share value creation logic tend to be transitional, i.e., between a supplier- and a mutually-determined perspective. While the value proposed is typically supplier-determined, the customer value propositions are realized through extensive actions by the customers. For example, in many cases, the actual resources that are shared are sourced from customers, with the supplier firm facilitating a convenient way for customers to share and access resources.

Customer value propositions for the optimizing value creation logic typically articulate economic, functional, and environmental benefits. The environmental benefits were most often articulated as reduced needs to use energy or a resource, leading to calculated reductions of, for example, CO2 emissions. Customer value propositions also highlight improved performance outcomes, reduced risk, reduced need for capital, and ease of operations. The key message of the customer value propositions is that by engaging with the supplier's offering, the customer can optimize value from existing resources through improved resource application. Thus, it can be said that the key message of the optimize value creation logic-based customer value propositions is close to traditional B2B services; the environmental aspects that suppliers include in their customer value propositions reflect the need to improve the institutional legitimacy of the offerings. These customer value propositions were directed primarily towards direct customers, not towards a wider stakeholder group, reflecting that the suppliers primarily influence customers' mindset to see the optimize value creation logics as environmentally sustainable alternatives. The perspective of these customer value propositions tends to be reciprocal and mutually determined; the customer is expected to provide information on how, when, and to what specifications they want the supplier to perform activities previously taken care of by the customer.

Customer value propositions for the replace value creation logic highlight functional, environmental, and social benefits, thus having the broadest range of value dimensions articulated from the four value creation logics. The key message

articulated is that by switching to this type of offering, customers can immediately gain functional improvements while also doing good for the environment, and in some cases, for society. These customer value propositions are also often directed towards societal stakeholders and direct customers and have the widest audience for the customer value propositions from the value creation logics. Thus, it seems that these offerings require the supplier to shape the institutional environment by both legitimizing the offering to not only the customers but also stakeholders who influence the institutional environment more widely. Replace value creation offerings are usually novel and thus might not hold legitimacy without conducting institutional work. In terms of the perspective, these customer value propositions tend to be transitional, as they are primarily supplier-determined, but emphasize improved customer and usage experiences as sources for value creation.

4.4.4 Contribution of publication IV

The main contributions of publication IV regarding the thesis are the identification of the four value creation logics as crucial for value creation through business models from implementing circular economy principles, and the identification of the dimensions of value articulated in and the recipients of the customer value propositions of supplier firms with a diverse set of circular economy offerings. Contributing to the extant literature combining circular economy and strategy, the core value creation logics highlight focus areas for firms that implement circular economy in their business models (Pieroni et al., 2019), emphasizing the logic that economic value is generated within a circular economy business model. From the perspective of the influence of the changing institutional environment on value creation, the dimensions of value articulated in the customer value propositions contribute towards what kinds of institutional work the different value creation logics require to enable value creation (Nenonen et al., 2019, 2020). It was identified that based on the value creation logic, the institutional barriers that the firms need to target with their customer value proposition differ. For example, within the resurrect logic, it was identified that the institutional perception of recycled and reused products being of lesser quality was a primary topic of institutional work articulated within the customer value proposition. The customer value propositions for the replace value creation logic articulated the broadest range of benefits. They were directed towards societal, institutionally embedded actors in addition to direct customers (Chaney et al., 2019), implying that the novelty of these offerings required

strong efforts towards first legitimizing the offerings, especially from a sustainability perspective.

5 DISCUSSION AND CONCLUSIONS

5.1 Value creation by industrial firms in the institutional environment changing due to circular economy

The aim of this thesis was to identify ways for industrial firms to strategically develop business that creates value in the market change surrounding the emerging circular economy phenomenon. To reach this objective, three sub-research questions were developed at the interfaces of the theoretical fields of the thesis: strategy, circular economy, and institutional theory. This chapter discusses the thesis research findings in light of extant research, structured around answering the sub-research questions, and, ultimately, the main research question of the thesis.

The first research question of the thesis focused on the institutional legitimacy of circular economy principles to identify the contemporary institutional environment within which firms develop circular economy business. The findings of publications I and II showed that while the circular economy enjoyed institutional support through the regulative pillar, significant barriers exist in institutions' normative and cultural-cognitive pillars. For example, negative perceptions of used and recycled materials and products, institutionalized thinking through linear systems, and normatively valued activities that the effective implementation of circular economy could endanger. Thus, the institutional legitimacy of circular economy principles is not wholly aligned with the principles' ability to improve business sustainability, as the more limited recycling principle (Charonis, 2012; Korhonen et al., 2018) is being favored over the other principles. Earlier CE literature has taken a stance where the CE principles have been assumed to create value through their ability to improve environmental sustainability and consequently that reduce and reuse would be more valuable to business than recycling (Ghisellini et al., 2016). These findings contribute towards this literature by showing that the objective and perceived desirability of the CE principles in the market differ. From this, conflicts regarding value creation and environmental sustainability, and thus undesirable business implementations towards perceivably desired rather than objectively effective actions, can result. These findings also contribute towards the emergent literature adopting institutional theory in the CE field (Levänen, 2015; Levänen et al., 2018), showing that

policymaking in the form of regulations, while important, is not by itself sufficient to drive successful implementation of CE. Rather, as important institutional drivers and barriers for CE emerge from the normative and cultural-cognitive pillars of institutions, also these need to be accounted for and influenced to support the adoption of CE.

The findings also show that further institutional support is required for the reuse and reduce principles, aligned with the criticism in the circular economy literature towards the significant limitations of the ability of recycling alone to make the economic system sustainable (Ghisellini et al., 2016; Kirchherr et al., 2017; Korhonen et al., 2018). However, the findings of publication II show that the institutional environment is moving towards supporting the reuse and reduce principles. The finding in publication II that the focus of the circular economy was moving away from recycling first at the firm level due to identification of new business models, while the macro- and meso-level activities focus away from recycling was moving slower, supports the adoption of the business model concept in the circular economy research. This somewhat alleviates concerns expressed by, e.g., Hofmann (2019), that the business model concept is too economic focused and thus threatens the sustainability focus of the circular economy. While this transformation takes place, concerns about potential rebound effects from the implementation of reuse and reduce activities (Levänen et al., 2018; Millar et al., 2019) could emerge more clearly, allowing a reassessment of the ability of circular economy to bring about a sustainable economic system.

This thesis's findings imply that recycling is reaching a peak in legitimacy with a subsequent fall, while the more effective reuse and reduce principles continue to gain legitimacy. Although the circular economy covers a wide range of different technologies and activities, this finding is aligned with the perspective of the dynamic, cyclical nature of legitimacy for technologies (Markard et al., 2016). From this perspective, the emerging criticism of the ability of the circular economy to make the economic system sustainable (Korhonen et al., 2018), of the potential rebound effects of new business models (Millar et al., 2019), and the lack of focus on social sustainability (Murray et al., 2015; Schroeder et al., 2019) could be seen as the seeds for the eventual fall of the legitimacy of the circular economy, posing a question of what will follow. However, as the circular economy is in the gaining legitimacy phase and is not a single technology but rather a way of thinking about the economic system, whether the circular economy's legitimacy will fall or whether the circular economy will evolve to address the concerns remains to be seen.

The second research question of the thesis focused on how firms can propose, create, and capture value from the circular economy. The findings of publication III identified recycling as industrial firms' dominant principle for creating and capturing value from the circular economy. However, when recycling was the primary principle implemented, the findings of publication III imply that existing business models change minimally, mainly through the replacement of virgin materials with recycled ones. This requires less reinvention of existing business models (Johnson et al., 2008), and the implementation of recycling was usually done in a secondary business model operated separately from the original business model (Hacklin et al., 2018). The findings thus suggest that the implementation of circular economy through recycling might be easier. The separation of the business models can also enable identification of customer value and economic profits from both the original business model and the circular economy implementation (Chesbrough & Rosenbloom, 2002) while simultaneously slowing a holistic transformation to an entirely circular economy-aligned business model (Hacklin et al., 2018).

Four value creation logics at the core of the business models in circular economy—the resurrect, share, optimize, and replace value—were identified in publication IV. The logics are consistent with the ReSOLVE framework (de Sousa Jabbour et al., 2019; Ellen MacArthur Foundation, 2015a), which regenerate, share, optimize, loop, virtualize, and exchange as types of business models for circular economy. However, the value creation logics condense the models by focusing on value creation aspects rather than technical implementation: combining regenerate and loop into resurrect, focusing on infusing value to resources in circulation; and virtualize and optimize into optimize, focusing on delivering more value from fewer physical resources.

By focusing on value creation, especially from an economic value perspective, the identified value creation logics also contribute more widely to the circular economy business model literature, which has primarily been focused on technical ways to implement circular economy principles into business to improve sustainability (see, e.g., Lüdeke-Freund et al., 2019). The value creation logics allow connecting economic value potential to the technical implementations of circular economy business models by identifying where the business model's focus needs to be placed technically to best support economic value creation. Regarding the proposing of value from circular economy business models, it was identified that the benefits articulated in the customer value propositions of circular economy firms were often much broader than just economic benefits (Anderson et al., 2006), including

environmental and social benefits as well, and thus employing a wider range of benefits in customer value propositions (Patala et al., 2016).

The value creation logics help connect strategic considerations for value creation related to sustainability explicitly to implementation methods, which has been lacking in strategy literature (see, e.g., Engert et al., 2016). The value creation logics show that when adopting circular economy, economic value creation is not solely reliant on customers' emerging calls for suppliers to become more sustainable (Mariadoss et al., 2011). Rather, in the resurrect value, value creation is reliant on the effective revalorization of resources, in the share value on the ability to provide convenient and timely access to resources, in the optimize value on the thorough understanding of customers' processes, and in the replace value on the understanding of the customers' connections to their environment. Thus, the findings imply that while sustainability can offer a competitive advantage regarding specific customer segments that demand it (Kapitan et al., 2019), other improvements to competitiveness can be gained from circular economy implementation.

The value creation logics can be connected to other contemporary topics in the management field. While the resurrect value is mostly connected to the circular economy due to its focus on closing resource loops by reinfusing value to resources, both the share and optimize values highlight the potential of servitization for improving competitiveness (Kowalkowski et al., 2017). Meanwhile, the replace value relies on the ability to innovate products that better fulfill emerging customer needs, resonating strongly with traditional product marketing (Kotler & Armstrong, 2018). Thus, firms looking towards circular economy as a method of improving sustainability also benefit from understanding these topics in contemporary management literature, even if those topics are not focused on sustainability. This also highlights that sustainability itself rarely contributes to the firm's creation and capture of economic value directly. Rather, the connection is more indirect. Economic value creation more strongly depends on the ability to induce efficiency improvements or address customer needs.

The third research question of the thesis focused on the alignment to and shaping of institutions by industrial firms in institutional environments changing due to the circular economy. The circular economy was identified as a source of institutional change, as evidenced by the developing policy frameworks for supporting circular economy and the misalignment between the support of the institutional environment and the prioritization of the 3R principles of circular economy. Thus, the institutional environment towards which industrial firms implementing circular

economy develop business can be especially fruitful for institutional work (Nenonen et al., 2019). The finding that recycling is the dominant way to implement circular economy in a business model could, however, suggest that industrial firms are primarily focused on aligning to the institutional environment, as findings also suggest that recycling is currently the most legitimate circular economy principle to implement (Oliver, 1997). The institutional differences between the geographical areas analyzed in the study and their effect on the implementation of the otherwise quite similar cases also suggest that consistent with the institutional theory perspective, a degree of alignment to the institutional environment is needed to create value (Oliver, 1997; Scott, 2008a).

The wider case set of publication IV allowed the analysis of alignment and shaping when the industrial firm's business model was not focused on recycling. Here, the findings showcase that customer value propositions are used as tools for shaping institutions in the market (Nenonen et al., 2020; Storbacka & Nenonen, 2011), as the architectural design elements, specifically the benefits and the recipients of the customer value propositions, varied based on the value creation logics, which themselves had varying institutional legitimacy. Customer value propositions of industrial firms were aimed at shaping the institutional barriers towards circular economy partly identified in publication I, a finding that is aligned with the identification of reforming institutions as a context-specific, triggering market-shaping capability (Nenonen et al., 2019).

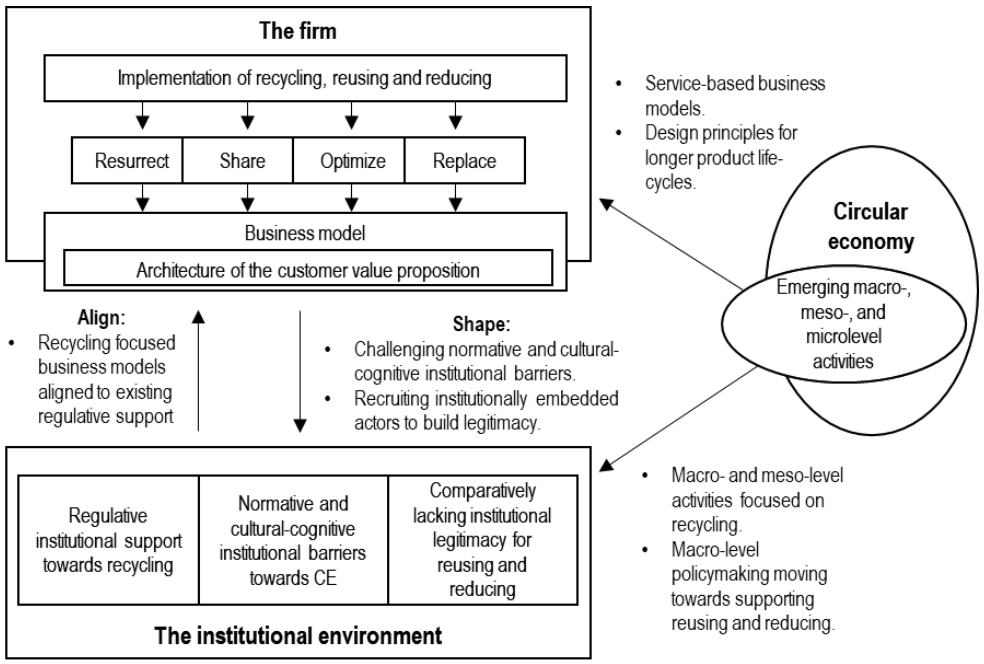
The thesis's findings also show that industrial firms conduct strategic institutional work when new phenomena emerge in existing markets. Thus, the findings widen the perspective of existing literature on strategic institutional work, which has focused on its role when firms enter new geographical markets (Meyer et al., 2009). Thus, the findings support the notion of institutional work as a continuous orientation (Chaney et al., 2019), rather than as a temporary aspect of entering new markets. Regarding the institutional orientation perspective, the findings also show that firms with novel resources without established legitimacy articulate their customer value proposition towards a broader, societal stakeholder group when compared to other industrial firms, thus employing the customer value proposition to improve institutional embeddedness (Chaney et al., 2019) in the institutional environment, in addition to directly influencing market legitimacy.

Regarding the rhetoric used in the customer value propositions studied, customer value propositions for the offerings replacing traditional alternatives contained the broadest range of benefits, including aspects outside of environmental sustainability such as health benefits. This suggests that these offerings, in particular, are gaining

legitimacy, as the rhetoric focuses on legitimizing the offering as opposed to disguising the lacking legitimacy of the offerings, as would be the case if the offerings were losing legitimacy (Patala et al., 2019). The findings also show that institutional legitimacy is not only a result of the regulative institutions but also relies on the normative and cultural-cognitive pillars of institutions, both of which might contain aspects against the regulative legitimacy identified for an offering. For example, while recycling has institutional support through the regulative pillar, cultural-cognitive perceptions towards recycled materials and products exist that also hinder recycling. Thus, an industrial firm needs to identify the full range of regulative, normative, and cultural-cognitive pillars of institutions when conducting institutional work to improve its offerings' value creation potential.

The main research question of the thesis is answered by combining the findings related to the three sub-research questions discussed. To support the discussion, Figure 6 illustrates the main implications of each sub-research question and combines them together to supplement the theoretical focus of the thesis.

Figure 6. Value creation by industrial firms through circular economy in the changing institutional environment



From the perspective of value creation through circular economy, two primary aspects were identified as important considerations for industrial firms: the internal

aspect of circular economy implemented by the firm within its business model and the external aspect towards the implementation's institutional legitimacy. From the internal perspective of circular economy implemented by the firm within its business model, it was identified that the implementation of circular economy principles (Ghisellini et al., 2016; Kirchherr et al., 2017) is facilitated by four distinct value creation logics: resurrect, share, optimize, and replace value. Each of these value creation logics can be linked to contemporary phenomena in the management literature. The resurrect value is most focused on the loop-closing aspects of the circular economy phenomenon (Ghisellini et al., 2016). The share and optimize values both focus on improving value creation through the servitization of product-based business (Kowalkowski et al., 2017). Meanwhile, the replace value links to more traditional product marketing aspects where the focus is placed on innovating improved products that fulfill customer needs better than the competition (Kotler & Armstrong, 2018).

From the external perspective towards the institutional legitimacy of the implementation in the business model, the findings indicated that there exist misalignments between the theoretical prioritization of where reduction should be prioritized compared to reusing, which should be prioritized to recycling (Ghisellini et al., 2016) and the institutional legitimacy of the principles, as findings implied that recycling enjoyed higher legitimacy than reusing and reducing. Previous literature on circular economy has focused on the sustainability aspects (Bocken et al., 2016; Geissdoerfer et al., 2017) and related deficiencies of the circular economy concept (Korhonen et al., 2018; Millar et al., 2019; Murray et al., 2015) to discuss its value for implementation. Thus, the findings highlight that, while the objective sustainability impacts are important from the perspective of the circular economy's ability to truly improve the global economy's sustainability, they cannot be directly used as proxies for the desirability of circular economy implementations from an economic value creation perspective.

Further highlighting this perspective, the 3R principle with the highest legitimacy, recycling, was also dominant in its ability to facilitate value capture through circular economy by inducing cost savings from the use of recycled materials and new revenue sources from take-back services and products made from recycled materials. However, the dominance of recycling could also be explained by the ability of industrial firms to implement recycling to existing business models through secondary business models with minimal modifications to the original, linear business model (Hacklin et al., 2018). This implies that for firms implementing

circular economy, recycling is the easiest method for doing so in a way that contributes to increased economic value creation and capture in a business model.

The findings from the analyzed customer value propositions for each value creation logic implied that firms across the value creation logics conduct institutional work to shape the institutional perceptions towards their offering (Nenonen et al., 2019; Storbacka & Nenonen, 2011). Furthermore, it was identified that institutional work towards the normative and cultural-cognitive institutions was the focus in the resurrect, optimize, and share value, where institutional barriers in these pillars exist that reduce their legitimacy. Specifically, the customer value propositions focused on shaping the perception that recycled and reused materials and products are of inferior quality compared to virgin products for resurrect value; the perception that owning a product is more convenient and time-efficient than renting a product for share value; and the perception that optimizing resource usage and thus improving efficiency is not an improvement in sustainability for optimize value. For each of these three value creation logics, the customer value propositions were directed towards customers, suggesting that, when adopting the institutional orientation perspective (Chaney et al., 2019), firms creating value from the circular economy through these value creation logics perceive that the legitimacy of the offerings can be improved by communication from the firm itself. In the case of the replace value, however, the offerings were new to the market and relied on replacing traditional resources to create and capture value. Thus, in these cases, the value of the offering itself was articulated most widely across different value dimensions (Patala et al., 2016; Rintamäki et al., 2007), implying a need to establish legitimacy widely through the normative and cultural-cognitive pillar (Patala et al., 2019). Furthermore, the customer value propositions of the replace value were often also directed towards societal stakeholders, implying that the firms used the customer value proposition as a vehicle for recruiting institutionally embedded actors (Chaney et al., 2019) to improve the legitimacy of the novel offerings and potentially to reduce the legitimacy of the offerings the firms focused on replacing.

As the circular economy is changing industrial firms' institutional environment, attention was also placed towards the direction in which the legitimacy of different circular economy principles could be moving (Markard et al., 2016). Findings indicated that while macro- and meso-level support for circular economy continues to focus on recycling, the focus has been moving towards reusing and reducing on the micro (firm) level through new, service-based business models and the adoption of design practices for longer product life cycles to support such business models. This implies that the transformation of the legitimacy towards supporting reduce

and reuse principles is driven from the micro level, which is supported by the findings of industrial firms' institutional work. Taking a dynamic view of institutional legitimacy (Markard et al., 2016), the findings suggest that to increase the legitimacy of reuse and reduce activities, the legitimacy of recycling needs to comparatively decrease, raising questions about the long-term strategic value of adopting the recycling principles towards value creation from circular economy, which was identified as the most convenient route for firms to take. However, legitimacy-building rhetoric (Patala et al., 2019) is also used by industrial firms in the customer value propositions of resurrect value creation logic, and within it, recycling offerings, implying that recycling is still in a legitimacy gaining phase. Thus, the findings imply that the circular economy overall continues to be gaining legitimacy and thus requires institutional work to institutionalize them to improve value creation. At the same time, it is the linear economy model that is currently losing legitimacy due to the circular economy-induced change in industrial firms' institutional environment.

5.2 Theoretical contributions

The research of this thesis combined theoretical perspectives from strategy, circular economy, and institutional theory literature to study the value creation of industrial firms in the institutional change induced by the circular economy. Through three empirical, qualitative multiple-case studies and a literature review, contributions were made to each field. The research of the thesis solidifies the extant strategic management literature with an institutional theory perspective and further strengthens the circular economy research, especially from the perspective of the ability of firms to create economic value from the implementation of circular economy.

This research contributes to the strategy literature by highlighting the role of the institutional environment in value creation. The research conducted in this thesis shows that the institutional environment is also an important consideration with a temporal dimension, as the legitimacy of business changes over time, aligning with the recent studies of Markard et al. (2016) related to technological legitimacy. This widens the perspective of extant literature in the strategy field, which has primarily focused on differences of institutional environments between geographical areas (Meyer et al., 2009). Furthermore, the research conducted in this thesis shows that firms actively articulate legitimacy-improving aspects of their offering towards customers to improve value creation by reducing institutional barriers and recruiting

institutionally embedded actors in the society to improve the legitimacy of, especially novel, offerings. Thus, this thesis's research shows that industrial firms conduct institutional work towards shaping institutions while articulating their customer value propositions, a perspective that has only recently been addressed in the literature (Nenonen et al., 2020).

Furthermore, this research identified that each institutional pillar must be considered when institutional work is being conducted. Even if an activity enjoys regulative legitimacy, institutional work towards shaping normative and cultural-cognitive institutions is still required to improve or even enable value creation. These findings are aligned with the recently emerged approaches of institutional orientation as a strategic orientation (Chaney et al., 2019) and the market-shaping perspective, where reforming institutions has been identified as a triggering capability towards shaping markets for improved value creation (Nenonen et al., 2019). The findings further contribute to both of these perspectives by showing empirical findings of their application in the implementation of circular economy business by industrial firms and highlighting how the triggering capabilities of reforming institutions (Nenonen et al., 2019) can be necessary for even highly legitimate business. Such was the case with resurrect value creation logic needing to reform institutional perceptions towards the quality of products from recycled materials, even though recycling was identified as the most legitimate circular economy principle. Contributing to the institutional orientation perspective (Chaney et al., 2019), the findings of the study show that the role of institutional embeddedness is especially important in connection with novel offerings, as was the case with the replace value creation logic, where firms often articulated value towards institutionally embedded stakeholders to support legitimization of the offering.

In terms of circular economy literature, this thesis contributes by showcasing the institutional legitimacy of the circular economy principles of reduce, reuse, and recycle; and by identifying the four value creation logics of resurrect, share, optimize, and replace. While previous circular economy literature had highlighted the prioritization of the 3R principles (Ghisellini et al., 2016), and argued that especially recycling (Korhonen et al., 2018) but also reusing (Millar et al., 2019) have limitations concerning sustainability, little research had previously approached the issue through the institutional legitimacy lens (Levänen et al., 2018). Even then, the focus had been primarily on regulative institutions. The research in this thesis identified that among the 3R principles, recycling is the most institutionally legitimate, while reuse and reduce lack legitimacy in comparison. Furthermore, the important role of normative and cultural-cognitive pillars of institutions was identified as affecting circular

economy implementation, as even with regards to recycling that had general regulative institutional support, there were cultural-cognitive institutions that acted as barriers. The four identified value creation logics contribute primarily to the field of circular economy business models (Bocken et al., 2016; Lüdeke-Freund et al., 2019). Previous literature in this field has focused on technical implementations for loop closing through business models and has paid little attention to creating economic value. The four value creation logics highlight core aspects towards creating and capturing economic value, thus complementing circular economy business model typologies such as the ReSOLVE framework (de Sousa Jabbour et al., 2019; Ellen MacArthur Foundation, 2015a), and the business model patterns synthesized by Lüdeke-Freund et al. (2019).

To the institutional theory field, the thesis contributes in the form of institutional perspectives towards an industrial firm's strategic business development. Identifying that industrial firms conduct institutional work within their customer value propositions, especially to transform existing normative and cultural-cognitive institutions, implies that an institutional perspective is ever-present in developing a firm's business model. This requires the industrial firm to recognize the state of the institutional environment towards which it develops business. This research widens the type of institutional work identified within the core institutional theory literature as deliberate actions towards creating, maintaining, and disrupting institutions (Hampel et al., 2017). The findings thus highlight that institutional work is not only separate actions towards institutionally embedded actors, as hinted by the institutional orientation of Chaney et al. (2019) but rather an important dimension of business model development itself. In other words, the institutional environment should be considered in relation to the sensing, transforming, and seizing capabilities of a firm and thus responded to as part of industrial firms' business models.

5.3 Practical contributions

The thesis offers practical contributions for managers of industrial firms that strive towards developing circular economy business to create value more sustainably, and for policymakers that strive towards implementing policy to achieve sustainability improvements in society from circular economy. For managers looking to implement circular economy into business to improve both economic and environmental performance, the key message of the thesis is:

Industrial firms developing circular economy business need to understand both their value creation logic and their institutional environment to create and capture value.

This key message draws together the internal and external changes taking place in the emergence of the circular economy from the perspective of an industrial firm. On the one hand, the circular economy offers firms multiple ways to improve their business from an economic perspective through internal changes to the business model of the firm; for example, through efficiently resurrecting the value of otherwise wasted resources or increasing the value creation potential of existing resources through optimizing or sharing. However, the change in the institutional environment is effective in determining what kind of business is perceived as valuable, which, especially in the case of circular economy business, due to its link to sustainability, affects a firm's ability to create and capture value. To concretize how industrial firms' managers can consider this key message while developing circular economy business, specific important steps to take in business development can be suggested.

First, *managers of industrial firms need to* i*dentify the most suitable way to implement circular economy for the firm.* Research in the thesis indicates that implementing CE through recycling could be easier for firms with existing linear business models, as fewer reconfigurations of the existing business model are needed. However, as reducing and reusing have been identified as more effective ways to theoretically improve sustainability and economic performance and should be gaining legitimacy faster than recycling, firms should explore opportunities to implement these activities through service-based business models and design practices towards more resilient, longer-lasting products.

Second, *managers need to identify which value creation logic to pursue and design the firm's business model's value creation and delivery system to achieve the key value-creating aspects of the value creation logic.* For example, cost-efficient revalorization processes for used resources in the case of resurrecting value. The firm's existing strengths are key considerations when choosing the value creation logic and the principles to implement. For example, a firm with strong expertise in process technologies can effectively leverage the resurrect value logic and the recycling principle, as the firm's existing resources enable it to develop cost-efficient processes crucial for creating value with the resurrect value creation logic. Meanwhile, an industrial firm with strengths in product design can focus on the replace value creation logic by developing new, more sustainable resources that other firms can effectively leverage. Furthermore, industrial firms that have already adopted services as core elements of

their business can effectively leverage the share and optimize value creation logics, as a service-based business model is crucial for creating value with both value creation logics.

Third, *managers need to identify the existing legitimacy of the business being developed and address potential legitimacy issues and institutional barriers in the customer value proposition*. For example, suppose the circular economy implementation is designed around the replace value creation logic to replace traditional resources with a novel resource. In that case, the identification of societal stakeholders (e.g., standards organizations, policymakers, and thought leaders) that can contribute to building the legitimacy of the firm's new resource and challenge the legitimacy of the traditional resources is another dimension of the value proposition to take into consideration. Moreover, while regulative institutions in the form of legislation are important in institutional changes, managers of industrial firms need to understand that normative and cultural-cognitive institutions have a significant role in enabling or blocking value creation, even if regulative institutional legitimacy exists for an activity. In other words, research on regulation is not sufficient to understand the legitimacy of a business under development; further analysis of how customers and stakeholders relevant to the customer normatively perceive a business to identify the normative legitimacy, and analysis of how customers act in the institutional environment to uncover potential cultural-cognitive legitimacy issues, is crucial. Thus, *the capability to identify and influence the institutional environment across regulative, normative, and cultural-cognitive pillars is important for developing business when the institutional environment is changing*.

For policymakers, the key implication is that *policymakers need to increase their focus on supporting the reuse and reduce principles of the circular economy*. This implication assumes that the environmental improvement of business while maintaining the ability to create economic value, suggested by the circular economy phenomenon, is the driving force for related policy. Here, the finding that a misalignment between the current regulative support and the theoretical effectiveness of 3R principles exists is an important consideration, with recycling continuing to dominate in relative regulative support compared to the theoretically more effective reusing and reducing. Following this implication, policymakers could, for example, develop more robust policies to prevent products from moving directly from the initial use phase to recycling, which should improve the reuse of products and ultimately bring both environmental and economic benefits to the economy. From a business perspective, new business models and design principles driving firms towards the reuse and reduce principles have already emerged. Policymakers need to identify ways to support these initiatives so that their institutional legitimacy can quickly be improved,

enabling the value creation potential of such activities. Such opportunities would include more strongly mandating the repairability of products and economic incentives to offer service-focused, usage-based business models.

5.4 Validity and reliability

In each of the empirical publications, several protocols were followed to improve the quality of the qualitative research conducted. The quality criteria of validity and reliability are used as the basis for discussing the quality of the research in this thesis (Bryman & Bell, 2015). In terms of validity, internal validity was improved by rigorously selecting forerunner cases with actual ongoing implementations of circular economy in a business offering, thus improving the match between the observations and the research subject. In terms of internal validity, the lack of interviews is a potential issue for internal validity, as it reduces the researcher's embeddedness in the case context. However, throughout the thesis research, the thesis author was deeply involved in multiple circular economy-related projects involving circular economy business development, improving the thesis author's visibility to the research context. The sourcing of data from multiple sources, i.e., data triangulation (Miles & Huberman, 1994) in publications I and III, and the sourcing of data from a well-recognized source embedded in the circular economy further improved the internal validity of the research (Yin, 1994). In terms of external validity of the research, the use of theoretical sampling and frameworks derived from extant theory (Patton, 1990), together with the use of replication logic in the selection of cases for the multiple case studies (Yin, 1994), further improve the generalizability of the findings to the theory.

To improve internal reliability, researcher triangulation (Flick, 2004) was used in each empirical study to reach a consensus of the research findings. External reliability is often seen as the issue of qualitative research, as the data analysis heavily relies on the interpretation of the researchers, and the collection of data typically involves flexibility during the collection process (Lecompte & Goetz, 1982). The use of publicly available, document-based data using well-recognized sources such as the LexisNexis search engine and SITRA improves the replicability and, thus, external reliability of the thesis research (see, e.g., Rusko, 2011; Ritala et al., 2014). However, as the phenomenon under research involved a social setting and was focused on a transforming setting, i.e., the circular economy-related market transformation, the findings within this specific context are derived at a particular moment (Lecompte

& Goetz, 1982), and would likely change if the research were replicated in the future. However, as similar market transformations occur outside of the circular economy context, this thesis research's findings, generalized to the theory presented in the theoretical background section of the thesis, apply to other similar market transformations.

5.5 Limitations and avenues for further research

While the research conducted in this thesis was able to show implications for creating value in a changing institutional environment, choices made for the research set limitations for the study. While identifying institutional work as an important aspect of economic value creation and capture in a changing institutional environment, the research focused on analyzing business models and customer value propositions, i.e., the results of the managerial practices of the firm, rather than the managerial practices themselves. Thus, it is not entirely clear how the firms' managers have arrived at the business models and customer value propositions analyzed in the study and, subsequently, how deliberate the institutional work conducted is. To alleviate this issue, future studies analyzing the role of institutional work to improve value creation could focus on in-depth, single-case studies that would analyze the process of the institutional work conducted to improve value creation in a changing institutional environment.

Using document-based data as the main data source also set limitations for the research conducted in this thesis. While this choice enabled the analysis of a wide range of cases across geographical regions, documents have certain issues such as that they are not originally created with the research questions in mind but by an author with their own meaning to convey to an expected readership (Coffey, 2014) and could thus deliberately highlight certain aspects while obscuring others (Hodgetts & Chamberlain, 2014), and that they have a bias towards capturing topics and events that are present rather than absent in the reality they reflect (Bowen, 2009). Furthermore, documents alone do not allow capturing the inner workings of an organization but rather focus on reporting on the results of organizations' actions (Atkinson & Coffey, 2004). While the use of trusted known sources and the multi-sourcing of data with the LexisNexis search engine helped to alleviate some of these concerns in this thesis, future studies on the topic could focus on gathering data directly from actors in the institutional environment through for example interviews, surveys and observations, and thus complement the findings of this thesis related to

especially institutional drivers and barriers that stem from the absence of institutions, along with the deeper understanding of the managerial practices of strategic development of circular economy business.

The choice of focusing on multiple-case studies without longitudinal analysis, as opposed to fewer cases studied with a broader focus on the temporal nature of a changing institutional environment, is another limitation for the research that could be addressed with a focus on longitudinal studies or with a replication of this study conducted at a later date. The cross-sectional approach's main limitation is that it does not allow direct analysis of the change taking place in the institutional environment. Instead, the direction of the institutional change taking place was inferred from earlier literature and this research's findings. Thus, future research should confirm the directions of the change of the institutional legitimacy inferred in this study, i.e., whether reuse and reduce really are comparatively increasing in legitimacy. This research avenue would also be fruitful for further studying the dynamic nature of legitimacy implied by Markard et al. (2016).

The choice to research circular economy-induced institutional change can limit the findings' generalizability regarding the importance of institutional work for enabling economic value creation by industrial firms. Market shaping literature has identified that institutional work is highly context-specific (Nenonen et al., 2019). Thus, in other transformations, such as the increasing adoption of artificial intelligence, the role of institutional work in enabling value creation can significantly differ from its role in the circular economy transformation. As the circular economy focuses on sustainability and thus has had a positive response from institutionally embedded actors such as policymakers, while artificial intelligence has faced much skepticism due to the risks of mass unemployment linked to the automation of work, the differences in institutional work effective for value creation between these two changes in the institutional environment could be drastic. Thus, further research on the role of institutional work within industrial firms' business models in relation to other on-going institutional changes would contribute to creating a generalizable theory on the phenomenon.

The rapidly developing nature of understanding about circular economy in both academia and practitioners also sets certain limitations for the present study. As the circular economy had recently emerged as a research field, frameworks for analysing the circular economy aspects of cases, namely the 3R-principles framework used in publications I and III, were derived from the most recent publications at the time, such as Ghisellini et al., (2016). Understanding on circular economy business has since continued to develop due to the rapid expansion of the research field, with

other frameworks for categorizing circular economy business such as the resource flow strategies of slowing, closing, and narrowing resource flows (Bocken et al., 2016) and the regenerate, share, optimize, loop, virtualize, and exchange (ReSOLVE) framework (de Sousa Jabbour et al., 2018). In this thesis, both of these frameworks and their connections to the 3R-principles and the value creation logics identified in this research were discussed to enable comparing and complementing the findings of this research with contemporary circular economy business research. However, the circular economy research field, along with understanding about circular economy business, continues to rapidly develop. Thus, to contribute to the collective understanding on the topic, future studies will need to also address this issue by employing contemporary understanding as the basis of research.

This research explored how industrial firms can strategically create business to create and capture economic value in the market change surrounding the emerging circular economy phenomenon. Based on the findings of the research, multiple fruitful avenues for future research can be identified. First, the findings highlighted the need to conduct institutional work to overcome potential barriers for value creation and establish legitimacy for circular economy business. While the institutional environment was the main focus in this research, it is also crucial to understand the direct customer perspective, as it is, in the end, the customer who chooses whether to conduct business with the supplier (Slater, 1997). Thus, future studies on the topic of circular economy business should directly embrace the viewpoint of the customer; for example, by identifying customers' motives for engaging with circular economy business models, as seen in the extant literature on related sharing economy business models (see, e.g., Bucher et al., 2016; Hawlitschek et al., 2016).

Second, the finding that firms embracing the replace value creation logic articulated customer value propositions towards a wider group of stakeholders to recruit them in the legitimization of the business suggests that future research on the topic of economic value creation from circular economy could benefit from adopting a multi-actor perspective to value creation, as suggested in the market shaping literature (Nenonen et al., 2019). This could take place through, for example, the adoption of an ecosystem perspective to create an understanding of how an ecosystem of actors together creates value in the circular economy (Aarikka-Stenroos & Ritala, 2017; Tsujimoto et al., 2018).

Third, the component-based business model concept was selected as the unit of analysis towards strategic business development in this research. While this choice enabled the analysis of value creation through circular economy business, it did not

directly address the often necessary development of products designed to enable such circular economy business models. For example, product attributes such as durability and maintainability need to be addressed in product development to enable business models that focus on lengthening product lifecycles. (Pinheiro et al., 2019) The findings suggest that many institutional drivers and barriers are also product related, the identified perceived lower price-to-performance of sustainably produced products being a prime example. Thus, future research with an institutional perspective on the adoption of circular economy principles as guidelines in new product development would increase understanding about institutional pressures to and economic viability of circular economy business.

Finally, the identified importance of institutional legitimacy for value creation through circular economy calls for continued research on the sustainability impacts of adopting circular economy in business. Understanding on this topic is scattered due to the umbrella-term nature of circular economy (Blomsma & Brennan, 2017), and has led to increasing criticism towards the phenomenon (see, e.g., Korhonen et al., 2018; Millar et al., 2019; Schroeder et al., 2019). This issue also inhibits business development for the circular economy, as the understanding of impacts is necessary to identify messages with which industrial firms should conduct institutional work when implementing circular economy into business.

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APPENDIX A: DEFINITIONS OF KEY CONCEPTS

Concept	Theoretical area	Definition	Author(s)
Business strategy	Strategy	Creation of a unique position where the business can create value in a superior way compared to its competitors long-term.	Porter, 1996; Wernerfelt, 1984
Business model	Strategy	The set of components in the firm's business venture that connects the customer value of the venture with the firm's ability to generate profit.	Richardson, 2008; Teece, 2010
Customer value proposition	Strategy	A description by the firm of the value it proposes its offering to create for the customers of the business. An organizing principle around which the business model is developed.	Ballantyne et al., 2011; Payne et al., 2017; Teece, 2010
Circular economy	Circular Economy	A regenerative system where the value of products and materials is maintained for as long as possible while minimizing waste and employing renewable energy.	Kirchherr et al., 2017; Türkeli et al., 2018
Reduce, reuse, recycle - principles (3R)	Circular Economy	Hierarchical principles to improve material resource efficiency and circulation. Reduce, i.e. overall reduction of the usage of material and products, should be prioritized, followed by reuse, i.e. returning products and components into circulation in the original intended use or a lower value form, followed by recycle, i.e. returning products and materials into circulation as processed materials.	Castellani et al., 2015; Ghisellini et al., 2016; Stahel, 2013
Circular economy business model	Circular Economy	A business model within components of which circular economy principles have been implemented.	Lüdeke-Freund et al., 2019; Manninen et al., 2018
Multilevel perspective	Circular economy	To be effectively adopted, circular economy needs to be implemented in activities on the micro-level, i.e. the level of individual firm-level actors, on the meso-level, i.e. the regional and business network level, and on the macro-level, i.e. on the economic system and national level.	Kirchherr et al., 2017
Institutional theory	Institutional theory	Theory that people follow institutions, i.e. resilient aspects of social structure, which manifest as guidelines for social behavior.	DiMaggio & Powell, 1983; Scott, 1987
Pillars of institutions	Institutional theory	Framework of regulative, normative, and cultural-cognitive institutions. Regulative institutions consist of formal and informal laws and rules. Normative institutions consist of values and norms. Cultural-cognitive institutions consist of taken-for-granted, common cognitive representations of the world.	Scott, 2008a, 2008b
Institutional environment	Institutional theory	The composition of institutions, including regulative, normative, and cultural-cognitive institutions, affecting the behavior of social actors in a specified environment, e.g. a geographical market.	Scott, 2008a
Institutional legitimacy	Institutional theory	General perception that the actions of a social entity are aligned with the regulative, normative, and cultural-cognitive institutions in an institutional environment.	Scott, 2008a; Suchman, 1995

PUBLICATIONS

I. Ranta, V., Aarikka-Stenroos, L., Ritala, P., & Mäkinen, S. J. (2018). Exploring institutional drivers and barriers of the circular economy: A cross-regional comparison of China, the US, and Europe. *Resources, Conservation & Recycling, 135,* 70-82. https://doi.org/10.1016/j.resconrec.2017.08.017

II. Ranta, V. & Saari, U. A. (2019). Circular economy: Enabling the transition towards sustainable consumption and production. In: W. Leal Filho, A. Azul, L. Brandli, P. G. Özuyar, & T. Wall (Eds.) *Responsible Consumption and Production. Encyclopedia of the UN Sustainable Development Goals*. Springer, Cham. https://doi.org/10.1007/978-3-319-71062-4_3-1

III. Ranta, V., Aarikka-Stenroos, L., & Mäkinen, S. J. (2018). Creating value in the circular economy: A structured multiple-case analysis of business models. *Journal of Cleaner Production, 201,* 988-1000. https://doi.org/10.1016/j.jclepro.2018.08.072

IV. Ranta, V., Keränen, J., & Aarikka-Stenroos, L. (2020). How B2B suppliers articulate value propositions in the circular economy: Four innovation-driven value creation logics. *Industrial Marketing Management*, *87,* 291-305. https://doi.org/10.1016/j.indmarman.2019.10.007

PUBLICATION I

Exploring institutional drivers and barriers of the circular economy: A cross-regional comparison of China, the US, and Europe

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Exploring institutional drivers and barriers of the circular economy: A cross-regional comparison of China, the US, and Europe

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ABSTRACT

The Circular Economy (CE) has been identified as a sustainable alternative to the current linear economic model. Thus far, research on the circular economy has focused on methods for better conserving the value in material flows. As the CE is currently being adopted as a sustainable development strategy in, e.g., China and the EU, identifying and comparing the drivers of and barriers to CE implementation would be beneficial for the acceleration of the development path. To contribute toward this research area, we built on institutional theory via a multiple case study covering China, the US, and Europe. We analyzed each region as an institutional environment and considered manufacturer and integrator types of value chain actors due to their central role in CE implementation. As our key findings, we identified that the general drivers of the CE from each institutional environment support recycling as the primary CE action, while support for other CE types appears to be lacking. Regulatory measures have primarily driven increased recycling efforts on both the integrator and manufacturer sides. Similarly, identified normative indicators overwhelmingly point toward recycling, while increasing reuse faces cultural-cognitive barriers. Between regions, China differs due to its informal sector and strong regulative institutional support. We conclude that to improve institutional support for the CE and allow it to fulfill its potential as a sustainable growth model, diversified institutional support for reducing the products produced and materials used as well as increasing reuse are needed.

1. Introduction

The Circular Economy (CE) approach refers to an economic system that is designed to be restorative and generative (Charonis, 2012); more specifically, the system maintains the value of products, materials, and resources in the economy for as long as possible, and the generation of waste is thereby minimized (European Commission, 2015). Accordingly, the CE approach has been receiving increasing attention recently as a step toward a more sustainable economic model. The CE theory suggests that increasing resource efficiency and waste reduction throughout the lifecycle of produced goods are, in fact, unexplored economic opportunities that have the potential for economic growth (Ghisellini et al., 2016; Witjes and Lozano, 2016). This fundamental linkage between environmental sustainability and economic potential has generated major interest in CE initiatives on a global scale (European Commission, 2015; Gang et al., 2012; Mathews and Tan, 2011).

Successful CE initiatives typically involve a broad variety of economic and societal stakeholders that need to work together in order to enable the circular flow of materials and related efficiency benefits (Geng et al., 2012; Preston et al., 2012). In particular, the literature has shown that implemented CE initiatives have often needed societal support, including legislative and financial subsidies (Fei et al., 2016; Levänen, 2015). Furthermore, recent research has increasingly highlighted the role of broader institutional issues such as norms and cultural aspects in shaping the transition toward more sustainable choices and the adoption of CE principles (Dai et al., 2015; Dubey et al., 2016; Levänen, 2015). However, the major focus of the CE literature has been on technical issues, such as material flows and technologies (Geng et al., 2009; Mathews and Tan, 2011), and thus the concept has been criticized for largely excluding the societal factors of sustainability (Murray et al., 2015).

Given the relevance of societal factors for CE adoption, we argue that the absence of an understanding of institutional drivers and barriers in mainstream CE analyses constitutes an important research gap. Although the extant studies have shown that diverse social institutions and legitimacy are relevant aspects of the transition to a CE (Ghisellini et al., 2016; Murray et al., 2015), our understanding of how these

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factors form the initiatives and drivers of as well as barriers to the CE are limited. The CE is an emerging global phenomenon, as China and the EU have simultaneously adopted it as a concept around which economically and environmentally effective future policy can be built (European Commission, 2015; Mathews and Tan, 2011). However, existing studies have focused mostly on single regions (e.g., Su et al., 2013) or have been limited to narrow sets of institutions, such as legislation (e.g., Sakai et al., 2011); thus, cross-regional comparisons that would suggest variations or offer a comprehensive picture of the phenomenon at a global level are needed. Furthermore, a multitude of viewpoints exist about how to actually incorporate the CE into concrete actions at the firm level. The definition provided by the EU Commission (2015) gives very little direction toward concrete operations and, academically, the concept is rooted in industrial ecology (Yuan et al., 2006), industrial symbiosis (Geng et al., 2012), product-service systems (Tukker, 2015), remanufacturing (Linder and Williander, 2015), corporate responsibility (Murray et al., 2015), and sharing economy (Preston, 2012), just to name a few. However, comprehension of the general drivers of and barriers to CE is very limited, possibly due to the fragmentation of the field. We argue that the principal difference between the linear economy and the CE is that, in the latter, material flows are integrated back into circulation. Following the established value chain perspective of Porter and Millar (1985), the critical actors in enabling the transition to the CE would thus be integrators, i.e., actors integrating material flows back into circulation; and manufacturers, i.e., actors completing the integration by enabling new value cycles from material flows.

Thereby, we *analyze the general and region-specific institutional drivers of and barriers to CE initiatives across China, the US, and Europe as found in manufacturer and integrator companies.* To contribute to the abovementioned research gap, we adopt an explicitly institutional view. We build on studies that have examined how CE approaches are shaped by norms and cultural aspects (Dai et al., 2015; Dubey et al., 2016; Levänen, 2015) and utilize institutional theory (DiMaggio, 1997; North, 1990; Scott, 2008) to help us analyze the (institutional) legitimacy of technologies (see, e.g., Markard et al., 2016). Applying the framework of regulative, normative, and cultural-cognitive institutional pillars of Scott (2008) enables us to map in detail how different types of institutional indicators (e.g., laws, norms, and beliefs) hinder or advance the adoption of the CE approach. The empirical part of the study presents a multiple case study approach with insights from Chinese, US, and European CE initiatives, analyzing each region as a different institutional environment (see, e.g., Tatoglu et al., 2015) and highlighting industrial cases of CE application across regions. As our key contribution, we identify regulative, normative, and cultural-cognitive institutional drivers of and barriers to CE across regions and value chain roles and map regional difference and similarities. Taken together, our results provide valuable insights into both academic and practical understandings of the heterogeneous institutional environments for CE implementation.

The structure of the study is as follows. Section 2, the theoretical background of the research, includes a discussion of circular economy and institutional theory. Section 3 presents the research methodology and describes the case selection, data gathering and data analysis procedures used. In Section 4, the findings from the case analysis are shown and summarized. In Section 5, the findings are further discussed by comparing the findings and identifying region and case-type specific drivers and barriers. In the concluding section, the implications of the findings, the limitations of the study and potential future research avenues are discussed.

2. Theoretical background

2.1. Identifying circular economy initiatives

The CE has been receiving increasing attention from academia (Ghisellini et al., 2016), governments (e.g., the EC Working Package, China's CE Promotion Law), and companies (Ellen MacArthur Foundation, 2016) as an alternative to the prevailing model of economic development: the so-called "linear economy" (Andersen, 2007), otherwise known as the "take, make and dispose" model (Ness, 2008).

The CE is often discussed through the 3R principles: reduce, reuse, and recycle (Feng and Yan, 2007; Preston, 2012; Reh, 2013; Sakai et al., 2011; Su et al., 2013; Yong, 2007). The reduce principle implies using minimal inputs of energy, raw materials, and waste by, for example, implementing better technologies, simplifying packaging, and using more power-efficient appliances (Feng and Yan, 2007; Su et al., 2013). The reuse principle states that "products or components that are not waste are used again for the same purpose for which they were conceived" (The European Parliament and the Council of the European Union, 2008, p. 10); this principle refers to the use of fewer resources, less energy, and less labor than that required to produce new products from virgin materials or even to recycle and dispose of products (Castellani et al., 2015). The recycling principle 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 reprocessing into materials that are to be used as fuels or for backfilling operations" (The European Parliament and the Council of the European Union, 2008, p. 10). Recycling is often discussed almost synonymously with the CE, and waste policies have included a strong focus on improving recycling rates (see, e.g., The European Parliament and the Council of the European Union, 2008). Since the 3R principles capture the essential aspects of the CE, we have determined its institutional drivers and barriers by analyzing whether they support or inhibit the 3R principles.

The 3R principles and the implications for advancing them demonstrate that the manufacturing and waste management sectors are central industries in the CE. However, the sectors have differing attitudes toward 3R principles due to their position in the value chain. In the traditional value chain perspective (Porter and Millar, 1985), product manufacturers produce goods and products, while waste management (i.e., integrator) companies deal with their disposal. In a profit-maximizing logic, reduce, reuse, and recycle have different impacts on actors in different parts of the value chain. Manufacturers that implement CE initiatives which fulfill some or all parts of the 3R principles seek benefits in terms of competitive advantage, albeit indirectly, in, e.g., increased efficiencies (Knight and Jenkins, 2009). The reduce principle is well aligned with this approach (Ayres and Van Den Bergh, 2005, p. 102), but designing and organizing reuse and recycling are not (Knight and Jenkins, 2009). In contrast, integrators, or waste management companies, seek to improve their processes with CE initiatives and direct business benefits, as they are structured in line with the 3R principles and thus have less conflicting business goals (Geng et al., 2009). For example, recycling is one of the central processes in an integrator's business, while for a manufacturer this represents an additional set of costs that need to be turned into competitive advantage, e.g., by actively communicating its efforts to relevant markets as a responsible business practice (Bocken et al., 2014).

2.2. Institutional theory and the legitimization of sustainability initiatives

Since our work builds on institutional theory, we begin by briefly discussing the key aspects of this approach. Institutional theory examines the established, resilient social structures that provide societal stability (Scott, 1987). Scott's (2008) framework of institutional theory suggests separating institutions into three pillars—*regulative, normative,* and *cultural-cognitive*—that are individually distinguishable but interdependently contribute to the resilience of the social structure. These pillars reveal through their indicators the rules, norms, and beliefs that impact social behavior and are reflected in activities, relations, and resources in a particular field, region, or community (Scott, 2008).

Table 1
Three Pillars of Institutions (Scott, 2008, p. 51).

	Regulative	Normative	Cultural-Cognitive
Basis of compliance	Expedience	Social obligation	Taken-for-grantedness Shared understanding
Basis of order	Regulative rules	Binding expectations	Constitutive schema
Mechanisms	Coercive	Normative	Mimetic
Logic	Instrumentality	Appropriateness	Orthodoxy
Indicators	Rules Laws Sanctions	Certification Accreditation	Common beliefs Shared logics of action Isomorphism
Affect	Fear, guilt/ innocence	Shame/honor	Certainty/ confusion
Basis of legitimacy	Legally sanctioned	Morally governed	Comprehensible Recognizable Culturally supported

These institutional rules are generated by both agency-based and unconscious processes (Strang and Sine, 2002). In general, they seem to evolve from the regulative pillar, which involves mostly conscious decisions, to the culturally cognitive pillar, which involves mostly unconsciously adopted decisions. Different schools of theorists studying institutions focus on different areas: For example, in economic studies, where actors are usually seen as agents who actively influence the construction of institutions, the regulative pillar is often highlighted, whereas early sociologists stressed the influence of normative systems in imposing constraints on social behavior (Scott, 2008, pp. 51–55). Table 1 summarizes the principal dimensions of institutions, as described by Scott (2008, p. 51).

Institutional theory has recently and extensively been used in explaining sustainable activities at both the firm and individual levels; likewise, the framework of the three pillars of institutions has established itself as a frequently used analytical tool. A range of studies on recycling and sustainable production, both central to the CE concept, have suggested ways that institutions shape the diffusion and adoption of sustainable business. The foci and key findings of these studies are displayed in Table 2. Overall, existing studies indicate that the institutional environment both supports and inhibits the adoption of and transition to a CE. For example, the regulatory system of an institutional environment can support a CE by discriminating against wastefulness and motivating circularity, but it can also inhibit CE by, for example, denying the reuse of certain products. Similarly, the normative system of the institutional environment can be expected to support the CE (e.g., Dai et al., 2015; Miliute-Plepiene et al., 2016) through, for example, establishing recycling as more acceptable than landfilling. However, the normative system could also be misaligned with the ultimate goals of CE by, for instance, establishing the reduction of greenhouse gases as more virtuous than the increase of the circulation of materials. The cultural-cognitive system can also play a crucial role in the establishment of societal expectations and structures that guide ways of thinking about, for example, waste and why sustainability is important. These systems interdependently and mutually set the legitimacy of the CE in the institutional environment.

3. Research methodology

Here, we will describe the research methodology used to examine the institutional drivers of and barriers to the CE in multiple regions. To study the combined research areas of the CE and institutional theory with relatively little preceding research, we adopted the case study as our research approach (Yin, 2003, p. 5). Qualitative case research is an established method for conducting explorative and theory-building research (Saunders et al., 2009, p. 146) and has also been previously used in the study of recycling and the CE (see, e.g., Mathews and Tan, 2011; Uiterkamp et al., 2011). To analyze the heterogeneous institutional aspects of the CE, we selected a multiple-case research design with six cases. Yin (2003, p. 53) argued that selecting a multiple-case design over a single-case design may be preferable because it reduces vulnerability to unexpected circumstances in the chosen cases and increases analytical benefits by providing multiple cases for cross-case analysis. In addition, the main driver for choosing a multiple-case design was our interest in examining and comparing different cases from multiple regions to yield a combination of institutional environments that would facilitate the identification of global and regional patterns.

3.1. Case selection

Qualitative analysis is used in this study; thus, the purpose of the case selection was not to attain a sample from which to draw statistically meaningful results, but to follow purposive (Saunders et al., 2009, p. 237) and theory-based sampling (Patton, 1990, p. 177) so that the cases would provide as much information as possible about the connection between the CE initiative and the institutional environment. The selection of the regions and the cases within each region followed maximum variation sampling (Patton, 1990, p. 172) in order to capture a wider picture of CE initiatives. Between regions, replication logic (Yin, 2003, p. 47) was used so that, even though case types differed across regions, each regional set of cases selected resembled the sets of other regions. Replication logic was used to increase the validity of the findings by comparing the drivers of and barriers to the CE in the institutional environments of the selected regions.

The case sampling proceeded in two phases. In the first phase, a range of cases were identified, and 10 cases were further evaluated for case selection. These cases were Huawei (CE recycling system for electronics), Dell (use of closed-loop plastics), Republic Services (recyclables separation in facilities after curbside collection), Ekokem (CE Village waste utilization concept), H & M (textile recycling), Renault (reuse and recycling of materials in the automotive industry), Suzhou (recycling of household waste in China), UPM (turning a company's own waste stream into a new product), Veolia (a CE-oriented waste management model), and Enevo (improving waste management efficiency through digitalization).

For each of these cases, an evaluation of the case value for the research agenda was conducted based on CE aspects and data availability. Using the criteria of different types of initiatives and institutional environments, a final set of six cases was selected. Thus, the final case sampling criteria were to select cases from three different institutional environments (China, the US, and Europe) and to select one integrator/ waste management-oriented and one product-oriented case from each institutional environment. With this sampling, we were able to contrast product manufacturers' initiatives with integrators' initiatives in different institutional settings and seek common and differing themes within integrators and within product manufacturers regardless of their institutional environments. The selected cases, together with details of their selection criteria, are shown in Table 3.

For China, Huawei was chosen as the manufacturer case due to the company's emphasis on the CE in multiple, recent, annual sustainability reports. The case of Suzhou's recycling system, an integrator, was included as the Chinese waste management case, primarily because it represented an opportunity to include an analysis of the informal sector in addition to the availability of prior studies on the subject. Dell was chosen as the manufacturer case from the US because the company has a closed-loop plastics program and, like Huawei, has recently promoted the concept of the CE. Republic Services was chosen as the waste management (i.e., integrator) case from the US because this company is a leading waste management and recycling operator in the region. The UPM case was chosen to show how a manufacturer can create end

Table 2
Use of Institutional Theory to Analyze the Diffusion of Sustainable Efforts.

Authors (Year)	Sustainability	Institutions
Mac (2002)	Argues that purely economic and "rational" aspects are not sufficient for firms when managing environmental decisions.	Identifies institutional theory as an important contribution toward understanding how firms make decisions regarding environmental problems.
Coenen and Díaz López (2010)	Explores conceptual commonalities, differences, and complementarities among the theoretical frameworks of sectoral systems of innovation (SSI), technological innovation systems (TIS), and socio-technical systems (STS) as approaches to innovation and technological change for sustainable and competitive economies.	Considers institutions to be a distinctive feature of each of the systems approaches and acknowledges the three-pillar framework of regulatory, normative, and cultural-cognitive institutions. Identifies that, while in SSI and TIS, institutions primarily serve as guiding innovators; in ST Systems, institutions, as agents of institutional change and social learning, play an integral role in the transformation from one ST System to another.
de Abreu et al. (2012)	Compares corporate social responsibility activities between textile firms in Brazil and China.	Uses the regulatory, normative, and cognitive pillars framework of institutional theory as the central analytical tool.
Pajunen et al. (2013)	Analyzes barriers towards the development of innovative residue based products, focusing on the Finnish domestic framework.	Focuses on analyzing institutional barriers that inhibit material cycles within the policy framework in Finland, and provides policy suggestions to reduce the barriers.
Dai et al. (2015)	Reports that doorstepping interventions can produce statistically significant increases in the recycling capture rate and analyzes why this is so.	Finds that social norms and emotions are important determinants and hints at the influence of normative institutions, despite not using the institutional theory approach.
Levänen (2015)	Analyzes the role of institutions in the development of industrial recycling in Finland.	Establishes an analytical framework categorizing institutions into formal institutions, which include the regulative pillar of the established institutional framework, and informal institutions, which include the normative and cultural-cognitive pillars.
Dubey et al. (2016)	Develops a theoretical model to provide insights into firms' sustainable consumption and production activities.	Adopts institutional theory as part of a model to explain the sustainable behavior of stakeholders in sustainable consumption and production (SCP) activities. Tests the significance of coercive, normative, and mimetic pressures on top management participation in sustainable activities. Finds that mimetic pressures and top management beliefs have a significant relationship with top management participation.
Miliute-Plepiene et al. (2016)	Analyzes what motivates households to recycle in Sweden and Lithuania.	Emphasizes norms as important determinants and finds almost all proxies for personal moral norm activation to be important and statistically significant in both countries. Does not explicitly use institutional theory.

products from its own and customers' operational waste. Industrial symbiosis in the form of UPM's use of waste from other companies as a resource was a major influence in the selection of this case. Finally, Ekokem, an integrator, represents a case of a CE initiative from an incumbent waste management industry. Together, the UPM and Ekokem cases cover the institutional environment of Europe. With these cases, multiple types of CE initiatives in a variety of regions can be addressed with comparisons between manufacturer and integrator businesses.

3.2. Data gathering and analysis

This study builds on a combination of primary and secondary data gathered from multiple sources. Secondary data have been established as a valid source of main data for a case study when using a broad range of publicly available data (e.g., Ritala et al., 2014; Rusko, 2011). As an example, Rusko (2011) analyzed strategic moves and competition in the Finnish forest industry using published historical accounts of the firms studied, newspapers, public material (e.g., annual reports), and archival documents (e.g., published research reports)—in other words, solely secondary data. Furthermore, using an extensive set of data gathered from multiple sources increased data triangulation (Yin, 2003, p. 34).

The major method of data collection in this study involved using the news search engine LexisNexis and documenting the dates of retrieval and the search terms used. The LexisNexis-acquired news data were then augmented with corporate annual reports, investor relations presentations, news articles from other established sources, and product details from the companies themselves (e.g., company websites). LexisNexis was selected specifically for its global news article search function, following the example of previous studies that have treated it as a reliable data source (Adams et al., 2009; Moynihan et al., 2000; Tankard, 2001; Zahra and Nielsen, 2002). In cases in which recent academic research material was available, academic papers were also used as secondary material for the cases. The major data were supplemented with two theme interviews for the European cases. The data sources and amounts of data for each case are shown in Table 4. Altogether, this study's extensive data set comprises 401 documents.

The analysis of the data set was conducted in a structured way using

Table 3
Cases Selected for Analysis.

Case	Institutional environment	Company employees	Company revenue (MEUR 2015)	Industry	Case description
Huawei	China	170,000	54,400	Phones, network equipment	E-waste recycling and new processes to increase material circulation
Suzhou	China	Thousands in the informal sector[a]	Not available	Waste management	Recycling in the presence of the informal sector
Dell	US	101,000	51,700	IT	E-waste recycling organized by producer
Republic Services	US	33,000	8700	Waste management	All-in-One™ recycling solution with minimal source separation
UPM	Europe	19,600	10,100	Forest industry, energy	Creating products from waste and sidestreams
Ekokem	Europe	680	260	Waste management	Separating recyclables from mixed waste

[a] Based on Fei et al. (2016, p. 76).

Table 4
Data Sources for Each Case.

Case	News Articles	Editorials/Commentaries	Company Releases	Research Articles	Other Company Material	Supplementary Material: Interviews
Huawei	4	1	7		8	
Suzhou	30	8	26	8	19	
Dell	22	12	2	1	12	
Republic Services	12	1	5		6	
UPM	12	7	98		27	1
Ekokem	12	3	35	1	20	1

Table 5
Framework used for case analysis.

	Regulative	Normative	Cultural-Cognitive
Indicators	Rules Laws Sanctions	Certification Accreditation	Common beliefs Shared logics of action Isomorphism

Excel spreadsheets to identify indicators of the three institutional pillars in the case material of each case. The case analysis method followed the pattern-matching method, in which a theoretical framework is used to identify empirical patterns from data (Saunders et al., 2009). Therefore, following the key elements of the analytical framework, highlighting diverse institutional indicators (cf. Scott, 2008), as shown in Table 5, manifestations were sought of such indicators from the data. For example, if the data for a given case mention that a law or rule restricted (or promoted) the case initiative in some way, this was listed in the regulatory pillar section of the case as a barrier (or driver) from the CE perspective. To determine if the institutional indicator served as a barrier or a driver, the institution's influence with respect to the 3R principles of CE—that is, supporting them (i.e., being a driver), inhibiting them (i.e., being a barrier) or neither—was assessed. As an example in the analysis and related qualitative assessments in the UPM case, the Profi products received multiple awards in design competitions due to the recycled materials of the product. This was identified as a normative indicator and a driver because of its support of recycling. To increase the reliability and quality of the study, researcher triangulation was used (see Flick, 2004), and all of the researchers conducted analysis, compared assessments and reached agreement on the findings. The most notable findings originating from this analysis are shown in the figures for each case.

We first conducted the within-case analysis for each of the six cases. These were followed by a cross-case analysis, which was conducted by pattern-matching the regional case sets selected using replication logic (Yin, 2003). The resulting common drivers and barriers were grouped to determine which institutional drivers appeared to be similar or distinct across the six cases.

4. Results

After identifying the institutional indicators of each case, the effects of the indicators were categorized as either drivers (if they supported the CE principles of reduce, reuse, and recycle) or barriers (if they inhibited these principles). The summaries of the results for each initiative are shown in the tables corresponding to each case. The most relevant findings are briefly described for each initiative.

4.1. CE cases from the Chinese institutional environment

4.1.1. Manufacturer case: Huawei

In 2013, Huawei set a goal to embrace a CE model across its operations. Since then, the company has been making annual efforts to reduce its landfill rates, CO_2 emissions, and product energy consumption, while increasing its manufacturing resource efficiency and seeking new business models that will enable new lifecycles for end-of-life products. For example, in 2015, the company redesigned its lifecycle management processes and started organizing auctions for optic cables

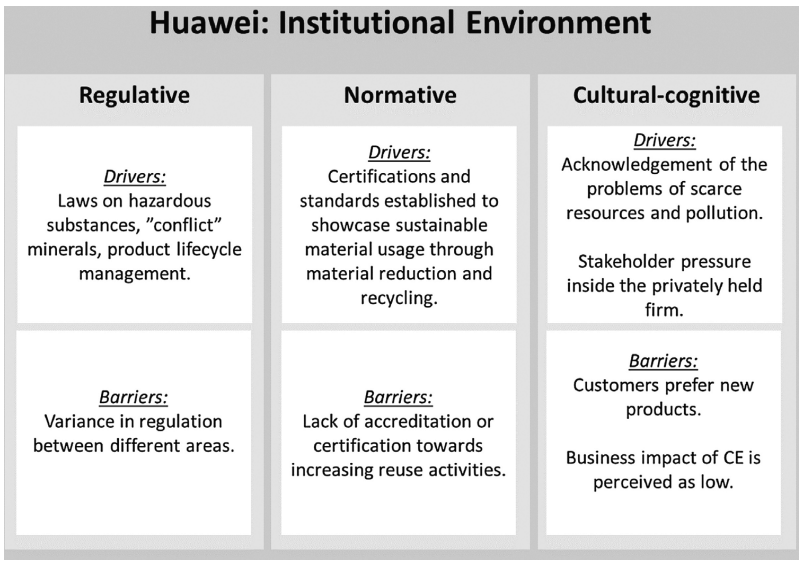

Fig. 1. Summary of the Institutional Drivers and Barriers in the Huawei Case.

and other end-of-life products that previously would have simply been discarded. A summary of the institutional environment identified in the case is shown in Fig. 1.

In the Huawei case, the primary driver appears to be the pressure placed by company stakeholders on the privately held company to move toward the CE. Due to this pressure, over the last three years, Huawei has implemented a company-wide CE model and begun efforts to increase recycling capabilities for phones. The main reasoning for the stakeholder pressure appears to be the acknowledgement of scarce natural resources and the resulting need to use materials more efficiently. Thus, *cultural-cognitive pressures appear to be the primary driver for the case.* However, it can be argued that since *the company perceives the impact of CE to be low from the business perspective*, *normative and regulatory pressures contribute*. Still, mentions of regulatory pressures to implement such efforts as auctions for end-of-life equipment, certifications to reduce material usage in products, and the use of specifically recycled materials are scarce. *A major barrier to advancing the CE in the Huawei case appears to be low incentives for increasing the reuse of products.* While the company is required to *recycle* certain products, no mention of improving product *reuse* is mentioned.

4.1.2. Integrator case: Suzhou

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, separate them from other wastes, and then process them for use by local manufacturers. The case shows how recycling efforts work in an environment in which the recycling infrastructure is still developing and the informal sector plays a major role in the creation of value through recycling. A summary of the institutional environment in this case is shown in Fig. 2.

While at first glance, the regulatory pillar appears to be the major driver for the Suzhou initiative since China has implemented high-level laws like the Law on the Prevention and Control of Environmental Pollution by Solid Waste, enforced in 1996 and revised in 2004, and the Circular Economy Promotion Law, enforced in 2009, it appears that the low-level implementation and enforcement of this guidance are inefficient. Instead, it appears that the major driver for recycling from municipal solid waste is the drive for *a means of income* (Fei et al., 2016). Thus, there is a major *normative barrier* to implementing a potentially more effective recycling system, as *this could strip thousands* (Fei et al., 2016, p. 76) *of people from their access to small but necessary income.* The legitimacy of the CE in the context of this case is, thus, especially interesting, since it shows that enforcing legislations and implementing measures that would promote the use of more advanced technologies is *sometimes perceived as illegitimate on the residential level.*

4.2. CE cases from the US institutional environment

4.2.1. Manufacturer case: Dell

Dell is a leading US-based manufacturer of personal computers (PCs) and computer equipment. It is the third-largest PC manufacturer when measured by units shipped, with shipments of 10.2 million PCs in the fourth quarter of 2015, according to technology analyst Gartner Inc. 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 computer recycling to consumers, and is now the first to launch a computer made of third party-certified, closed-loop recycled plastics. Thus, the analysis of Dell's recycling efforts and retake program provides insight into a leading CE initiative in the much-discussed area of e-waste. A summary of the institutional environment identified in the case is shown in Fig. 3.

A key driver in Dell's CE initiative is *the requirement by key states, such as California, to arrange recycling for end-of-life products free of charge.* Another driver is *the acknowledgement that recycled materials can provide cost savings*. For example, Dell expects cost savings from its closed-loop recycling system, through which it reclaims plastics from recycled computers and combines these with other recycled plastics for use in products. Since this is linked to the market-based cost of recycled materials, it can be defined as a regulatory driver. Identified institutional barriers appear to reflect *a cultural-cognitive view that products that are made sustainably (e.g., with recycled materials) offer poorer price and/or performance*, an issue that Dell explicitly argues does not apply to its products. The *normative institutional aspects of recycling* can also be seen as a barrier. Implementing recycling is seen as a valuable effort that is rewarded through certifications and sustainability awards, without a call to reduce material usage through other means or to implement reuse schemes.

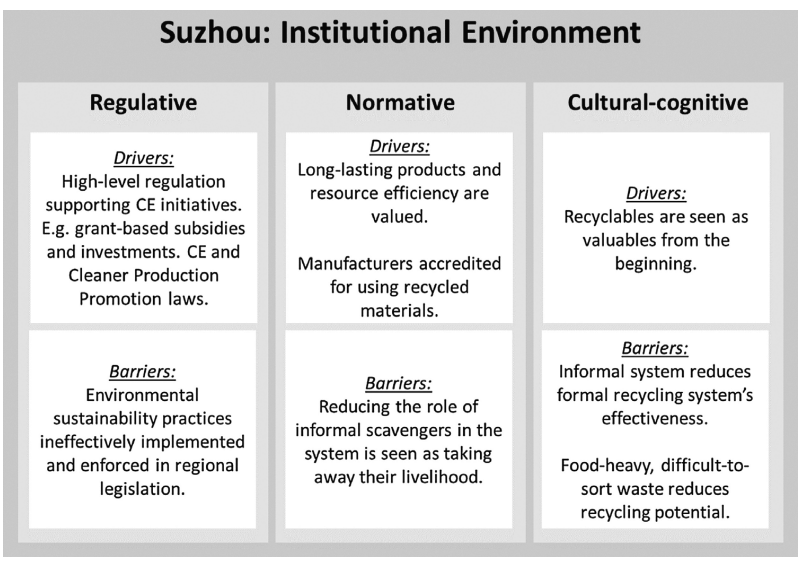

Fig. 2. Summary of the Institutional Drivers and Barriers in the Suzhou Case.

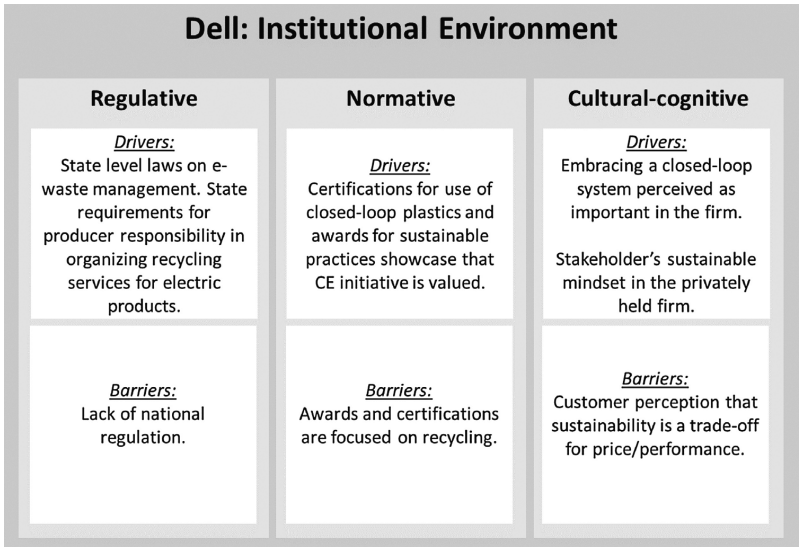

Fig. 3. Summary of the Institutional Drivers and Barriers in the Dell Case.

4.2.2. Integrator case: Republic Services

Republic Services is the second-largest waste management company in the US, with over 200 recycling centers nationwide. One of the company's main offerings is an "All-in-One™" recycling service. The company has both county/municipality customers and individual customers. Since the company's recycling service collects recyclables that are all placed in the same collection bin, its facilities have significant capabilities related to separating and sorting a wide variety of recyclables. After separating, sorting, and processing, most of the recycled materials are shipped to China. The institutional environment identified in the case is shown in Fig. 4.

The primary driver of Republic Services' CE initiative appears to be *a combination of normative and cultural-cognitive aspects*. While it is not mandatory to arrange recycling in every state in the US, recycling is valued to the extent that it is necessary for a waste management company to be competitive. Interestingly, recycling currently appears to provide few economic benefits: In its 2015 Annual Report, the company acknowledges that the value of the recycled materials no longer exceeds processing costs and, thus, that it is looking to shift some of the costs to customers through recycling fees. One potential contributor to the high processing costs is the low level of source separation, since many of the company's customers use a service in which all recyclables are placed in a single bin and separation is done at the facility level. Thus, *as processing costs are currently higher than the value that can be captured from the sale of recycled materials, the low level of source separation is a cultural-cognitive barrier for the CE.*

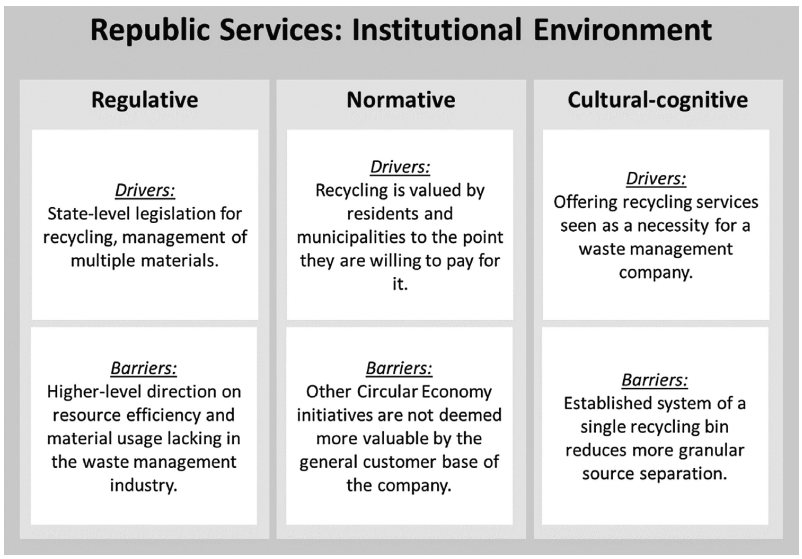

Fig. 4. Summary of the Institutional Drivers and Barriers in the Republic Services Case.

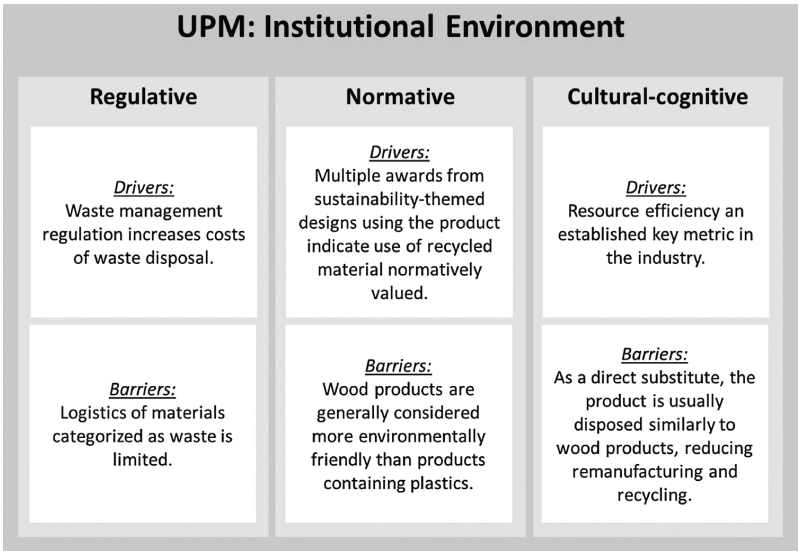

Fig. 5. Summary of the Institutional Drivers and Barriers in the UPM Case.

4.3. CE cases from the European institutional environment

4.3.1. Manufacturer case: UPM

The case of UPM ProFi, which manufactures biocomposite deck products from waste from label products generated in another business unit and by some customers of the company, is 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 industrial symbiosis, which has been discussed as a method of implementing the CE in the operation of industrial systems. A summary of the institutional environment in the case is shown in Fig. 5.

Increasing resource efficiency is a key objective in both the company and the industry. This goal can be seen as a central *cultural-cognitive driver* for this case, since the innovation behind the product is a result of developing methods to utilize company waste and sidestreams. From a regulative perspective, there are no direct barriers (e.g., laws). However, since firms are required to dispose of their waste in a proper manner, thus creating costs for the firm, the potential to reduce waste disposal costs can be seen as a *regulatory driver*. One other important driver for the initiative is *the normative value of being able to recycle waste*. Before the initiative, recycling the waste that is now used in UPM ProFi was not possible. Since the initiative, the company's new normative legitimacy has been recognized through design awards received by sustainability-themed projects at multiple global exhibitions and through the company's ability to recycle waste being used as a key selling point for the collection service the firm has set up to collect waste for ProFi from its customers. Barriers to the initiative's ability to advance the CE are mostly related to the product being a substitute for wood products, which reduces the product's ability to be recycled into new ProFi products, as the product can, and often is, disposed of through incineration.

4.3.2. Integrator case: Ekokem

Ekokem, the company behind this case's subject, the CE Village concept, is a specialized waste management operator that has recently profiled itself as a CE company. Increasing the recycling and reuse of materials is high on the company's agenda. The Circular Economy Village is a system that, through a combination of three connected facilities, can produce recycled materials, biogas, and energy using mixed waste. The institutional environment of the case is summarized in Fig. 6.

The regulative pillar of institutions appears to be one major driver for the CE Village. Several regulative developments have contributed to the need for such a facility. The *law banning the landfilling of waste that includes more than 10% organic material* directly supports the initiative, since the facility can separate organic parts from mixed waste and process it into biogas. The facility is also able to *match the recycling target of 65% for municipal waste* when source separation is taken into consideration. A *normative driver* for the CE Village is its ability to increase waste utilization rates, since *recycling is normatively valued in the institutional environment, as shown by, for example, high levels of source separation and the avoidance of landfilling.* The use of tried and tested technology already in use elsewhere in Europe can be seen as *a cultural-cognitive barrier in the sense of shared logics of action*, thus reducing the potential to use new and groundbreaking technologies. However, it must be noted that the technologies are combined in a way specific to the CE Village in order to address the constitution of local waste and enable the separation of, for example, plastics from the municipal waste; thus, it seems that the shared logics of action have not been particularly inhibiting in this initiative.

4.4. Comparing institutional environments and their institutional drivers and barriers

During the within-case analysis phase, we emphasized more detailed findings that offer clues to the effects of institutional drivers and barriers of specific cases. However, combining two cases from different industries can provide a more general outlook of the drivers and barriers of each institutional environment. The results of the individual case studies are summarized in Table 6. The cross-case comparison reveals similarities and differences between the cases with regard to the institutional environment and value chain actor type, enabling the identification of emerging patterns.

In China, there is a surprisingly large variance between the manufacturer and integrator cases. A common factor in both is a *cultural-cognitive, shared understanding of recyclables as valuable from very early on*. In Suzhou, recyclables already generate value for scavengers who collect them from residents or streets, and Huawei has started to organize auctions for end-of-life equipment, such as optic cables. In the US, a common trait seems to be that *recycling is normatively valued and is*

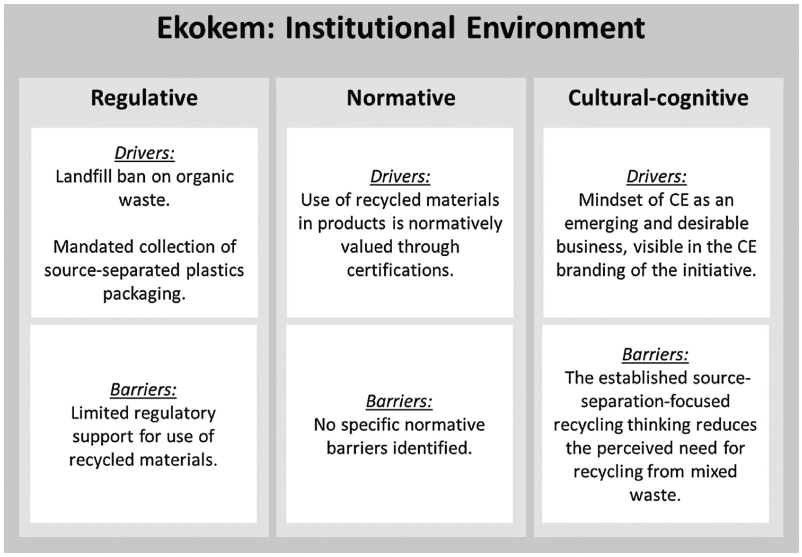

Fig. 6. Summary of the Institutional Drivers and Barriers in the Ekokem Case.

arranged even when not mandated by state-level laws. However, a common barrier in the US is the processing costs of recycling, since, in both cases, *recyclables like plastics are sent to China for further processing and manufacturing.* In the European cases, the *push to increase material utilization is a common driver.* Ekokem has increased its utilization of waste by combining multiple processes, and UPM uses waste and sidestreams to create new products to avoid the generation of waste for disposal.

5. Discussion

Comparing the institutional environments of China, the US, and Europe after consolidating them through their two different cases facilitates the identification of general CE drivers that are shared across different regions. This also allows the identification of region-specific drivers and barriers, which is crucial when discussing advancing the CE in a global economy. Fig. 7 shows the most notable emerging institutional drivers and barriers identified from the case analysis, clustered between value chain roles and the institutional environments. The general drivers and barriers have been identified according to the value chain role, linking them to concrete implementation and further highlighting the requirement of a holistic institutional approach for advancing the CE.

With regard to individual regions (i.e., institutional environments), our cross-case analysis reveals different *region-specific drivers and barriers*. In China, from the regulative perspective, a region-specific CE barrier appears to be the difficulties of implementing and enforcing CE laws on a local level. While the country has had high-level CE laws since at least 2009 (e.g., the CE Promotion Law), the implementation and enforcement of these laws vary, thus reducing the positive effects of CE support. Income for low-income residents who collect and sell recyclables appears to be normatively valuable, which could explain the difficulties in enforcing the regulatory support for the CE. However, since the informal sector still participates in recycling efforts to quite a large degree removing recyclable materials from the waste streams early on, and the waste streams generally are food-heavy and difficult-to-separate, the waste management system's ability to increase material circulation efficiently appears to be low; thus, China also displays a cultural-cognitive barrier toward implementing the CE. Based on the cases, however, the most influential factor in this region seems to be the normative legitimacy of the informal sector, which could inhibit the regulatory drivers for the CE.

In the US, in particular, certain cultural-cognitive influences appear to be specific to the institutional environment. First, recyclables are generally minimally separated at the source, such that the recycling system takes care of most of the separation. The Republic Services case from the US was also the only case in which it was acknowledged that the value of recycled materials could no longer cover processing costs. In this case, the solution was to start shifting the costs toward the customer through recycling fees, due to the single-collection-bin approach to the collection of recyclables. However, it must be noted that there is no evidence that increasing source separation would necessarily reduce recycling costs, and, in fact, such a result is unlikely in a system not designed for this approach. Finally, in Europe, the clearest institutional environment-specific institutional effect is the cultural-cognitive acknowledgement of a high level of source separation of waste, which increases utilization.

As our key contribution, *general drivers and barriers* of the CE were identified from each of the institutional pillars. All institutional environments displayed a hierarchical regulatory structure of high-level directives and region-specific legislation focused on improving the utilization of waste. With respect to the normative pillar, it is clear that landfilling is being avoided and replaced by other waste management methods in each of the institutional environments. This is visible in the certifications for using recycled materials by manufacturers, and in the preference of other waste management methods over landfilling by customers of the integrators. When analyzing the general barriers to the CE, the lack of institutional support for other CE principles outside recycling is notable in each of the institutional pillars. While high-level directives are starting to embrace other methods, such as reuse (e.g., European Commission, 2015), current regulations offer very little support. Similarly, while recycling is normatively valued, and certifications and awards for implementing recycling measures exist for both manufacturers and integrators, such benefits are rarely realized for initiatives that reuse products or components. One major cultural-cognitive barrier to reuse also seems to be customer preference for new products. Thus, the *general barrier* for the CE could be said to be the emphasis on recycling, which concurrently resonates with the lack of institutional support for reuse.

Table 6
Summary of Indicators of CE Barriers and Drivers in the Institutional Environment for Each Case.

	China Huawei Product-oriented	China Suzhou Integrator	US Dell Product-oriented	US Republic Services Integrator	Europe UPM Product-oriented	Europe Ekokem Integrator
Regulatory	Laws limit the use of hazardous substances in products and mandate product lifecycle management (e.g., recycling services)	Multiple high-level laws with varying success in enforcement	State-level laws mandate organization of product recycling	State-level laws; however, no national laws mandating recycling	Waste disposal regulation	Landfill ban on organic waste
Normative	Certifications awarded for using sustainable materials	Creating income for living valued over environmental practices	Use of recycled materials and closed-loop materials rewarded with certifications and awards	Customers value recycling over other means of waste management and are willing to pay for it	Use of recycled materials rewarded with certifications and awards	Recycling preferred over other means of waste management
Cultural-cognitive	Stakeholders of the privately held firm acknowledge the problem of scarce resources and pollution. However, customers generally prefer new products.	Recyclables are seen as valuable from the beginning. The informal sector is considered ordinary and reduces the efficiency of the formal recycling sector. Food-heavy waste streams are difficult to sort.	Stakeholders of the privately held firm have a sustainability-focused mindset and have been pressured toward implementing, e.g., closed-loop systems. However, consumers still perceive that sustainability is a trade-off between price and performance.	General customer base sees recycling services as a must for a waste management firm. Established single recycling bin system inhibits source-separation.	Resource efficiency is an established key metric in the industry. However, as the product substitutes a wood product, the end-of-life disposal goes through similar channels, reducing recycling of the product.	The general perception of CE as an emerging opportunity, visible in the CE branding of the initiative.

6. Conclusions

The purpose of this study was to identify general and region-specific drivers of and barriers to the CE in China, the US, and Europe. Institutional theory was used to analyze the drivers and barriers, following earlier studies using theory in the context of the implementation of other sustainability efforts (e.g., Brammer et al., 2012; Campbell, 2007), its recent adoption in analyzing waste management issues (Dai et al., 2015; Levänen, 2015), and its ability to extend the analysis of CE initiatives to more holistically cover all relevant environmental, social, and economic aspects (Murray et al., 2015). Using this approach, we retraced both the general drivers of and barriers to the CE that influenced the studied institutional environments, as well as region-specific drivers and barriers. This approach specifically answered the call to analyze the institutional drivers of and barriers to the CE and showcased emerging regional perspectives, efforts, and opportunities for the advancement of the CE.

A recurring theme among the cases, from the perspective of institutional theory, was the support of the regulative pillar in all institutional environments. However, this study's research also showed that the strength of the normative and cultural-cognitive pillars was surprisingly high and could negate the effect of the regulatory pillar. Whereas much of the previous literature has focused on the relation between regulative efforts and CE advances (Geng et al., 2009; Mathews and Tan, 2011; Yuan et al., 2006), our findings support the use of institutional theory to extend this perspective. Our results are 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 environment (Edelman et al., 1999; Scott, 2008). In other words, the legitimacy of any given initiative is decided through a holistic combination of all institutional pillars.

Our study has several implications for further CE research and practice. First, although prior research on ways to advance the CE has focused on the regulative policies of different regions, our study has identified that while the support of the regulative pillar is important, this alone is not sufficient for CE success. Thus, future research in this area should widen the scope to include research on the extent to which normative and cultural-cognitive conditions in different regions support or hinder the efforts implemented through regulative processes. Second, non-regulative methods for influencing the normative and cultural-cognitive conditions of the institutional environment should be researched further. Based on the findings of this study, a holistic vision of the CE, including all of the 3R principles (i.e., reduce, reuse, and recycle) is being inhibited by an overemphasis on recycling and an underutilization of the other principles. Potentially fruitful future research avenues, therefore, would include research on why principles other than recycling are underutilized and what should be done to improve the legitimacy of these principles. This stream of research seems especially important given that this study also shows that recycling can generate a kind of negative value if the value of recyclables is lower than the cost of producing them. While this study provides some general guidelines about the legitimacy of the CE, more detailed research embracing the institutional theory perspective is necessary.

By analyzing the legitimacy of the CE in multiple institutional environments, together with its general drivers and barriers, this study offers practical implications for both policymakers seeking to support the CE and firms deciding whether and how to implement it. Based on our results, the effective implementation and consistent enforcement of high-level CE regulation needs to be improved in China, where the informal sector appears as especially problematic for establishing an effective CE system. In the US, acknowledgment of the CE in national regulation would be beneficial for further establishing its legitimacy. In terms of increasing recycling efficiency, increased source separation appears to be the beneficial route toward utilizing value in waste flows, and thus should be further pursued in the US and China.

Even more importantly, general support for the CE favors recycling,

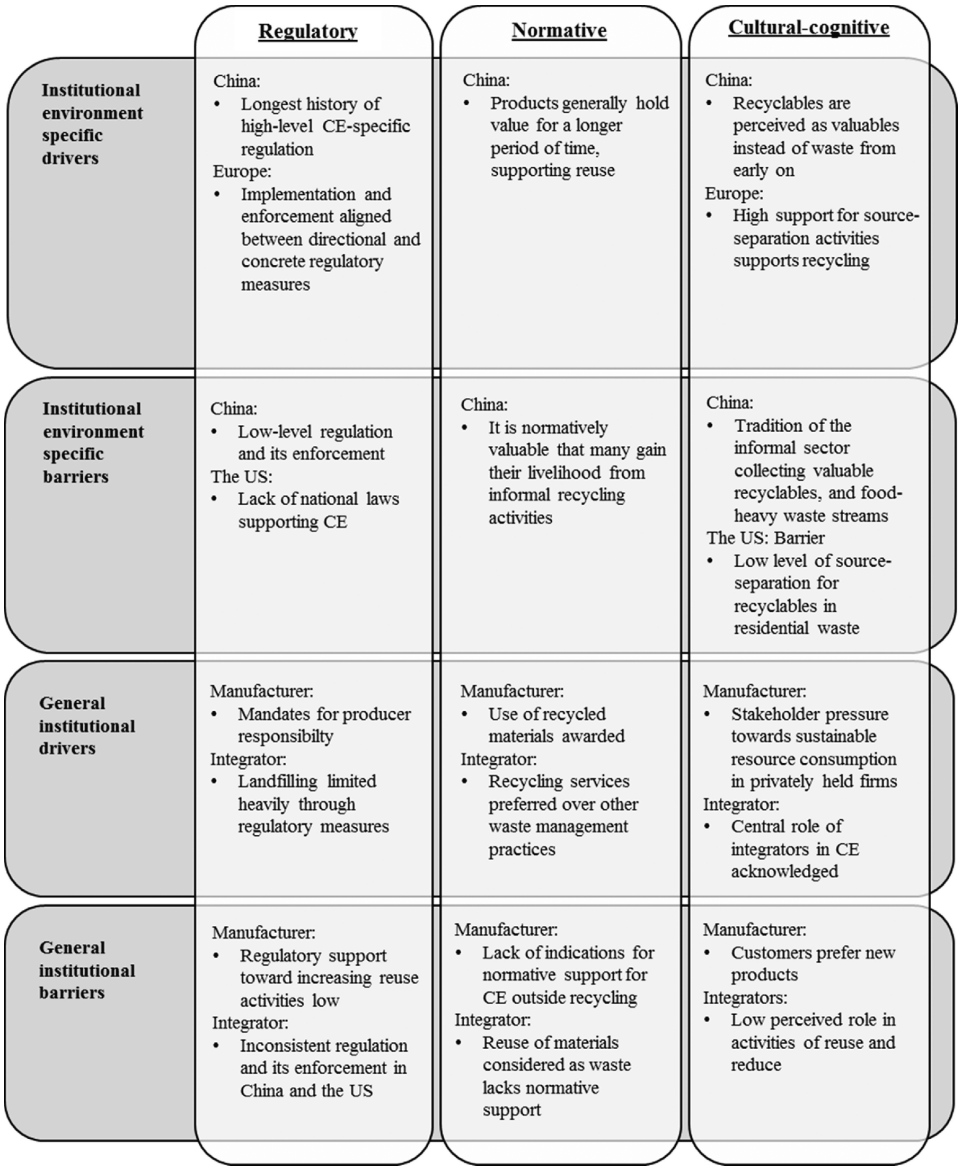

Fig. 7. Emerging patterns of institutional drivers and barriers between institutional environments and value chain actors.

while leaving reuse efforts, especially, unsupported. To accelerate transitioning to the CE, policymakers of each analyzed region should extend support for reuse schemes and take-back programs enabling reuse. This could be done through establishing requirements for the reuse of products and incentivizing emerging reuse efforts. Since normative and cultural-cognitive support for the CE remains similarly recycling-focused, increasing awareness of the other CE methods through, e.g., increasing their visibility in education and establishing certification schemes similar to those in the area of recycling, is equally as important as legislative measures. For firms, the implications of these findings are two-fold. First, since recycling appears to be the most legitimate way to implement the CE at the moment, it is also the most beneficial CE channel for firms. However, the influence of the normative and cultural-cognitive pillars was identified as strong; thus, firms should also direct their attention to alternative aspects when making decisions about the CE.

This study was explorative in nature, showcasing the general drivers and barriers for the institutional environments of China, the US, and Europe. Since our case selection and selection of institutional environments were purposeful, some limitations are acknowledged; therefore, the cases cannot cover the entirety of the industries where the CE is increasingly relevant. The selection of waste management companies could also have created a bias toward recycling, which may have manifested in the results. However, since the focus on recycling was clear in the product-oriented cases, we believe that our overall findings are valid. The case selection was carefully planned: Firstly, two

cases were selected for each environment using a replication logic of one producer-oriented case and one integrator/waste management-oriented case. Secondly, even though only China, the US, and Europe were covered, each of these regions exhibits global variation: the US and Europe are highly developed regions with established waste management infrastructures and comparably high waste utilization rates. By contrast, China has been implementing the CE as a development model for over a decade (Yuan et al., 2006). Despite these limitations, our findings can provide global implications in terms of potential development opportunities to pursue and pitfalls to avoid in different regions.

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PUBLICATION II

Circular economy: Enabling the transition towards sustainable consumption and production

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CIRCULAR ECONOMY

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Synonyms

Closed-loop economy, Blue economy, Cradle to Cradle

Definition

The circular economy concept describes an industrial economy with a zero-waste approach. Circular economy is a model for sustainable economic growth, where generation of waste and pollution is minimized by maintaining the value of products and furthermore materials longer and keeping them in circulation. It has a foundation in multiple sustainability-oriented practices, including the reduce, reuse and recycle principles of waste management hierarchy, the one industry's waste is another's resource –approach, the regenerative principles of cradle-to-cradle design, and the sustainable business model approach of product-service systems. Circular economy includes both biological materials and technical materials. Biological materials are beneficial for a circular economy as their natural circulations can be harnessed for value creation; and technical materials can be re-used multiple times without producing waste and harm to the environment (Scott, 2015). In addition to combining earlier sustainability approaches, circular economy discusses the need for a fundamental shift of practices throughout macro- (national and global), meso- (regional and business networks), and microlevels (products, firms, and consumers) and the implementations on each level.

Introduction

From mid-2000's forward, the concept of circular economy has been gaining ground as a path towards sustainable consumption of natural resources while maintaining economic growth. It is often introduced as a replacement to a 'linear economy' where natural resources are turned into products, which in turn become waste at the end of their lifecycle. The linear model creates a dependency between economic activities and consumption of natural resources, a dependency that has already led to global over-consumption of natural resources. If continuing as is, the situation will only worsen, as global population and consumption per capita continue to grow simultaneously. By introducing a model where materials and products are diverted from

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becoming waste and maintain their value and stay in circulation for a longer time, circular economy seeks to decouple economic growth from consumption of natural resources.

Circular economy is tightly connected to sustainable development, linking closely to UN's sustainable development goal (SDG) 9: industry, innovation and infrastructure, SDG 11: sustainable cities and communities, and especially the SDG 12: responsible consumption and production. However, due to its focus on solving natural resource consumption and waste issues however, circular economy has lacked a holistic perspective of the environmental, economic, and social aspects of sustainable development, primarily emphasizing the economic and environmental aspects (Murray et al. 2015). Recently scholars in the circular economy field have started focusing more on the social aspects of circular economy implementations as well by adopting a triple-bottom line approach to analysis and making circular economy relevant for further sustainable development goals, such as SDG 8: decent work and economic growth and SDG 10: reduced inequalities. Acknowledging the holistic framework is crucial for circular economy to fulfill its promise of sustainable development, as the change from linear to circular models has drastic effects on, for example, to existing waste management systems in developing countries where many rely on informally collecting and selling recyclable materials (Fei et al. 2016).

Partly the emphasis on economic and environmental sustainability is a result of the circular economy concept's focus on extending the hierarchy of reduce, reuse, and recycle, also called as the 3R-principles, from waste management to national and regional development and industrial systems all the way to the level of the consumer. Through this extension, the circular economy approach has a novel capability to suggest concrete implementations that simultaneously fulfill the 3R-principles and are economically viable, while also acknowledging the need for a fundamental systemic change of activities around production and consumption. As a result, circular economy is often discussed as a way to implement sustainable development (Ghisellini et al. 2016; Kirchherr et al. 2017). Especially CE focuses on ways to reach SDG 12: responsible consumption and production. This approach has also led to criticism due to a lack of clear theoretical foundation for the concept of circular economy, and also for the way of adopting multiple earlier concepts under its umbrella, as implementations of circular economy can be drastically different based on the level of analysis and approach that is followed (Blomsma and Brennan 2017; Homrich et al. 2018).

To capture the essence of circular economy as a simultaneously systemic and concrete approach to sustainable production and consumption, this entry is structured around displaying how circular economy has been implemented on macro-, meso-, and microlevels of activity, an established categorization in the circular economy literature (Ghisellini et al. 2016).-The dominant methods of implementing circular economy are also shortly presented, and links to SDG's are highlighted. However, since circular economy is still a young and developing concept, the core principles of 3R-principles in hierarchy, the triple-bottom line approach, and multilevel systems perspective provide the current frame while the discussion on implementations is continuously evolving in the literature.

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Circular Economy at the macro-level: Policy and regional development

The highest-level of the systems, the macro-level, is the furthest away from the actions of a single manager or a consumer. On this level, the transformation towards circular economy is primarily identified as policies and regulations, and as regional development programs that implement pilot projects and otherwise support initiatives, that support the 3R-principles of circular economy (Ghisellini et al. 2016). Activities on the macro-level influence the actions of firms and consumers by further legitimizing the concept (Ranta et al. 2017), and conveying trust and continuity in a way that economic actors on meso- and micro levels can initiate the transformation from linear to circular activities (Niesten et al. 2017). To give an overview of circular economy on the macro-level, this section showcases examples of policies and regional development initiatives towards circular economy from the China and the EU, the currently most active macro-level influencers of the circular economy.

High level policies and regulations: examples from China and the EU

While both China and the EU have highlighted circular economy as an important objective, the concept is perceived differently in the two areas. In China, circular economy has been brought to the center of the country's economic development strategy due to the pollution and waste issues created by rapid growth and urbanization. Thus, in China, the focus of circular economy is especially on SDG 12: Responsible production and consumption, while acknowledging the potential for economic growth in the spirit of SDG 8: Decent work and economic growth. Accordingly, the focus of Chinese macro-level influence is on making production cleaner, reducing waste and pollution generated in manufacturing, and improving the management of waste in both municipal and industrial contexts. Thus, the Chinese perspective to circular economy includes both materials and products but also the pollution aspects, while focusing on manufacturing and waste management as the foremost domains where circular economy has influence. This perspective can be seen in the way circular economy is furthered in China: the national programs include measuring of pollution and resource efficiency in large cities and in manufacturing, linking China's CE approach to SDG 11: sustainable cities and communities and SDG 9: industry, innovation and infrastructure. Chinese macro-level activities also include pilot programs where circular economy initiatives to increase resource efficiency and reduce pollution are first tested in selected cities and industrial parks, and from which learnings are then transferred to larger scale implementations. (McDowall et al. 2017)

In the EU, the perspective towards circular economy is different, as the concept is first and foremost seen as a potential path towards increased economic growth. The economic growth is expected to come through commercialization of new innovations and circular business models based on for example product-service systems (Tukker 2015) where a single product creates increased economic activity through added services or itself being sold as a service. Thus the focus of circular economy in Europe is to achieve the SDG 8: decent work and economic growth through industrial renewal in the spirit of SDG 9: industry, innovation and infrastructure. In alignment to this perspective, EU policies emphasize designing products for reusability, maintainability, and recyclability so that the service business models can be realized. Indicators used for tracking the progress of circular economy in the EU include, for example, end-of-life recycling input rates measuring the proportion of inputs derived from recycled goods into an industry. As a result of this perspective, circular economy policy in the EU is much less concerned of pollution and environmental

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impact of the concept than its Chinese counterpart. The scale of public investments to supporting transformation to a circular economy is also much smaller in the EU, and initiations of the transformation are expected to come from firms pursuing the economic opportunities of the concept. However, it must be noted that the scope of circular economy in the EU is much narrower than in China. While circular economy policy does not extensively focus on pollution, EU has other policy initiatives that fulfil this gap. (McDowall et al. 2017)

Urban and regional circular economy

Not all macro-level activity that supports the transformation to a circular economy happens on the national level, e.g. in the EU, or even the state level, e.g. as in China. Regional development activities, especially in cities, are also very relevant to moving the circular economy forward and furthening the SDG 11: sustainable cities and communities. One such development trajectory is the smart city concept, which has many linkages to the circular economy through the approach of improving the efficiency and livability of cities through smart technologies and use of data. When combined with the urban development strategy of urban metabolism focused on the flows of materials in a city, smart city initiatives are increasingly enabling the circulation of materials and the transition towards a more circular economy. (Liu and Peng 2014)

The smart city concept approaches moving the circular economy forward from two distinct perspectives. Firstly more importantly, the digital infrastructure of a smart city acts as an enabler of activities that increase the circulation of products already in use by, for example, providing ways for citizens to use shared resources such as city bikes, and further enabling citizens to share resources between each other through collaborative consumption platforms (Lyons et al. 2018). In a circular economy focused smart city, an area of interest is also enabling the production of resources such as food in a close vicinity to where the resources are consumed. When production and consumption take place near each other the reusing and recycling of components and materials in the case of technical products, or nutrients in the case of food becomes more feasible as the often critical barrier of logistics is reduced (Li et al. 2017). Secondly, smart cities often focus on optimizing waste management to be as efficient as possible by using smart sensors placed into the waste management infrastructure. This optimization of waste management infrastructure allows monitoring of the amount of waste produced, and minimizes the costs and pollution occurring from the logistics of waste management. It also creates up-to-date information about source-separated recyclables and movement of waste streams, creating potential for tightening the loop of using waste as a resource (Liu and Peng 2014).

Meso-level implementations: business networks

While the development of circular economy on a macro-level consists primarily of top-down policy or infrastructure related initatives, circular economy development on a meso-level is more market-driven and inherent to the business system. While meso-level initiatives are firm-driven, their implementation takes place at a level of a business network or a business ecosystem and thus requires the collaboration of multiple firms with aligned interests in circular economy (Ghisellini et al. 2016). The most prolific circular economy implementations on the meso-level are industrial symbioses, where multiple industrial firms collaborate to use resources efficiently (Saavedra et al. 2018), and green supply chains, where firms collaborate in a supply chain to close the loop for products and materials that traverse through it (Witjes and Lozano 2016).

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Industrial symbiosis

Industrial symbiosis is one of the central ways in which circular economy advances the SDG 9: industry, innovation and infrastructure. Industrial symbiosis emerges when industrial firms begin collaborating with each other to make better use of the resources that they require. By combining their efforts, firms in an industrial symbiosis strive to turn their synergies regarding materials, energy, water, and by-products into competitive advantage over firms that do not have access to an industrial symbiosis. (Chertow and Ehrenfeld 2012) Industrial symbiosis is one of the key concepts underlying circular economy, and fundamentally shares the ones waste is another ones resource –mindset.

The most common scenario for the birth of an industrial symbiosis is the existence of industrial plants that generate excess resources that they themselves cannot use effectively. This resource can be for example energy generated in a chemical process, or by-products that are valuable to firms in other industries. For a single plant not operating in an industrial symbiosis, the options are to either search for a buyer for the resource from the market, or dispose the resource entirely. Industrial symbioses as industrial parks form when other firms locate their plants to close proximity of the industrial plant and start a collaboration to use its excess resources. Furthermore, multiple industrial firms can collocate and form an eco-industrial park, where one key focus is on identifying and taking advantage of synergistic connections between the firms. (Boons et al. 2011) For example, in the case of Kalundborg, Denmark, an often-cited case for industrial symbiosis, over ten stakeholders including industrial firms from multiple industries, the municipality, and local farmers are involved in the exchange of water, energy, and multiple by-products such as biomass, gypsum, fly ash, and liquid fertilizer. The key for successful exchanges to emerge was that all firms taking part see economic benefits, for example, by gaining resources more efficiently, reducing treatment costs, or being able to turn underutilized resources to revenue. (Jacobsen 2006) Thus, the motivations for moving towards an industrial symbiosis from the perspective of a firm are similar to those of moving towards circular economy: being more efficient with the use of resource throughout the system, and turning it into a competitive advantage.

In many industrial symbioses, a key characteristic is close proximity, which enables the firms to effectively collaborate and exchange resources. Key issues that collocation in an industrial park solves are the question of logistics, and most importantly of knowledge transfer. The logistics problem in industrial symbioses is a question of economics and cost effectiveness. Long transportation distances create a barrier for transporting resources with low value-density due to increasing transportation costs. Making internal logistics more efficient is also a motivating factor for the development of specific infrastructure for firms to exchange resources. The knowledge issue however creates a barrier that can prevent exchanging even very valuable resources due to insufficient knowledge about where the producers and potential users of excess resources reside, or whether they exist at all. The fact that by-product exchange in industrial symbiosis usually crosses industry boundaries highlights the issue, as experts of one industry can be incapable of identifying the potential of byproducts they produce or potential alternative sources for the materials they use themselves from other industries. (Boons et al. 2011) As the potential for scaling the logic of industrial symbiosis from industrial parks to larger systems is one central aspect of moving towards a circular economy, solving the issue of knowledge transfer of industrial symbiosis potential is an increasingly important topic.

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One approach to solving the issue has been to take a top-down approach to facilitating industrial symbiosis, positioning the development of eco-industrial parks as an objective of policymaking and regional development. For example, in China, a key part of the strategy of circular economy has been the identification of industrial symbioses and their exploitation in eco-industrial parks in order to reduce the environmental effects of manufacturing (Mathews and Tan 2011). Thus, regional and governmental actors play a key role in solving the knowledge transfer issue through identification and communication of potential use of resources in collaboration with industrial actors. The emerging industry 4.0, where internet-connected digital technologies are brought to an industrial environment to optimize operations with data-driven methods, is another potential answer to solving the knowledge transfer issue. In industry 4.0, data can be analyzed in real time and information about industrial symbiosis potential can be communicated to other stakeholders quickly. However, the success of digital technologies requires industrial firms to openly share information about their resources, what they are not always prepared to do. While the regional development approach is able to facilitate trust and create connections between actors in a potential industrial symbiosis exchange, it is still unclear how digital technologies will overcome the issue. (Tseng et al. 2018)

Circular supply chains

When a manufacturer adopts sustainability practices in its supply chain, it can be implemented and analyzed through slightly different angles that are all promoting sustainability and to some extent furthering the principles of a circular economy; these include: green supply chain management, reverse logistics/closed loop supply chain and social sustainability (Ansari and Kant, 2017). Adopting circular supply chains is especially important to advance SDG 12: responsible consumption and production, as the availability of sustainable products for end-customers is dependent on the sustainability of the upstream supply chain.

The closed loop supply chain is designed so that the recycling and recovery of products in their end-of-life stage can be better managed. This often requires that manufacturers take into use a so-called reverse logistics process. A reverse logistics process means that the goods are returned and recovered by the manufacturer or by some other actor operating for the manufacturer. Reverse logistics is used for handling returned products, recycling, remanufacturing and resale. In closed-loop supply chains the materials flow in reverse order due to recycling purposes, which complicates the whole supply chain management process, e.g. inventories, replenishment (Cannela et al. 2016). The American Reverse Logistics Executive Council has defined reverse logistics in the following manner: it is the "process of planning, implementing, and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal" (as cited in (Govindan et al., 2015). Usually the starting point for reverse logistics is at the end user side who are the first customers of the products. The used products are collected from the customers as returned products and the end-of-life management of the products starts. This can be recycling, where the original product is broken down to create raw materials or additional parts. Or it can be remanufacturing that results then in the resale of the products on the markets. It can also mean repairing the products so that they can be resold on the markets. There can also be the need to dispose of some of the used material or parts of the products. (Govindan et al., 2015)

Reverse supply chains (RSC) have received more attention lately as the number of environmentally conscious or green consumers has increased and in surveys they are reporting their willingness to pay premium prices

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for sustainably produced products. The RSC processes include special steps for handling the used products: the acquisition, the reverse logistics, sorting, recovery and remarketing (Larsen et al., 2018). The reverse supply chain can be divided into three elements: the actual repair or remanufacturing process; the product itself which can be the final product, a product part, or a product material; and a financial driver for RSC which is either revenue increase or a decrease in the costs of operation (Larsen et al., 2018). Examples of reverse supply chains include: repair, i.e. refurbishment, of products for resale in the primary markets in the form of a reduced priced version of the original product; refurbishment of product parts and components for reuse in the products that have been repaired as well as for resale as spare parts; and resale of used materials in the supply chain to suppliers of original materials.

Implementation on the firm level

Circular design

Product design for the circular economy can also be called circular design, and it can be influenced by eco-design principles and the so-called Inertia Principle which ties to the concept of product integrity. In circular product design the basic assumption is that, in theory, a product cannot become waste (Hollander et al., 2017). Through advocating reduction of waste, circular design advances the SDG 12: responsible consumption and production. The product lifetime is a critical factor in a circular economy. This is because in a closed-loop system following circular principles, from the perspective of material flow, the resources in the system need to be considered from all time perspectives, including the time when the products were not ready yet and in their end-of-life phase when they are no longer useful products.

According to eco-design principles, the waste hierarchy based on the European Waste Framework Directive should be taken in to account (Hollander et al., 2017). The waste hierarchy includes a list how the handling of waste should be prioritized. In eco-design, the prevention of waste is the most preferred option, followed by reuse, recycling, and possible other recovery options, while disposal has been presented as the least preferred option. Waste is considered in the Waste Framework Directive to be all substances or objects that the owners discard or have an intention or a necessity to discard. Currently, the concepts of prevention, reuse and recycling are connected to the notion that products eventually end up being waste. However, in the circular economy, the concept of waste does not exist, and therefore the concepts of reuse and recycling need to be redefined in this context with other terms.

For circular design, Stahel (2010) presented the Inertia Principle, that states that something that is not broken should not be repaired, something that can be repaired should not be remanufactured, and something that can be remanufactured should not be recycled. This way the economic value that is at that point inherent in the product should be maintained by replacing and repairing only what is essential for keeping the product functional. When designing products with the Inertia Principle, the focus is on product integrity, i.e. that the product stays the same after it has been manufactured during its product life (Hollander et al., 2017). When designing products with the Inertia Principle, the least preferred choice is to recycle the product, because it destroys the integrity of the product by disintegrating its materials and reprocessing them.

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Circular product design strategies need to also take into account design of the technological cycles, design for biological cycles, and design for disassembly and reassembly. Products should be designed for remanufacturing already in the early product design phase. In the product design stage over 70% of the product life costs are agreed, and for this reason the potential handling of the product at the end of its life cycle, including remanufacturing, should be taken into account economically and from the material perspective already from the very beginning (Matsumoto et al., 2016). With eco-effectiveness and cradle-to-cradle design principles (see e.g. Mendoza et al., 2017) the aim is to stretch beyond zero emission approaches in order to develop products and industrial systems that improve or maintain the quality and productivity of the used materials in all life cycle stages (Braungart, 2007). As an important element of the eco-effectiveness concept, the cradle-to-cradle design principles targeted at creating products and industrial systems that have a positive relationship with the ecological health as well as long-term economic benefits (Braungart, 2007).

Already in the product design phase it is very important to consider the design of the entire sustainable circular systems covering the full product life cycle of product, and especially with regards to critical materials Lieder and Rashid, 2016). The circular design principles include guidelines on the material choices that should be considered already in the product design phase with regards to critical materials. Critical materials include such materials that are available only in one or few countries, the use of which is restricted due to large corporate interests, or such materials that are economically important for a certain country or their national security. Critical materials may involve supply risks, environmental impacts, or supply restrictions which result in the criticality and could result in a global scarcity of the specific material (Lieder and Rashid, 2016).

The product life lengths of many contemporary manufactured products have shortened which has led to the increase of material flows and generation of waste in society. Circular product design principles aim at improving the efficiency of material usage, production and processing of materials, which would ultimately lead to more durable products with longer product lives (Lieder and Rashid, 2016). To slow down the resource flow loops, circular product design strategies stress the importance of design for long-life products, the extension of product-lives. Long-life products should be reliable and durable so that consumers can trust and be attached to them (Mendoza et al., 2017). Product-life extension is achieved by ensuring that products are easy to maintain and repair, upgrade and adapt to different usages. In addition, standardization and compatibility with other products as well as disassembly and reassembly should be made simple and straightforward (Mendoza et al., 2017). Especially the focus on easy disassembly in the product design phase enables better reuse due to easy maintenance and repairs, as well as easy reuse of parts and materials. The design for recyclability and reuse is critical for increasing the recycling and reuse shares of products in their end-of-life phase. In the case of plastic packaging, the reuse and recycling of the material can require substantial redesign. However, it is worth the effort, as the design for recyclability and reuse can decrease the costs of recycling plastic package waste even up to 50% (Ellen MacArthur Foundation, 2017).

Remanufacturing

Remanufacturing is an important process assisting in the transition towards a circular economy in the manufacturing industry and advancing the SDG 9: industry, innovation and infrastructure. Circular economy is considered to be the solution to multiple global challenges, as for example, waste generation and resource scarcity, as well as being sustainable economically; however, the concept of circularity has already been introduced earlier in association with enhancing the reuse, remanufacturing or recycling of products in their

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end-of-life phase (Lieder and Rashid, 2016). Remanufacturing is a process used in the industry utilized for restoring used products, i.e. cores, into a new product life. In the process, the used product is treated in different phases and finally it is tested to verify that it meets the required standards set for the products (Wei et al., 2015). Remanufacturing is in an important role when recovering products near their end-of-life and extending their product lives. After WW2 in the 1940's, the automobile industry resorted to remanufacturing as there were limited resources and a need to reuse car parts. In the 1990's remanufacturing was researched as the field where recycling is conducted by manufacturing, thus restoring and renewing products by inspection, disassembly, cleaning, reconditioning and reassembly (Lieder and Rashid, 2016).

Research has shown that with remanufacturing companies can save even 90% in the use of materials in comparison with new product manufacturing processes and also the energy needed in the remanufacturing is significantly lower than for original production (Matsumoto et al., 2016). Thus remanufacturing has environmental benefits as well as economic impacts. In used products there is often embedded value from the first original manufacturing phase, but these products tend to be disposed of taking advantage of the remaining value. In remanufacturing the remaining value is used as an advantage to create high margins economically. The ultimate goal of remanufacturing is to recover the remaining value of used products by reusing the product components that are still in good condition and function well (Larsen et al., 2018).

Remanufacturing is considered to be one of the vital elements in the implementation of resource-efficient manufacturing in a circular economy (Matsumoto et al., 2016). Remanufacturing transforms used products into products with similar quality and functionality as new products. Remanufacturing can also mean the addition of additional and better functionality to used products, e.g. by having more durable surface materials. Remanufacturing can be implemented, for example, on automobile components, different kinds of machinery, cameras, furniture, etc. In remanufacturing the form and shape of product usually remains the same, and it is a more beneficial process than material recycling from the perspective of energy and material savings.

Remanufacturing can be seen as a positive element in the economies of some countries, as it is labor intensive it helps to create new jobs, advancing the SDG 8: decent work and economic growth. In addition, remanufactured products can be sold at a lower price than new manufactured products and thus they can help to create more social welfare in poorer countries advancing the SDG 10: reduced inequalities. Remanufacturing has important links with sustainable production and is an enabler for a sustainable society which is why it is globally considered to be important (Matsumoto et al., 2016). The potential and size for remanufactured product markets is still hard to estimate in many countries. However, in order to develop and promote remanufacturing and supporting policies, it would be important to do more detailed market impact analysis for remanufactured products.

Business Models for a Circular Economy

To move to circular economy, firms need to innovate their business models to enable circular strategies, in the spirit of SDG 9: industry, innovation and infrastructure (Bocken et al. 2016, Ranta et al. 2018). Presently, most business models are optimized for linear economic system that does not take into account the negative environmental impacts of waste in the business model and product prices. Linear business models around

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products gain growth from selling more, leading to lack of incentives for product-life extension. In a so-called circular business model, the value creation is based on exploiting the residual economic value retained in used products to produce new product offerings (Linder and Williander, 2017). Sustainable circular business models help to transform to a circular economy with innovative product design solutions and manufacturing processes, including remanufacturing, so that sourcing, resource consumption, and waste generation will change over time. Sustainable circular business models need to take into account the entire supply chain, stakeholders, including consumers, so that all the required environmental, social and economic sustainability factors are identified and addressed (Mendoza et al., 2017).

When creating a circular business model, the value proposition, value creation and delivery, and value capture need to by designed with circular principles. When following a circular strategy, the required changes in material flows are included in the value creation logic to aid its implementation (Nußholz, 2017). Circular business models can be defined in terms of resource efficiency taking into account material substitution, the extension of product lives and closed material loops: "A circular business model is how a company creates, captures, and delivers value with the value creation logic designed to improve resource efficiency through contributing to extending useful life of products and parts (e.g., through long-life design, repair and remanufacturing) and closing material loops." (Nußholz, 2017)

In the innovation and development of sustainable circular business models, such multidisciplinary methods as backcasting and circular design can be used to apply the circular economy principles. With backcasting a company can vision how it transforms its current business practices towards a future vision and how this vision can be reached at a systems level. The target of circular design is to minimize the resource requirements of products and the environmental impacts of the whole product life cycle in the first phases of product design. Backcasting and circular design are an effective set of tools with which companies can set long-term targets based on visions and implement practical product design practices to achieve them. With a framework that includes both of these angles, companies can incorporate their stakeholders also in the process for innovating circular business models with circular design principles (Mendoza et al., 2017).

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There are different versions of the circular business model in the literature. The main circular economy principles are presented in the ReSOLVE framework. ReSOLVE stands for: regenerate, share, optimize, loop, virtualize, exchange (Lewandowski, 2016). Another approach to circular business models is presented in the Product Service System (PSS) business models that concentrate on producing products and services that have been designed to fulfill customer requirements and in addition to be environmentally, socially and economically sustainable (Annarelli et al., 2016). In product-service systems (PSS) (Tukker 2015) and related service business models, firms have an incentive to design for maintainability and recoverability of materials, and also for extending product life, as the additional services are what drives growth. According to the PSS approach, sustainability goals can be attained in different ways, for example by: reuse and recycling at the end of the product life cycle; maintenance services to lengthen products lives; leasing and sharing to allow multiple use (Annarelli et al., 2016). In a sharing economy approach to business models, collaborative consumption forms the basis for an economic model with a cultural dimension, where products are available for use but they are not exclusively owned by the users. The sharing economy reflects the use-orientation in the PSS business model approach. For example, car sharing and bike sharing systems are an implementation of the PSS model.

Key issues

Consumer behavior

One of the foundational issues in the implementation of the circular economy is the adoption rate of new kinds of products by consumers and the advancement of SDG 12: responsible consumption and production. If firms develop circular business models or products and consumers do not adopt them, circular economy will not move forward throughout the economy. Ever since the industrial revolution, disposable products that have been designed to be disposed of after use, have been prevailing, and in the fashion trends and style, a throwaway culture has been popular among consumers. Most global brands have business models that have been built on this kind of consumption culture, even though they are being challenged to change their business models (Dauvergne and Lister, 2012; Saari et al., 2017). Most global brands have the required CSR activities implemented, however, sustainability is still not considered to be a priority in their strategies (Dauvergne & Lister, 2012).

Sustainable consumption can be driven by brands, for example, Fairtrade brands in the food and textile industry reflect a positive brand reputation, and it is a significant selection criteria for consumers (Czinkota et al., 2014). Green branding and green marketing are important means for selling green products to consumers, as brands are one of the most important purchase selection criteria among consumers (Keller and Lehmann, 2006; Aaker, 2011). When designing consumer marketing for products created with sustainable circular principles, the communication needs to focus first on the concrete product characteristics that fulfill consumers' needs and only then should it address the environmental information on the product, including details on the sustainability and supply chain management (Saari et al., 2018). The sustainability of a product needs to be introduced in the consumer marketing so that the sustainability aspects improve the competitiveness of these products when compared to conventional products. Providing visibility on the entire supply chain, including remanufacturing processes, can have a competitive advantage for manufacturers when they are managing risks in their operations and integrating sustainable practices in their overall business processes (Cannela et al. 2016).

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Future directions

The main factors influencing the majority of consumers still in a purchasing situation are the actual product characteristics, quality, brand and price of the products. To ensure that circular economy is also supported among consumers, products and services developed with closed loop principles from waste resources should offer the same functionality as conventional products created from virgin materials. The calculation of the product prices need to be included in the business models so that the full product life cycle including maintenance and repair of the products are covered as well, and the consumers can also benefit from this.

Producers still need common incentives that would favor launching products manufactured with circular design principles and circular business models. The criteria for circular product design need to be still harmonized globally and regionally, e.g. within EU, so that material design and origin of material is clearly defined, especially for packaging and that limits for additives and chemical substances are set for especially plastic products. With Extended Producer Responsibility (EPR) the EU is trying to influence producers to be more responsible for the type of products they produce for the markets (Watkins et al, 2017).

When the guidelines for reporting data on waste streams have been standardized, companies will have better visibility to the availability of e.g. recycled materials that they can be using in their business (Eunomia, 2017). This will reduce the uncertainty associated currently to recycled material availability and allow companies to build more circular business models. In addition, the prices of recycled materials should be more competitive in comparison with virgin raw materials, so that companies can benefit economically from producing or remanufacturing products according to the circular economy principles.

Cross-reference

Eco-industrial parks; Reuse, Reduce Recycle; Cradle to Cradle; Cleaner Production and Technologies; Industrial symbiosis; Industrial Ecology; Recycling of materials; Urban metabolism.

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PUBLICATION III

Creating value in the circular economy: A structured multiple-case analysis of business models

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Creating value in the circular economy: A structured multiple-case analysis of business models

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ABSTRACT

The circular economy (CE) has gained traction as a pathway towards more sustainable economic growth. The main actions leading towards a CE have been identified as the 3R principles of reduce, reuse, and recycle. However, understanding is lacking regarding how the adoption of CE using the 3R principles generates value and revenue in a business context. Thus, this study structurally examines business models used by CE-driven firms utilizing the fundamental business model components of value proposition, value creation/delivery, and value capture. By developing a detailed framework of business model components, acknowledging the particular features of CE implementation, and conducting a multiple-case study combining the business model approach with the 3R principles, this study analyzes feasible CE business models from multiple industries in Europe, the US, and China. The following five research propositions are derived from the findings of the explorative case analysis: 1) the cost-efficiency of circular operations is the key proponent to successful CE business, 2) take-back services enable the acquisition of particular wastes as resources, but they need to be incentivized through reductions in customers' total waste management costs, 3) circular business models require the focal firm to separately manage multiple positions in the value chain, 4) the take-back system for gaining value through CE can be implemented successfully in multiple ways, and 5) recycling is easier to implement than reducing or reusing due to a smaller impact on the business. These propositions contribute to the circular business model literature by showing how economic value is generated by CE initiatives and providing foundations for theory-testing future research. The propositions also provide guidance for policymakers and managers on supporting and implementing circular business.

1. Introduction

Today's dominant economic development model—the so-called "take, make, and dispose" model—is currently being challenged. More sustainable methods of consuming and managing materials and natural resources are becoming increasingly vital, on both the regional and global scales. From the perspective of resource intake, the current model relies on doing business based on the use of virgin material resources (Yuan et al., 2006). Yet, as many natural resources are limited in quantity, there is an urgent need to create new methods for harnessing and using resources (Mathews and Tan, 2011). In this challenging context, the circular economy (CE) provides an alternative model for analyzing and understanding consumption. In a CE, products and materials continue to circulate in so-called "loops" for as long as they can provide value, while simultaneously promoting activities that reduce the need for the material per unit of value produced. These activities include, for example, service-based offerings such as rental services, the creation of more durable and/or leaner products, and increasing the use of recycled materials (Zhu et al., 2010). Due to its potential for concurrent economic value creation and sustainable development, the CE is increasingly receiving attention on a global scale among businesses (MacArthur, 2013) and policymakers (European Commission, 2015; Jiao and Boons, 2017).

Yet, for the CE to truly emerge as the new growth model it must be able to deliver on its promises to provide economic growth along with sustainability. If CE businesses are unable to compete economically with the current linear model of "take, make, and dispose," CE implementation will be an uphill battle (Charonis, 2012). Here, the business model concept can provide a critical foundation for discussing economic value generation in a business

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by linking the value proposition, value creation, and delivery mechanisms, along with ways of capturing value for a firm (Osterwalder et al., 2005; Richardson, 2008). Studying business models in a CE is thus vital to determine the actual economic benefits that can result from embracing CE practices at the company level.

Previous studies focusing on the CE from a business model perspective have consistently employed the sustainable business model approach (Lewandowski, 2016; Linder and Williander, 2015; Rizos et al., 2016; Weissbrod and Bocken, 2016), which combines environmental, societal, and economic value (Bocken et al., 2014). Hence, there is a gap in the scholarly literature examining business models for CE predominantly from the economic value perspective. CE-oriented studies outside of business-model research have typically focused on circulating material flows and advancing the 3R principles of reduce, reuse, and recycle (Ghisellini et al., 2016) in CE initiatives such as industrial symbioses (Mathews and Tan, 2011) and increased waste recycling activities (Zhu et al., 2010). These studies however remain silent on how CE creates economic benefits, value, and revenue at the company level. This perspective is critical because, as Lieder and Rashid (2016) in their comprehensive review of CE in the manufacturing context state, business models, product design, and supply design are eventually determined by the underlying motivation of gaining economic value. Therefore, our research question is as follows: With what kinds of business models do CE-driven business ventures operate in terms of their value proposition, value creation and delivery, and value capture?

This study fills a current research gap by using an economic value perspective to assess business initiatives in the field of CE. To this end, we developed a conceptual component-based business model framework to specifically study CE business models from a review of the business model literature; this is detailed in section 2. In section 3, we describe our explorative multiple-case analysis of different CE business models from a variety of industries and geographical locations. Section 4 outlines the key results of each case and reveals patterns across cases using the framework developed in section 2. In section 5, propositions for circular economy business are developed based on the findings and on earlier literature on business models and circular economy, after which the limitations of the study are discussed. Section 6 concludes the study by pinpointing contributions, implications to research and practice, and areas for future research.

2. Theoretical background

2.1. The business model approach

The concept of the business model encompasses multiple aspects, ranging from how the firm earns revenue to how it structures its organization (Clauss, 2016; DaSilva and Trkman, 2014). As this multifaceted concept with various definitions has received criticism for its ambiguity and thus its usability as a research concept (Mäkinen and Seppänen, 2007; Massa et al., 2017), reviewing business model approaches is crucial to use this concept to analyze the economic value of CE initiatives. The general view is that the business model bridges the gap between the firm's strategy and its concrete operations by describing the logic it applies to create value to customers and capture economic value for itself (see the full review in Appendix A). Early research tended to describe types of business models almost as formulas to follow (Linder and Cantrell, 2000), but as the field has developed, the typological view has given way to a more flexible approach treating the business model as built of parts that together in interaction describe the way the firm does business (Saebi et al., 2017). The smaller units of the business model represent either defined components that should be considered while developing or analyzing a business model (Osterwalder et al., 2005) or an activity system that depicts the interdependent activities required to create value (Zott and Amit, 2010).

This study adopts the business model component approach, which recent reviews by Clauss (2016) and Foss and Saebi (2016) have identified as the established approach for analyzing business models as they appear at a point in time. Hereafter, the business model concept refers to the set of components in the firm's business venture that connects the customer value of the venture with the firm's ability to generate profit. This definition synthesizes aspects prevalent in existing business model definitions. The business model is not a factor to analyze merely as an afterthought but rather 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 (Wirtz et al., 2016). This approach is illustrated by the depiction of the business model as a set of components in the firm's business ventures. However, within the component-based approach, multiple approaches to which components and furthermore subcomponents constitute the business model exist (DaSilva and Trkman, 2014; Wirtz et al., 2016). Table 1 presents the views of key authors on the components and sub-components of a business model.

Our definition also reflects the view that the business model depicts a single business venture or offering and does not necessarily reflect the components of an entire firm (Chesbrough and Rosenbloom, 2002). Another aspect of the business model, illustrated by this definition, is the need to view a venture's value from two perspectives. The venture needs to create value for the customer while also generating profit for the firm (Saebi et al., 2017; Teece, 2010). The business model serves the important role of bridging these two types of value creation within a single concept.

2.2. Circular economy: objectives and principles

The concept of the circular economy (CE) proposes new ways for firms to create previously unattained value for both customers and the firm itself (MacArthur, 2013). This concept suggests the simultaneous creation of environmental and economic benefits and has the potential to generate employment opportunities in an emerging industry (European Commission, 2015). However, in order to analyze where the economic value of CE is expected to come from in practice, it is valuable to discuss the overall objectives of the circular economy and, especially, to identify how CE implementation is to have an economic value-generating effect on a business.

The main actions through which the CE is realized are the 3R principles—reduce, reuse, and recycle—that focus on the circulation of materials in the system (Ghisellini et al., 2016). *The reduce principle* calls for *minimizing the overall amount of materials and energy used and waste generated in the system by increasing efficiency in both production and consumption* through, for instance, improving technologies, simplifying packaging, and using more power-efficient appliances (Feng and Yan, 2007; Su et al., 2013). The reduce principle has the most diverse practical implementations because it aims to eliminate the need to reuse or recycle materials. In one example, the zero-waste strategy aims to maximize value produced while minimizing waste and environmental impact (Figge et al., 2014). Unilever (2016) adopted this strategy and eliminated nonhazardous waste to landfills at more than 600 facilities by February 2016.

The reuse principle holds that *"products or components that are not waste are used again for the same purpose for which they were conceived"* (The European Parliament and the Council of the

Table 1
Views on business model components and corresponding sub-components.

Author, Year	*Components*	*Sub-components*
Linder and Cantrell, 2000	Value proposition	**Value proposition:** customer, customer needs, products, services and experiences, channels, pricing
	Value delivery	**Value delivery:** execution, distinct capabilities
	Financial structure	**Financial structure:** distinct financial structure
Morris et al., 2005	Offering	**Offering:** product/service type, value creation and delivery
	Market	**Market:** type of organization, geographical market size, customer position in the value chain, market segment, transactional/relational market
	Internal capabilities	**Internal capabilities (one or more of the following):** production/operating systems, selling/marketing, information management/mining/packaging, technology/R&D/intellectual/creative or innovative capability, financial transactions/arbitrage, supply chain management, networking/resource leveraging
	Competitive strategy	**Competitive strategy (one or more of the following):** image of operations, product, or service, quality/selection/features/availability/innovation leadership
Osterwalder et al., 2005	Product	**Product:** value proposition
	Customer interface	**Customer interface:** target customer, distribution channel, relationship
	Infrastructure management	**Infrastructure management:** value configuration, core competency, partner network
	Financial aspects	**Financial aspects:** cost structure, revenue model
Richardson, 2008	Value proposition	**Value proposition:** offering, target customer, basic strategy to win customers and gain competitive advantage
	Value creation & delivery system	**Value creation & delivery system:** resources and capabilities, value chain, activity system, business processes, links to suppliers, partners and customers
	Value capture	**Value capture:** revenue sources, economics of the business
Bocken et al., 2014	Value proposition	**Value proposition:** offering, customer segments and relationships
	Value creation and delivery	**Value creation and delivery:** key activities, resources and capabilities, channels, partners, technology
	Value capture	**Value capture:** cost structure, revenue streams
Clauss, 2016	Value proposition	**Value proposition:** offering, customers and markets, channels, customer relationships
	Value creation	**Value creation:** capabilities, technology/equipment, partnerships, processes
	Value capture	**Value capture:** Revenue model, cost structure

European Union, 2008, p. 10). Reusing products and components requires fewer resources and less energy and labor than producing new ones from virgin materials or even recycling and disposing of products (Castellani et al., 2015). Reuse thus has the potential to increase overall resource efficiency and to produce additional revenue from multiple use cycles. This principle is central in use-oriented product-service systems, where the firm does not sell its product but offers it as a service (Tukker, 2015), and in the emerging sharing economy, where people with surplus resources rent them to those who need them (Belk, 2014) often through platforms, such as Airbnb, which allows people to rent their unused rooms as accommodations.

The recycle principle refers to *"any recovery operation by which waste materials are reprocessed into products, materials, or substances whether for the original or other purposes"* (The European Parliament and the Council of the European Union, 2008, p. 10). In recycling, products and components are always transformed back into materials. The recycling principle also supports using recycled and recyclable materials; as in the case of Swedish outdoor equipment brand Fjällräven that manufactures a backpack made of 95% recycled polyester (Fjällräven, 2016). Recycling is often treated as synonymous with the CE, and waste policies have had a strong focus on increasing recycling rates (Kirchherr et al., 2017). However, when considering resource efficiency and the ability to maintain the value of materials in circulation, recycling might be the least sustainable solution of the 3R principles because it is limited by the natural law of entropy, complexity of materials, and potential for abuse (Stahel, 2013). The 3R principles are the tangible methods to influence material use in the CE (Ghisellini et al., 2016), so their implementation should contribute to economic value when firms adopt CE business models (Urbinati et al., 2017). To analyze the economic viability of the CE in business, therefore, it is important to examine all three principles using the business model approach.

2.3. Towards a conceptual framework to analyze business models in the CE field

Various forms of the business model concept have been recently applied to the circular economy. Scheepens et al. (2016) discuss the importance of creating both economic and environmental value in circular business models and apply an innovative Life Cycle Assessment (LCA)-based eco-costs value ratio approach that focuses on customers' willingness to pay. While the approach is very promising in that it tests both the environmental and economic effects of a circular business model, it does not help to identify how economic value is generated in a circular economy on the firm or systemic level. Rizos et al. (2016) studied the barriers to and enablers of circular business model implementation in small and medium-sized businesses (SMEs). Although they highlight the reasons why SMEs implement circular business models, the authors do not explore whether these models generate concrete economic value. Research by Lewandowski (2016) has been the most focused on identifying value creation methods through an analysis of the business model canvas (Osterwalder et al., 2005) in regard to CE literature.

However, each of the recent contributions to the field have approached CE from the perspective of sustainable business models. In the sustainable business model approach, the value centricity of the business model is extended to include societal and environmental values, as well as economic value (Dentchev et al., 2018). This extension follows the suggestion that environmental sustainability could provide a competitive edge to companies as customers and other stakeholders such as legislators become increasingly aware of environmental risks (Bocken et al., 2014). While the sustainable business model concept drives its adopters to create more sustainable businesses, it simultaneously muddles aspects relevant to economic value generation, thus reducing its applicability as an analytical tool for assessing this type of value generation, which is the ultimate driver of decision making in business (Lieder and Rashid, 2016).

Based on the business model literature reviewed, we developed a component-based framework that enables the analysis of specific cases in a structured, in-depth manner. We acknowledge the frameworks presented in previous business model literature and adopt the general business model framework by Richardson (2008). Thus, we use value proposition, value creation and

delivery, and value capture as our main components. The same general framework has emerged as a leading high-level framework for business model components (Clauss, 2016). and has already been used in the sustainable business model field (Bocken et al., 2014). Furthermore, because the business model concept has received criticism for its ambiguity (Chesbrough and Rosenbloom, 2002; Magretta, 2002; Zott et al., 2011), we enhance the level of detail by adding sub-components, which, as portrayed in Table 1, is an established way of concretizing the business model concept. This approach is similar to that of Lewandowski (2016); however, we decided not to extend the business model components to include CE-specific components such as take-back programs as those could be seen as parts of CE business model archetypes and thus limit the usability of the framework. Rather, our approach was to include components in the business model concept that can identify the variety of CE approaches during analysis.

To assess value proposition, we selected offering and target customer as sub-components because they can include, e.g., servitization aspects (Tukker, 2015) or emerging customer segments (e.g., Chertow, 2007). Resources and capabilities, organization, and position in the value network represent the sub-components of value creation and delivery in our model; these can capture, e.g., take-back programs (Lewandowski, 2016) without the need for additional sub-components. For value capture, revenues streams and the economics of the business were selected as sub-components because, regardless of the addition of CE aspects, a firm will capture value through added revenue or realized benefits to the economics of the venture. The complete conceptual framework developed for our case analysis is shown in Fig. 1. In addition to the business model layer, a separate CE-specific layer of 3R principles was included to improve and ensure the identification of CE aspects during case analysis. As stated by Ghisellini et al. (2016), the 3R principles convey the main “actions” through which the CE concept is put in practice according to CE research (Ranta et al., 2017; Su et al., 2013). However, directly embedding the 3R principles amongst the business model components would clutter the framework, as they could potentially emerge in any of the sub-components depending on one's perspective. Thus, rather than embedding the 3R principles in the business model framework, they were analyzed separately whilst their connections to the business model framework emerged.

3. Research methodology

3.1. Research design

An explorative, multiple-case strategy (see e.g. Eisenhardt, 1989; Miles and Huberman, 1994) was used to examine business models in the field of CE for several reasons. First, the lack of literature combining the business model perspective and the CE concept signals a lack of understanding regarding the business potential of CE initiatives (see, e.g., Lieder and Rashid, 2016) and thus highlights the need to explore CE in a structured way. Second, as relevant studies to date have been mainly conceptual, a multiple-case strategy allowed us to empirically analyze the business model components of several cases in a fine-grained, in-depth, and contextualized way, as well as compare cases and map emerging patterns between them that represent different types of CE initiatives in different global markets.

Four cases from different geographic locations and employing different types of CE initiatives were chosen. A purposive sampling strategy was applied, as it is an established method in case studies (Eisenhardt, 1989, p. 537). We followed several purposeful sampling principles (see Patton, 1990, p. 177) to improve the external validity of the analysis of our sample (Eisenhardt, 1989). Firstly, we employed maximum variation sampling based on geographical region, enabling the identification of common patterns cutting across varying regional legislation (European Commission, 2015; Jiao and Boons, 2017). Second, following extreme case strategy

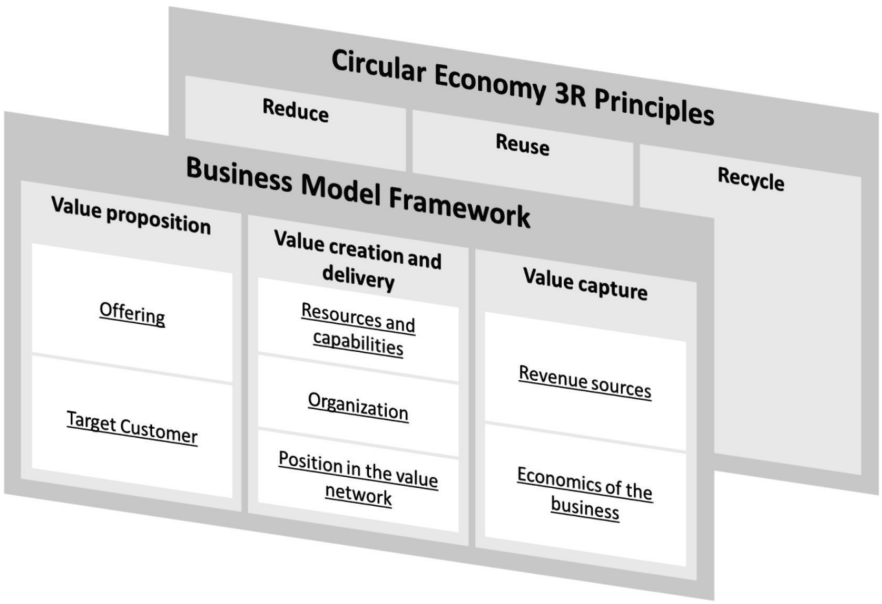

Fig. 1. The developed conceptual framework for analyzing business models in the CE field.

we picked notably functional cases, beyond mere pilot cases, identified in collaboration with experts in the field. Third, to capture different types of initiatives, we used theoretical sampling, which allowed us to include both main types of CE initiatives driven by businesses on the micro-level: production (e.g., eco-design, cleaner production) and waste management (e.g., "scavengers" and "decomposer") (Ghisellini et al., 2016, p. 19).

Case sampling proceeded through two phases. First, through a preliminary search of CE-related publications, reading previous CE case studies, and discussions with experts from business and academia, we identified nine potential cases. Second, we selected a final set of four functional cases representing different global locations and CE initiatives for detailed structured analysis, as shown in Table 2.

3.2. Data gathering

We aimed to gather extensive data to uncover the business model elements of the cases and applied a LexisNexis search to collect a multi-source dataset of versatile, publicly available documents. LexisNexis was used to improve the quality and reliability of the data, as it is an established source of archived document data (e.g., Adams et al., 2009; Tankard, 2001). Between July and September 2016, searches were conducted for each case in LexisNexis using search terms derived from preliminary information about each case. For example, for the Dell case, searches were conducted using search terms such "Dell Optiplex" and "Dell Reconnect," as those were central components of the case. In general, the data collected covers 2006–2016, but cases allocated differently within the timeframe and are not simultaneous. In total, the searches yielded more than 200 media and news articles, press releases, reports, statistics, and studies (including articles in scientific and professional journals) (see Table 3). This method of using multi-sourced public data has been employed before by, e.g., Ansari et al. (2016), who studied TiVo and the television ecosystem in the U.S., and Ritala et al. (2014), who studied the business models of Amazon.com.

In addition, we supplemented this extensive archival dataset by conducting one-to-one interviews with senior executives in the European cases; thematic interviews with company representatives holding key positions in the focal cases were conducted in June 2016. The interviews lasted on average 50 min and were recorded and transcribed. Informants were asked to describe the case's business model through questions related to the value proposition (value to the customer), value creation and delivery, and value capture (value to the company). These interviews both complemented and partly validated the archival data, and targeted the same timeframe as the document data collected for each case. Collecting extensive data from multiple sources (e.g., research, media, and company documents) increased data triangulation (Miles and Huberman, 1994) and improved the construct validity of our study (Yin, 1994).

3.3. Data analysis

Data analysis was conducted in two phases. In the first phase, within-case analyses were conducted (Eisenhardt, 1989; Miles and Huberman, 1994). Analysis focused on retracing, identifying, and classifying the business model and 3R principle elements from the vast data collected for each case. In this process, the data was transformed into case study write-ups structured around the business model and 3R principle frameworks (Eisenhardt, 1989, p. 540). Using the business model and 3R principles as the basis for analysis and approaching them from using insights from previous literature improved our method's internal validity (Yin, 1994) First, the data was collected on a centralized Excel spreadsheet, which was used as a supporting tool, not only to manage the data but also to augment the reliability of the findings through cross-examination of multiple sources. When identifying and classifying the components of the conceptual frameworks in each case, the data was manually traced for references to the framework components. For example, when seeking the "offering" component of the business model framework, data referring to a product or service on offer to customers was classified in this category. Similar retracing and categorization was conducted for the CE 3R principles. For example, if data sources mentioned that an initiative recycled materials, those efforts were linked to the framework in the analysis.

The second phase of analysis consisted of cross-case analysis. Because this research was exploratory due to the limited understanding of the phenomena, theory-based pattern matching from categorization or different dimensions would have had limited feasibility. Thus, we employed the tactic of comparing cases through mapping out their differences and similarities, and identifying the emerging patterns. Together with the rigorous case sampling principles used, the cross-case analysis improved the

Table 2
Selected cases and relevant background information.

Case	Location	Company employees	Company revenue (MEUR[b] 2015)	Industry	Background
Suzhou	China	Thousands in the informal sector[a]	Not available	Waste Management	Municipal waste management, "scavenger" case
Dell	the U.S.	101 000	51 700	IT	End-of-life IT equipment circulation
UPM	EU	19 600	10 100	Forest Industry, Energy	Process industry eco-design product
Ekokem	Finland	680	260	Waste Management	Source separated and special waste management, "decomposer" case

[a] Based on Fei et al. (2016, p. 76).
[b] Million Euros.

Table 3
Data sources collected for each case.

Case	*News Articles*	*Columns*	*Research Articles*	*Company Releases*	*Other Company Material*
Suzhou	30	8	8	26	19
Dell	22	12	1	2	12
UPM	12	7		98	27
Ekokem	12	3	1	35	20

external validity of our results and enabled us to draw broader conclusions about economic value creation in a CE (Eisenhardt, 1989).

4. Results

The conceptual framework created in section 2 was used to analyze the four cases. The within-case analyses for UPM's Profi, Ekokem's Circular Economy Village, the Chinese city of Suzhou, and Dell's Reconnect service comprise of a description of each initiative using the business model and 3R principle framework. In the last sub-section, the four cases are further compared in a cross-case analysis using the conceptual framework to summarize the results and identify emerging patterns to be developed further into propositions in the discussion section.

4.1. UPM case results

This case venture resulted from the identification that a waste stream from the company's label business could be used as materials for wood-plastic composite (WPC) products called Profi. In the process of selling WPC products, the company is capturing new cycles of value from the same materials it used to manufacture labels that were previously sold to customers. This is especially true when the label waste used is procured from customers through the company's waste management service. As the interviewed director of strategic partnerships explained, *"We have a contract with the customer so that after the lining from the labels has been used, we collect the waste back—as it is "pure" waste, we know exactly what it contains and can then use it to produce Profi."*

In this situation, the waste was once a label product for which the company received revenue and is now returned to the company for another round of revenue generation as a WPC product. Potentially, if the waste management service is generating revenue, the same material can then generate a third round of revenue. The case is outlined with the analysis framework in Table 4.

The business model reduces the amount of waste by turning a major waste stream into a resource for another, completely recyclable product (Smith, 2008). Over 60% of the raw material for the WPC products can be sourced from label waste which previously could not be recycled and was disposed of through incineration or landfilling (UPM, 2016). Thus, the primary way that the WPC's business model enables CE is by reducing the amount of waste generated through the company's label business. The recycling principle is being embraced in the manufacture of the WPC products, which creates a recycling cycle for previously-difficult-to-recycle label waste (Smith, 2008; UPM, 2013a, 2013b). Comparing the business model components and the 3R principles in Table 4, the source of value similarly appears to be recycling capability, as it enables the service component of the business model while also contributing to the ability to manufacture WPC products, the primary source of revenue resulting from the initiative.

4.2. Ekokem case results

The company behind the CE Village concept is a specialized waste management operator that has recently profiled itself as a CE company. Ekokem's CE Village is the first of its kind in Finland and contributes towards the understanding of what CE means in the country. From the business model perspective, this case is an example of creating value capture mechanisms to support an 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 CE Village, as the interviewed research & development manager explains the following regarding revenue sources: "We also collect a gate-fee as we accept the waste, in addition to the revenue gained from the sales of the process end-products."

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 susceptible to price volatility. Overall, the business model aims to maximize value capture from the mixed-waste stream; thus, this case creates increased economic activity through CE. The case is outlined in the analysis framework in Table 5.

From the CE perspective, the main contribution of the case comes from the sales of recycled materials. If virgin materials are substituted with recycled materials, then the CE Village will reduce the amount of virgin materials used in its market. This seems to be the case, as the value proposition of the recycled plastics produced include reducing material costs through the substitution of virgin materials with recycled ones (Ekokem, 2016). No direct reuse was identified in the case, and the reduce principle is not embraced through the direct reduction of material usage but rather through the substitution of virgin materials.

4.3. Suzhou case results

China has attempted to build a formal recycling system. For example, in Suzhou, the separation of different sources of

Table 4
Relations of 3R principles and business model components in the UPM case.

Business model component	Reduce	Reuse	Recycle
Offering	RafCycle liner waste management service reduces waste to landfill and the incineration of label waste.	No reuse identified in the case.	Durable high quality, recyclable WPC-products made partly from recycled label waste.
Target Customer	Raflatac label customers and all firms involved in the label value chain.	No reuse identified in the case.	Consumers, architects, and builders.
Resources and Capabilities	Capability to source-separate label waste where label waste is produced.	No reuse identified in the case.	Patented material. Capability to process label waste into ProFi-products using traditional plastics-molding processes.
Organization	UPM Raflatac operates RafCycle, leveraging UPM's paper recycling logistics infrastructure and partner waste management firms.	No reuse identified in the case.	RafCycle delivers label waste to ProFi factories in Germany and Finland. ProFi and UPM Raflatac are in different business units.
Position in the Value Chain	New position in the value chain for UPM: organizing waste management services to label customers.	No reuse identified in the case.	ProFi products are sold to end customers through resellers.
Revenue Sources	Raflatac revenue from label sales.	No reuse identified in the case.	Sales of ProFi.
Economics of the Business	Reduces waste management costs for label customers.	No reuse identified in the case.	Cost-efficient materials from label waste.

household solid waste has been provided by the city's government since 2000 (Zhang and Wen, 2014, p. 6446). Yet, this government program remains largely ineffective because taxes, environmental protection, and other costs have led to the informal system, still formidable in the country and currently outside of governmental control gaining a significant cost advantage. For example, in their analysis of how to integrate the formal and informal sectors, Fei et al. (2016) approximated that over 80% of the cash flow in the recycling system of Suzhou goes through the informal sector, due to the large advantage in the amount of facilities and amount of material recycled. In this case, analysis of the business model with the CE principles was conducted to illustrate how Suzhou's system of recycling household waste operates. The case is outlined through the analysis framework in Table 6.

The most notable finding of the business model analysis in the Suzhou case is the single revenue source from the sale of recycled materials. This is because the recyclables are traded as valuables from the beginning, as opposed to for example the waste treatment providers collecting a gate fee like in the case of Ekokem. Informal waste collectors for example, rely—for part of their living—on their ability to sell recyclables to operators who can further process the recyclables into materials (Fei et al., 2016). Because the operators in the recycling system can only acquire revenue from the sale of recycled materials, their business models must focus on providing materials to manufacturers as cost-efficiently as possible. In practice, this results in very low income, on average 1200 RMB per month in 2012 compared to the average of 2770 RMB for citizens, for employees in recycling sites (Fei et al., 2016), and in the use of low-level technology and the reduced ability to compete if environmental rules (that reduce cost efficiency) are complied with.

The main principle through which the CE is advanced and value is generated 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. It can be argued that using recycled materials reduces the use of virgin materials. No direct instances of reuse were identified in the analysis.

4.4. Dell case results

Dell is a leading US-based manufacturer of personal computers (PCs) and computer equipment. It is the third-largest PC manufacturer when measured by units shipped, with shipments of 10.2 million PCs in the fourth quarter of 2015, according to technology analyst Gartner Inc. (Renstrom, 2016). By using recycled materials in its products, Dell saves material costs without altering product performance. Dell says this cost-saving is currently nominal, but the company expects savings to increase as the use of recycled materials and the program are scaled up (Dell, 2016). The *savings from material costs* is, however, a clear, direct value capture mechanism for Dell. The case is outlined in the business model framework in Table 7.

A major aim of the closed-loop program is to enable recycling of end-of-life computer equipment. Dell focuses on *recycling the plastic content of computers*, which it can efficiently use to manufacture new products, reducing costs. In 2015, Dell reused more than 3.4 million pounds of recycled plastics from old electronics in computers and displays, in addition to 10.7 million pounds of plastics from plastic bottles and other recyclable sources (Dell, 2016; Renstrom, 2016). Dell does not use other materials extracted from e-waste, such as valuable metals, but transfers these to recycling companies contracted to disassemble and separate materials suitable for the closed-loop program (Renstrom, 2016). While this business model captures computers and displays for reuse, Dell itself does not gain any economic value from reuse. Instead, Dell pays its non-profit partner Goodwill to handle the separation and reuse part of the business model (Napsha and Olson, 2009; Negley, 2012; Renstrom, 2016). This suggests that reuse does not create sufficient economic value to merit incorporation in Dell's business model as a source of revenue because it is a cost. Of the 3R principles, therefore, recycling is the primary contributor of economic value.

4.5. Summarizing the results through a cross-case analysis

The analyzed cases each differ with regard to their business models, industries, and geographical areas, but recurring themes emerge across the cases. Table 8 summarizes all the recurring themes, and those making the greatest contributions will be discussed in more detail.

As the first key theme, in all the cases, the main source of economic value from CE to the focal firm is achieved through recycling. For UPM, recycling label waste results in cost-efficient and sustainable materials for the WPC products. In the Ekokem case, adding recycling capabilities enables the focal firm to capture additional value from the sales of recycled materials in addition to the existing revenue source of gate fees. In Suzhou, sales of recycled materials is the only source of revenue, and in the Dell case, the

Table 5
Relations of 3R principles and business model components in the Ekokem case.

Business model component	Reduce	Reuse	Recycle
Offering	Waste treatment service that reduces waste incineration and landfilling by increasing recycling rates.	No reuse identified in the case.	Recycled plastics granulates and products.
Target Customer	Industrial and agricultural plastics waste producers, municipal waste management operators, and national plastic waste source-separation program.	No reuse identified in the case.	Plastics industry for granulates; construction industry for ready-made products.
Resources and Capabilities	Waste treatment resources including earlier waste-to-energy and the new recycling system.	No reuse identified in the case.	Combination of an ecorefinery, plastics refinery, and biorefinery enables high recycling rates.
Organization	Waste management operators deliver mixed waste and source-separated plastics to Ekokem for processing.	No reuse identified in the case.	Eco- and plastics refineries operated by Ekokem; biorefinery operated by a partner firm.
Position in the Value Chain	Provider of waste treatment services to waste collectors, agriculture, and industry.	No reuse identified in the case.	New position for Ekokem in selling recycled plastic granulates and products.
Revenue Sources	Gate-fees	No reuse identified in the case.	Sales of recycled plastics granulates and products.
Economics of the Business	Source-separating plastics can lead to lower gate fees for the customer.	No reuse identified in the case.	Recycled plastics are cheaper than virgin plastics.

Table 6
Relations of 3R principles and business model components in the Suzhou case.

Business model component	Reduce	Reuse	Recycle
Offering	Collection of recyclables directly from households. Reduces total household solid waste, which is officially directed to incineration.	No reuse identified in the case.	Cheap recycled materials for manufacturing firms.
Target Customer	Residents.	No reuse identified in the case.	Manufacturing firms.
Resources and Capabilities	Capability to flexibly collect recyclables from residents, often door-to-door.	No reuse identified in the case.	Capability to process recyclables into recycled materials very inexpensively. Low technological resources.
Organization	Individual waste pickers.	No reuse identified in the case.	Formal and informal recycling sites that preprocess waste for processing sites.
Position in the Value Chain	Waste pickers collect recyclables from residents and sell them to recycling sites.	No reuse identified in the case.	Recycling sites buy recyclables from waste pickers and sell preprocessed recyclables to processing sites, which sell recycled materials to manufacturing firms.
Revenue Sources	Sales of recyclables.	No reuse identified in the case.	Sales of recycled materials.
Economics of the Business	Recyclables have economic value right from the beginning.	No reuse identified in the case.	Each actor in the system has to pay for recyclables, and their only source of revenue is sales of recycled materials. Informal sector has a cost advantage, as they do not follow environmental regulations.

Table 7
Relations of 3R-principles and business model components in the Dell case.

Business model component	*Reduce*	*Reuse*	*Recycle*
Offering	Free take-back service for consumers to reduce incineration and landfilling of e-waste.	Used computers from the Reconnect program through non-profit partner Goodwill.	Closed-loop plastics introduced to existing Dell products, improving their sustainability.
Target Customer	Consumers with unused and end-of life computers.	Consumers.	Current Dell target customers.
Resources and Capabilities	Network of over 2000 free take-back service locations.	Capability to separate computers suitable for reuse. Refurbishing and resale services to consumers. Both by non-profit partner Goodwill.	Manufacturing capability for closed-loop plastics, take-back service, and recycling of materials from used computers.
Organization	Take-back service implemented by the non-profit partner Goodwill.	Refurbishment and sale of used computers is done by the non-profit partner Goodwill.	Closed-loop plastics recycling and processing is performed by Wistron, and the manufacturing of computers occurs in China. Other materials recycled by partner recycling firms.
Position in the Value Chain	Free take-back service diverts used computers from improper disposal and integrates them into the Reconnect program.	Goodwill separates reusable computers from those that need recycling.	The recycling system enables Dell to capture post-consumer plastics cost-efficiently while improving the sustainability of the business.
Revenue Sources	Dell pays Goodwill for accepting, inspecting, and packaging computers for recycling.	Reusable computers are sold by non-profit partner Goodwill.	Sales of Dell products with closed-loop plastics.
Economics of the Business	Take-back service is funded by Dell.	Goodwill is a non-profit organization; a donation of a working computer can equate to 6.8 h of job training for a Goodwill employee.	Recycled plastics are cheaper, and their prices are more stable than those of virgin plastics.

only part of the Reconnect service that is connected to Dell's business model is the replacement of virgin sourced plastics by more cost-efficient closed-loop plastics. The way in which recycling generates economic value thus differs based on whether the firm is selling recycled materials or products made from recycled materials, with new revenues streams in the former case and lower material costs in the latter.

The second key theme is that the analyzed business models included a type of take-back system to acquire waste suitable for recycling. Although the take-back system contributed to revenue only in the Ekokem case, establishing such systems in a way that enables separation of recyclables from mixed waste streams is crucial to the success of economic value creation through recycling. However, methods of organizing the take-back system varied widely in the case companies. The system in the UPM case was organized internally, while it was organized through partnerships in the Dell case. In the Ekokem case, it was organized through provision of a waste management service with a gate fee, whereas recyclables were purchased from waste pickers in the Suzhou case.

The third recurring key theme is that either the take-back service or the sold products made from recycled materials were very closely linked to an existing business, while the new operation was organized separately. For example, in the UPM case, the existing Raflatac business unit started offering the take-back program to its customers, while the WPC product business is arranged as a completely separate enterprise; Raflatac's RafCycle service operates as an internal supplier for the WPC product business. In Dell's case, the separation is even clearer, as Dell only organizes the take-back program, which then supplies closed-loop plastics for Dell's existing products. This allows the original business to run as before while adding circularity to the business. However, this simultaneously alters the focal firm's position in the value chain, as the firm suddenly finds itself both providing waste management services and selling materials, whereas only one or the other has been the case previously.

Fourth, in the analyzed cases, the reuse principle is underutilized as a source of economic value. Only Dell reuses but, even in this case, Dell does not incorporate reuse into its business model but leaves it to its non-profit partner, Goodwill. Rather than capturing economic value from reuse, Dell pays Goodwill to separate reusable

Table 8
Recurring themes of the relations of 3R principles and business model components in the analyzed cases.

Business model component	*Reduce*	*Reuse*	*Recycle*
Offering	Reducing mixed waste by increasing source-separation and increasing recycling.	Take-back services and sales of used and refurbished products.	Cheaper materials for manufacturing or sustainable high-quality end products.
Target Customer	New target customers through take-back services.	Used products to consumers.	New target customers for recycled materials.
Resources and Capabilities	Capability to provide take-back services that are accessible to customers.	Capability to separate working products and components from waste and refurbish them for resale.	Capability to capture source-separated waste for efficient recycling.
Organization	Take-back of products and materials operated separately from product manufacturing, either through partners or by other business units.	Separating reusable products from materials and refurbishment organized together.	Use of recycled materials in producing products is based in a separate business unit from the recycling system.
Position in the Value Chain	Diverting waste to recycling in various parts of the value chain.	Early separation of reusable products from waste streams.	New position in the value chain, either in sales of new products from recycled materials or in waste management or take-back services.
Revenue sources		Refurbished reused products.	Sales of recycled materials or products made from recycled materials.
Economics of the Business	Increasing source-separation and thus reducing mixed waste reduces waste management costs.	The sales and refurbishing of used products is subsidized.	Recycled materials cheaper than virgin materials.

computers and equipment, so the reuse principle generates costs rather than revenue. The economic value gained from the reuse principle seems small, especially when considering the Ellen MacArthur Foundation (2013) and European Commission's (2015) expectations for major benefits from increased reuse, such as new jobs servicing and refurbishing products.

Finally, while the recycling principle is the main source of economic value to the focal firm in each case and the reuse principle appears to be underutilized, the reduce principle emerges throughout the cases as an incentive for customers to take part in the take-back services. Reducing the amount of waste by taking advantage of the take-back services provides economic value to customers in the UPM, Ekokem, and Dell cases. The reason for this is that in each of these cases, selecting the take-back service instead of the traditional waste management service effectively reduces waste management costs. While the waste management costs in the Suzhou case are not clear, participation in the take-back service is also incentivized since recycling sites pay for the recyclables. Thus, in the Suzhou case, partaking in the take-back service also results in economic gain for the customer.

5. Discussion

Through a structured analysis and multiple-case comparison, we developed an understanding of the kinds of business models—with regard to the components of the business model and 3R principles—that enable CE business operations. In the next section, findings of this theory-developing qualitative multiple case study are developed into circular business model propositions that provide theoretical implications for further circular business model research as well as implications for managers and policymakers for moving towards CE.

5.1. Propositions for CE business models

Based on our explorative case analysis we suggest the following five propositions for implementing CE business models from the perspective of economic value creation and the 3R-principles.

Proposition 1. *Cost efficiency of circular operations is the key proponent to successful CE business*

In each of the analyzed cases, the main economic value to the focal firm was gained from using recycled materials as cost-efficient alternatives to virgin materials, or from selling recycled materials to manufacturers for this purpose. Thus, from a business model perspective, the improvement to the business model was due to the economics of the business component of the business model. Richardson (2008) describes the economics of a business as the way the firm gains a profit margin through higher revenues or lower costs. In the analyzed cases, leveraging recycling resulted in better cost efficiency through lower overall material costs.

Proposition 2. *Take-back services enable the acquisition of particular wastes as resources, but they need to be incentivized through reductions in customers' total waste management costs.*

In each case, cost efficiency is driven by a take-back system ensuring that the focal firm can acquire waste suitable for efficient recycling. Lewandowski (2016) has suggested including take-back systems in CE business models, and our findings support that conclusion. However, our findings also provide further insight into customer incentives to use take-back systems. In waste management infrastructures that reliably collect gate fees from waste producers, the ability to reduce waste management costs provides an incentive in the analyzed cases. Take-back services also blur the lines between the 3R principles because the adoption of take-back services reduces the generation of waste for disposal by replacing disposal with either reuse or recycling. Thus, although from the focal firms' value-capture perspective, efficient recycling appears to be the driver of economic value of take-back services, the reduce principle is central in the value-proposition perspective of take-back services.

Proposition 3. *Circular business models require the focal firm to separately manage multiple positions in the value chain.*

Our analysis also shows that moving to a more circular business model introduces new positions in the value chain for the focal firm. For example, if the original business model's revenue sources were from product sales, the focal firm's position in the value chain diversified due to the introduction of a take-back system, which enabled the materials to loop back and generate value (MacArthur, 2013). An especially interesting aspect of this appearance of multiple positions in the value chain was that these two positions were managed separately. A reason for this could be that, as implied by our second proposition, the take-back system itself should be able to provide value to customers, and thus it should be managed separately as a business model of its own (Chesbrough and Rosenbloom, 2002).

Proposition 4. *The take-back system for gaining economic value*

through CE can be implemented successfully in multiple ways.

The necessity of the take-back system and its enabling of cost-efficient circular operations were central to each of the analyzed cases. However, the organization of the take-back system and thus the way cost-efficiency was achieved could be designed in multiple ways. This suggests that while the take-back of suitable waste is a requirement, there is no single right answer as to how it should be implemented, other than that it should be managed separately. Implementation of the take-back system internally, through partnerships, or through purchasing from markets all appear to be applicable and successful approaches.

Proposition 5. *Recycling is easier to implement than reducing or reusing due to its smaller impact on the business model.*

The dominance of recycling to obtain economic value from CE business was a surprising finding, especially considering that previous CE literature has highlighted the potential economic value of moving towards reuse since it preserves products at a higher value (MacArthur, 2013; Stahel, 2013). We propose that the dependence on recycling is a result of it being easier to implement into a previously linear business model. Compared to reuse, where new activities such as refurbishment, maintenance, and remanufacturing as well as separate sales of new and used products are required for implementation (Lieder and Rashid, 2016), introducing recycling merely replaces virgin materials with recycled materials, with little effect on the fundamentals of the business model (e.g., target customers or revenue sources). The separation of management of the different positions in the value chain also supports our fifth proposition that managing CE activities so that they have minimal impact on the original business model is easier than integrating CE directly to the original business model through reduce or reuse.

5.2. Implications to research and practice

The five propositions provide theoretical implications for the academic discussion on the CE and business models. Linking to earlier business-model and CE literature, these propositions explain why recycling is a dominant method of implementing circularity within businesses. *Future research* could test and develop the propositions established in this qualitative explorative study. Quantitative methods are rarely used in CE business model research, and these propositions could serve as initial research questions for quantitative analyses to test theory in this area. In particular, the importance of the take-back system to recycling's ability to generate economic value and the finding on the separate management of diversified positions in the value chain indicate interesting areas for future circular business model research. Reuse is underrepresented in economic value generation, so future studies could also be aimed at providing concrete evidence on how reuse generates economic value in circular business models. Furthermore, although recycling is the dominant source of economic value in the business models, the reduce principle often coincides with recycling as a central contributor to the value proposition for customers in take-back services. Thus, following Kirchherr et al. (2017), we recommend further detailed, structured investigations on the CE implementation methods because the lines between the 3R-principles as the methods of implementing CE can become blurred and co-dependent.

The propositions also have practical *managerial implications* as they offer concrete guidance on how to gain economic value from CE business. Managers implementing CE business should pay specific attention to the cost-efficiency of circular operations as it is the key proponent to gaining economic value from CE. The need of incentives for the customers of the take-back system, the implication of benefit from managing the take-back system separately from other business, and the notion that no one single implementation for the take-back system is the only way to success are all practical learnings that can be transferred to the design of CE business models. The relative ease of implementing CE through recycling as opposed to reduce or reuse is also an important consideration, allowing firms to embrace CE faster without drastic changes to current business models.

Our findings also suggest *implications and offer guidance for policymakers*. The recycling principle was the dominant source of economic value for the focal firms in our study. From an environmental standpoint, this is concerning, as recycling requires more energy than reusing products or reducing the use of materials and inevitably leads to the loss of some of the original materials as well as some of their properties (Charonis, 2012). Hence, this limits the ability of recycling to close material loops completely. Many of the positive social impacts of CE are also expected from refurbishing, maintaining, and remanufacturing products, none of which are introduced when only recycling is implemented. The incentive of waste management costs was a major enabler of take-back systems for recycling, and thus providing further incentives that directly support reuse—even to the detriment of recycling—could move firms towards implementing reuse in their operations. However, since reusing has a much larger impact on the business model than recycling as it requires the fundamental change of starting to sell used products, the direction of incentives towards the actual activities required for reuse could be more effective.

5.3. Limitations

This study relied on purposefully chosen cases; therefore, we acknowledge that the case selection posed limitations to the study's external validity, as not all types of CE initiatives could be directly analyzed within the scope of the study. However, we rigorously sampled the case studies based on multiple purposeful sampling criteria to capture a broad set of different CE initiatives and conducted a cross-case comparative analysis. This was intended to improve the study's external validity and enable more generalizable conclusions from the findings (Eisenhardt, 1989).

Subsequent research on the subject should target cases that help explain the relative dominance of recycling as a driver of economic value and should consider expanding the 3R principle framework in the business model context. Although the definitions of the 3R principles are clear from the perspective of a waste management hierarchy, their boundaries can become blurred when analyzing value creation from a business model perspective as they often coexist. A more holistic categorization acknowledging the connections and interlinkages between the principles could clearly capture the essence of diverse CE business models. For example, in a review of CE conceptualizations, Kirchherr et al. (2017) identified the 3R principles framework as dominant in the CE literature but also found more extensive frameworks that suggest new principles and make their definitions more explicit from a value-creation perspective.

Regarding data collection, the majority of the data came from the four focal case companies, although LexisNexis was used to gather secondary material from reliable news outlets. To address the validity of the media-originated data, we performed triangulation using, for example, company data (see e.g., Ansari et al., 2016). However, media- and company-originated data could have introduced bias into the results, even though triangulation through multi-sourced data was performed in attempt to reduce it. Sampling that is also based on the timeframe of the cases could increase the validity of future multiple-case research by improving the triangulation effect of cross-case analysis (Yin, 1994).

6. Conclusions

In this study, we approached the emerging CE concept from the business model perspective, contributing towards the research gap on the economic value of CE for firms (Lieder and Rashid, 2016). Through linking case analysis to previous literature, we developed five propositions for conducting circular business: 1) the cost efficiency of circular operations is the key proponent to successful CE business, 2) take-back services enable the acquisition of particular wastes as resources, but they need to be incentivized through reductions in customers' total waste management costs, 3) circular business models require the focal firm to separately manage multiple positions in the value chain, 4) the take-back system for gaining economic value through CE can be implemented in multiple ways, and 5) recycling is easier to implement than reducing or reusing due to a smaller impact on the business model. Based on these findings, the "recycle" principle is surprisingly more dominant in economic value creation in CE when compared with the "reduce" and especially "reuse" principles. As recycling has a limited ability to keep materials in circulation (Stahel, 2013), it is important that policymakers find ways to facilitate value creation through the principles of "reduce" and "reuse" for the CE to reach its full potential.

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Appendix A. Reviewed business model research and definitions

Author, Year	*Research Type*	*Business Model Definition*
Linder and 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 and 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 and Rosenbloom, 2002	Case study of business models for innovations in 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, using case studies	"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, 2004	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 this is done and with which financial consequences." (p.3)
Richardson, 2008	Review of business model literature from a strategic perspective	"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)
Teece, 2010	Explores the business model 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)
Zott and Amit, 2010	Review of business model literature leading to an activity system perspective to business model design	"The content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities" (p. 219)
Bocken et al., 2014	Review of business model literature and practice to develop archetypes for sustainable business models	"In this paper, a business model is defined by three main elements: the value proposition, value creation and delivery and value capture." (p. 43)
DaSilva and Trkman, 2014	Conceptual paper discussing the theoretical foundations of the business model approach	"The core of the business model is defined as a combination of resources which through transactions generate value for the company and its customers." (p. 383)
Clauss, 2016	Review of business model literature to develop a scale to measure business model innovation	"Business models are structural templates of how firms run and develop their business on holistic and system-levels " (pp. 386–387)

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PUBLICATION IV

How B2B suppliers articulate value propositions in the circular economy: Four innovation-driven value creation logics.

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Research paper

How B2B suppliers articulate customer value propositions in the circular economy: Four innovation-driven value creation logics

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ABSTRACT

The transition toward the sustainability-driven circular economy is emerging across global markets. The circular economy refers to a regenerative and restorative economic system that aims to optimize resource usage and reduce waste, and offers potential to innovate novel value creation opportunities in B2B markets. However, how the value creation opportunities in circular economy are captured in supplier firms' customer value propositions (CVPs) remains underexplored. To address this critical gap, we develop a theoretical framework that illustrates the architecture of CVPs, and use it to conduct an extensive multiple-case study across several industries, offering types, and firm sizes, analyzing 74 documented CVPs in the Finnish circular economy. The results reveal that CVPs in the circular economy embody four alternative value creation logics (resurrect, share, optimize, and replace value) that are built on different forms of innovations, and highlight different design elements. This study advances current marketing theory by illustrating how suppliers articulate CVPs in the circular economy, and highlighting the key differences to prevailing insights from linear economy. For managers, this study offers important insights into designing CVPs that resonate with circular economy–oriented customers and broader stakeholders.

1. Introduction

As a prominent approach to improving sustainability in B2B markets, the circular economy has emerged as an alternative to the linear economy with evident interest across some of the world's largest market systems, including China (Mathews & Tan, 2011), the Europe Union (McDowall et al., 2017), and the United States (Esposito, Tse, & Soufani, 2018). In addition, the approach has gained momentum across several academic disciplines (Bocken, de Pauw, Bakker, & van der Grinten, 2016; Spring & Araujo, 2017). A key reason for its widespread popularity is that the circular economy encapsulates many sustainability trends, including carbon neutrality (Türkeli, Kemp, Huang, Bleischwitz, & McDowall, 2018), resource efficiency (Ghisellini, Cialani, & Ulgiati, 2016), and industrial ecology (Zaoual & Lecocq, 2018), functioning as an overall framework for the global transition to sustainability (Hopkinson, Zils, Hawkins, & Roper, 2018).

In general, the circular economy refers to a closed-loop, restorative, and regenerative economic system, which aims to optimize resource and waste use by "slowing, closing, and narrowing material and energy loops" (Bocken et al., 2016).The key goal of the circular economy is to innovate ways to "keep products, components and materials at their highest utility and value, at all times" (Webster, 2015, p. 16), while creating long-lasting economic, environmental, and social outcomes for the broader social system (Ghisellini et al., 2016). Thus, the circular economy is essentially built on innovations that promise to generate "more value, and for a longer period" for firms and society than the traditional linear economy does (Urbinati, Chiaroni, & Chiesa, 2017, p. 487). However, despite the increased value potential that the circular economy holds, we know very little about how B2B firms in this economy articulate the novel value creation opportunities that their innovations deliver to customers and broader stakeholders (Boons & Lüdeke-Freund, 2013; Manninen et al., 2018).

Customer value propositions (CVPs) are considered as supplier firms' most important *strategic tools* for articulating how the firms create value to and with their customers and stakeholders (Eggert, Ulaga, Frow, & Payne, 2018; Payne, Frow, & Eggert, 2017). However, although CVPs have a rich and long history (see e.g. Ballantyne, Frow, Varey, & Payne, 2011), most of this is based on the linear economy, where CVPs are built on distinct product-service offerings, and tend to highlight unique product features and monetary benefits for direct customers

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(Anderson, Narus, & van Rossum, 2006; Wouters & Kirchberger, 2015). In contrast, in the circular economy, CVPs are usually built on novel innovations that promise multiple benefits to broader societal stakeholders (D'Antone, Canning, Franklin-Johnson, & Spencer, 2017; Porter & Kramer, 2011). However, current literature provides only a few insights into how to design such "blended" or "sustainable" CVPs (Emerson, 2003; Manninen et al., 2018; Patala et al., 2016). Thus, understanding of how to design CVPs in the circular economy, and what kind of superior value they promise to the target beneficiaries, is missing. This is a critical issue for firms that are transitioning to the circular economy. To drive the adoption of their innovative offerings in the circular economy, firms need a deep understanding and practical tools to develop CVPs that demonstrate how their offerings create more value compared to competing, but less sustainable alternatives in the linear economy (Esposito et al., 2018; Ramirez, Gonzalez, & Moreira, 2014).

CVPs are usually developed using different design elements (Payne et al., 2017), which together articulate broadly what, how, and for whom value is created. However, in this study, we argue, and subsequently demonstrate, that extant CVP literature has considered different design elements primarily in the linear economy context, but that there is a growing need to understand how CVP design elements are used in the circular economy context (c.f. Bohnsack & Pinkse, 2017; Manninen et al., 2018). From a broader perspective, different configurations of design elements constitute the overall structure, or "architecture," of CVPs, which crystallizes a firm's underlying value creation logic and the superior value package the firm delivers to target customers (Payne et al., 2017, p. 472). Although a few previous studies have unpacked the architecture of highly innovative CVPs (e.g., Payne & Frow, 2014a), they have focused on single-case studies in the linear economy. Thus, more generalizable insights into CVP design elements and their overarching architectures are needed both theoretically and managerially.

Against this background, the purpose of this study is to explore *how B2B suppliers use CVPs to articulate value in the circular economy*. We address this purpose in two ways: First, we identify *how suppliers' CVPs can be deconstructed based on their architecture*. By architecture we refer to the configuration of the key design elements that CVPs consist of (Payne et al., 2017). This gives us a theoretically rigorous and managerially applicable structure for analyzing CVPs in detail. Second, we identify *how different CVP architectures convey value*. This allows us to identify different design element configurations, reveal their key characteristics, and ultimately, provide granular insights into how different firms use CVPs to convey value from innovations in the circular economy (c.f. Payne & Frow, 2014b).

To address the research questions, we integrate theoretical insights from CVP, sustainability, and innovation literatures into the architecture and requirements of CVPs in the circular economy. Then, we conduct an extensive multiple-case study (Eisenhardt & Graebner, 2007), and analyze 74 documented and publicly available descriptions of circular economy-driven supplier firm CVPs across multiple industries, offering types, and firm sizes, to provide rich and nuanced empirical insights into CVPs and their use in the circular economy.

As a result, we first deconstruct the architecture of CVPs and, subsequently, reveal four alternative value creation logics (resurrect, share, optimize, and replace value) that are built on different forms of innovations, and characterize typical CVPs in the circular economy. We then describe the key CVP design elements that each value creation logic embodies, and discuss the implications of each logic. Taken together, the findings from this study contribute to several priority areas in the current CVP literature by i) developing a theoretical framework that illustrates the architecture of CVPs (Payne et al., 2017), ii) deconstructing CVPs in multiple industries to provide a "more comprehensive and transparent understanding of the differentiating …elements" that CVPs embody in different contexts (Payne & Frow, 2014a, p. 238), and iii) demonstrating how firms can use CVPs to articulate value from novel innovations in the circular economy (Boons & Lüdeke-Freund, 2013). Collectively, the findings from this study expand current CVP theory (Chandler & Lusch, 2015; Eggert et al., 2018; Payne et al., 2017) toward a pluralistic, societal, and systemic view of CVPs that is increasingly needed in the contemporary and sustainability-driven business environment (Kotler, 2011; Porter & Kramer, 2011; Varadarajan, 2017). For managers, this study offers important insights into designing CVPs that resonate with customers and broader stakeholders in the circular economy.

The paper is organized as follows. In the next section, we discuss the current understanding of CVPs and their architecture, as well as the role of innovations in the circular economy. Then, we present the research design and the empirical findings. Finally, we discuss implications for CVP, industrial marketing, and circular economy literature and management practice, and suggest potential avenues for future research.

2. Theoretical background

2.1. Customer value propositions as strategic tools

CVPs have a central position in the marketing literature as a supplier firm's primary strategic tools for articulating the value they aim to deliver to their customers and broader stakeholders (Ballantyne et al., 2011; Payne & Frow, 2014b). In addition to customer-targeted messages, CVPs can function also as important guidelines for a firm´s internal strategy (Payne et al., 2017), or as market shaping devices that can steer service systems towards a position that makes the firm's CVP even more differentiated or distinguished (Nenonen, Storbacka, & Windahl, 2019).

Fundamentally, CVPs reflect the supplier´s *strategic value creation logic* (Payne et al., 2017) and play a critical role in the supplier's business model (Ehret, Kashyap, & Wirtz, 2013). Thus, CVPs have been commonly defined as supplier-initiated statements or promises of the potential benefits that a particular product or service will deliver to customers (Anderson et al., 2006; Rintamäki, Kuusela, & Mitronen, 2007).

Much of the previous CVP literature has been built around the idea that quantified benefits and their monetary worth to relevant, often firm-level stakeholders are at the heart of resonating CVPs, particularly in B2B markets (Hinterhuber, 2017; Terho, Haas, Eggert, & Ulaga, 2012; Wouters & Kirchberger, 2015). Yet, as the contemporary market space has become increasingly networked, where exchanges are enacted, experienced, and evaluated by diverse and multiple actors (Eggert et al., 2018), several studies have noted the need to understand and articulate CVPs more broadly (Chandler & Lusch, 2015; Frow et al., 2014; Storbacka & Nenonen, 2011). This includes understanding a broader set of value drivers beyond those that are economic or monetary (Corvellec & Hultman, 2014; Patala et al., 2016), targeting a wider set of stakeholders than (business) customers alone (Ballantyne et al., 2011; Frow & Payne, 2011), and developing CVPs that are not restricted to supplier inputs only (Frow et al., 2014; Kowalkowski, Persson Ridell, Röndell, & Sörhammar, 2012). Taken together, instead of passive, supplier-initiated, and relatively fixed offerings of value for customers, emerging research considers CVPs increasingly as active, mutually-crafted, and open proposals for service systems to take part in value co-creation (Chandler & Lusch, 2015; Eggert et al., 2018). For example, Storbacka and Nenonen (2011) point out that CVPs can function as tools to "script" markets, too, and allow firms to go beyond focusing on existing customer needs that the firm can competitively fulfill, to shaping broader markets that give firms even better competitive advantage with multiple customers or service systems.

Given the increased complexity of CVPs in contemporary markets, recent studies have emphasized the need to dissect (Bohnsack & Pinkse, 2017), disentangle (Hinterhuber, 2017), or deconstruct (Payne & Frow, 2014a) CVPs into specific elements that would provide a more comprehensive and transparent understanding of the different CVP elements and their configurations that promise superior value to

customers. In this study, we refer to the suite of different CVP elements as an overall CVP architecture, and assume that individual CVPs (can) feature different element configurations. We distinguish CVP architecture from the CVP anatomy (Skålén, Gummerus, von Koskull, & Magnusson, 2015), where the latter is focused on the supplier´s key practices (routinized activities) that enable the creation of CVPs, while the former is focused on the key elements that suppliers intentionally articulate to stakeholders.

2.2. The architecture of customer value propositions

The architecture of CVPs can be understood as a configuration of CVP design elements that "determine how CVPs affect both the supplier firm and its customers" (Payne et al., 2017, p. 478). Current CVP literature highlights six key design elements that have differential effects on CVPs, namely, benefits, recipients, perspective, focus, explicitness, and granularity (Payne et al., 2017).

First, a *benefits* element is usually at the heart of CVPs; it articulates the type of value outcomes (i.e., economic, functional, environmental, social, symbolic) that target customers can expect to receive (Rintamäki et al., 2007). Especially in business markets, marketing messages that highlight economic and functional benefits are usually considered most convincing (Anderson et al., 2006; Wouters & Kirchberger, 2015). Second, a *recipients* element articulates the relevant stakeholder groups that can expect to benefit from the CVP (Frow & Payne, 2011). While CVPs can be addressed to wider stakeholder groups and service ecosystem actors, such as employees, customers, suppliers, partners, shareholders, and society (Chandler & Lusch, 2015; Frow et al., 2014), in practice, most CVPs target business decision makers in buyer-supplier dyads (Kowalkowski, Kindström, & Carlborg, 2016). Third, a *perspective* element articulates whether the CVP is primarily a unidirectional and supplier-determined promise of value, or a reciprocal and mutually determined proposal of value (Payne et al., 2017). While this highlights the relevant stakeholders' expected roles and activities in terms of value delivery and co-creation (Ballantyne et al., 2011), in practice, most CVPs are supplier-initiated promises of value delivery, where customers are treated primarily as passive recipients rather than active co-creators of mutually initiated proposals (Kowalkowski et al., 2012).

Fourth, a *focus*[1] element articulates whether the CVP promises value-in-exchange, value-in-experience, or value-in-use (Payne et al., 2017). Essentially, value-in-exchange focus promises to deliver value as more efficient product/service offerings, value-in-experience as enhanced total customer experiences, and value-in-use as realized customer goals in broader ecosystems (Eggert et al., 2018). In practice, though, many CVPs still emphasize superior product features and value-in-exchange perspective. Fifth, an *explicitness* element indicates how explicitly or implicitly organizations articulate their value propositions to internal and external audiences (Payne et al., 2017). This is determined by whether CVPs are objectively quantified, calculated, and articulated (Hinterhuber, 2017; Wouters & Kirchberger, 2015) or more subjectively demonstrated, depicted, and described (Keränen, 2017). Currently, most CVPs tend to demonstrate unique, yet unquantified, offering features (Anderson et al., 2006; Bohnsack & Pinkse, 2017; Heikka & Nätti, 2018). Finally, a *granularity* element articulates whether the CVP is formulated at the firm, customer segment, or individual customer level (Payne et al., 2017). Each level has its own implications in terms of other elements, and as the granularity increases, organizations need increasing amounts of customer insight and input to design resonating CVPs (Eggert et al., 2018). While organizations can employ CVPs at multiple levels, most of them tend to prioritize one at a time, usually at the firm level (Payne & Frow, 2014b). Key design elements that form the overarching architecture of CVP are summarized in Table 1, with illustrative examples from current managerial practice and relevant literature.

While a few recent studies (Bohnsack & Pinkse, 2017; Manninen et al., 2018; Patala et al., 2016) have considered how CVPs should be adapted to the circular economy context, they focus almost exclusively on different ways to convey the benefits element, but leave other CVP design elements unexplored. Therefore, current literature provides limited insights on how to adapt the whole architecture of CVPs to the circular economy.

2.3. Innovations as enablers of value creation in circular economy

The circular economy is an innovation-driven phenomenon, and largely driven by the ongoing sustainability transition that influences virtually all actors across different industries and economies (Esposito et al., 2018; Geissdoerfer, Savaget, Bocken, & Hultink, 2017; Spring & Araujo, 2017). Under the sustainability imperative, supplier firms are increasingly encouraged to innovate environmentally friendly products and services (Katsikeas, Leonidou, & Zeriti, 2016; Pujari, Wright, & Peattle, 2003), while consumers, business buyers, and wider societal actors are increasingly paying attention to environmental, ecological, and social purchasing criteria (D'Antone et al., 2017; Kotler, 2011). However, there is a growing evidence that innovating environmentally friendly and sustainable offerings alone is not sufficient condition to differentiate them from traditional alternatives (e.g., Müller, 2012; Olson, 2013; Ramirez et al., 2014; Rokka & Uusitalo, 2008). Instead, to make to sustainable offerings more competitive, and facilitate their adoption in wider value chains and social systems, suppliers should be able to communicate how the sustainable innovations create and deliver value to their customers and relevant stakeholders (Kapitan, Kennedy, & Berth, 2019; Patala et al., 2016).

In the circular economy, sustainability is usually introduced to the markets through different innovations (Prieto-Sandoval, Jaca, & Ormazabal, 2018) that aim to create value fundamentally by improving systemic resource efficiency and circulation of materials (Ghisellini et al., 2016). This can occur through three different mechanisms: Closing resource loops by recycling or reusing discarded materials and/or waste back to the circulation, narrowing resource flows by reducing the amount of resourced needed for a given operation, and slowing resource flows by extending the lifecycle or usage period of specific resources (Bocken et al., 2016).

In the innovation literature, innovations are usually discussed either in terms of processes (how innovation happens), outcomes (what is innovated) (Crossan & Apaydin, 2010), or whether the innovation is focused on resources or practices (Skålén et al., 2015). Usually this is conceptualized in terms of different innovation forms, which typically include product, service, process, and business model innovations (Crossan & Apaydin, 2010). Similar categorization is common in the circular economy literature (Bocken et al., 2016; Prieto-Sandoval et al., 2018), and Table 2 displays how different innovations forms enable value creation t in the circular economy. Current literature indicates that different forms of innovations are necessary to take advantage of the mechanisms of improving systemic resource efficiency, i.e. closing, slowing, and narrowing resource loops (Bocken et al., 2016; Prieto-Sandoval et al., 2018).

Previous B2B marketing literature has emphasized the role of innovations as a key to successful adoption of sustainable and circular economy–oriented business strategies in industrial markets (Spring & Araujo, 2017). For example, Mariadoss, Tansuhaj, and Mouri (2011) show that innovation-based strategies and marketing capabilities are imperative for achieving competitive advantage from environmental sustainability, and Gusmerotti, Testa, Corsini, Pretner, and Iraldo (2019) argue that innovations are key drivers for B2B firms to increase circularity in their businesses. However, despite the central role of innovations as enablers of the circular

[1] In Payne et al. (2017), the *focus* element refers the number and breadth of superior benefits, while the *perspective* elements refers to both the stakeholder roles (supplier-determined, transitional, or reciprocal) as well as the nature of the value promised (value-in-exchange, value-in-experience, or value-in-use). To provide a more granular understanding of the CVP architecture, and clarify the boundaries between different elements, we capture the number and breadth of superior benefits under the *benefits* element (c.f., Anderson et al., 2006), the stakeholder roles under the *perspective* element (Payne et al., 2017), and the nature of the value promised under the *focus* element.

Table 1
Design elements underlying the architecture of a CVP (adapted and expanded from Payne et al. (2017).

CVP design elements	In terms of CVP design, answers to the question:	Exemplified in current CVP literature usually as	Supportive literature
Underlying elements			
Firm´s value creation logic	What is the fundamental value creation logic that the architecture of CVP reflects	Differentiation advantage or cost savings	Lehmann and Winer (1991); Kaplan and Norton (2001)
Core offering	On what resources or capabilities is the CVP built on	Product/service offerings	Anderson et al. (2006)
Key design elements			
Benefits	What kind of benefits CVP emphasizes	Economic benefits, monetary value	Anderson et al. (2006); Rintamäki et al. (2007)
Recipients	To whom the CVP is targeted	Business customers or key decision makers in buyer-supplier dyads	Frow and Payne (2011); Frow et al. (2014)
Perspective	Whether the CVP is a unidirectional and supplier-determined promise of value, or a reciprocal and mutually determined proposal of value	Usually supplier-initiated statements, customers treated mostly as passive recipients	Ballantyne et al. (2011); Kowalkowski et al. (2016); Payne et al. (2017)
Focus	Whether the CVP emphasizes value-in-exchange, value-in-experience, or value-in-use	Superior product features or value embedded in offerings (value-in-exchange)	Ballantyne et al. (2011); Kowalkowski et al. (2012)
Explicitness	How explicitly or implicitly organizations articulate their value propositions to internal and external audiences	Unique, yet unquantified, offering features	Wouters and Kirchberger (2015); Payne et al. (2017); Sakyi-Gyinae and Holmlund (2018)
Granularity	Whether the CVP is formulated at the firm, customer segment, or individual customer level	Emphasis on non-specific firm-level CVPs	Payne and Frow (2014a); Patala et al. (2016)

Table 2
Different innovation forms and how they enable value creation in the circular economy.

Innovation form	As discussed in the innovation literature	As exemplified in the circular economy literature
Product	Products that are perceived as meaningfully new, novel, original, or unique. (Henard & Szymanski, 2001; Wang & Ahmed, 2004)	More durable products, products that are refurbished or recycled, or products that significantly reduce use of materials (Bocken et al., 2016)
Process	"Introduction of new production methods, new management approaches, and new technology that can be used to improve production and management processes." (Wang & Ahmed, 2004, p. 304)	Processes that prevent the generation of waste by facilitating value in products to be maintained or increased. For example, recycling (Ghisellini et al., 2016), remanufacturing (Lieder & Rashid, 2016), and product take-back processes (Lewandowski, 2016)
Service	"New services have been introduced to the market, or existing services have been significantly improved or important changes have been made to their basic characteristics, intangible components, or desired purposes." (Santamaría, Jésus Nieto, & Miles, 2012, pp. 148–149)	Services allow products and materials to maintain their value for longer, or increase the value creation potential of a single product. For example, maintenance services or sharing services (Spring & Araujo, 2017; Tukker, 2015)
Business model	"Business-model innovation occurs when a firm adopts a novel approach to commercializing its underlying assets" (Gambardella & McGahan, 2010, p. 263)	New ways for firms to offer and capture value from reduced sales of new products and materials, for example, pricing products as services with payments through monthly fees. (Goyal, Esposito, & Kapoor, 2018; Ranta, Aarikka-Stenroos, & Mäkinen, 2018).

economy, only a few studies have examined how B2B suppliers can leverage different forms of innovations in CVPs (Lindič & da Silva, 2011; Skålén et al., 2015).

3. Methodology

3.1. Research design

To provide much needed research on the use of CVPs in sustainability and the circular economy (Boons & Lüdeke-Freund, 2013; Manninen et al., 2018; Patala et al., 2016), we employed an exploratory and qualitative multiple case research approach with the aim of building theory from empirical insights (Eisenhardt & Graebner, 2007). An exploratory approach is particularly suitable for identifying emerging topics (Corbin & Strauss, 2014), and a qualitative strategy allows us to elicit holistic insights on complex and multi-layered issues (Yin, 2018), such as the design and architecture of CVPs in the circular economy.

Given the scant number of previous studies that deconstructed CVPs (Payne & Frow, 2014a), and that most empirical CVP studies are limited to single-case designs in specific industries or applications (e.g. Corvellec & Hultman, 2014; Kowalkowski et al., 2012; Payne & Frow, 2014b), there is a need for more comprehensive analyses that take into account multiple industries and offering types. Hence, to address this need, we adopted a multiple case study design to develop holistic insights from an extensive analysis of a wide range of CVPs across multiple industries, offering types, and firm sizes to facilitate rich and robust theory development and improve generalizability of the findings (Eisenhardt & Graebner, 2007; Yin, 2018)

3.2. Data collection

To facilitate theory development, we used purposive and maximum variation sampling logics (Patton, 2015) to identify and select cases that would be particularly revelatory and information-rich in terms of CVPs in the circular economy. Hence, we focused on the documented and publicly available case compilation by the Finnish Independence Fund (SITRA), a national and well-recognized independent expert organization focused on creating and driving awareness about the circular economy in Finland. SITRA´s circular economy case repository includes altogether 102 documented descriptions[2] of CVPs of exemplary, highly

[2] The cases collected and compiled by SITRA are based on interviews with the case firms, and emphasize the case firm´s business model, and how their offering creates value to customers, other stakeholders, and the firm itself. In other words, the cases describe the understanding that the firms have about the value creation potential of their own offering, and their intended CVP and its targeted customer or stakeholder segments.

innovative, frontrunner supplier firms that articulate broadly the innovation underlying the CVP, as well as its value creation potential to various stakeholders. Given our focus on a B2B context, we limited our empirical analysis to 74 CVP descriptions from this group that involved B2B offerings and were developed by a wide variety of Finnish B2B suppliers operating in a wide range of industries (e.g., energy, textile, food, construction) in global markets. The documented CVPs were accessed in April 2018 and saved in a database for further analysis. The total length of analyzed material was 148 pages of single-paged text. An overview of the 74 cases is provided in Appendix A.

Overall, such an extensive and diverse dataset involves CVPs built on different innovations and promise various value outcomes to a diverse set of stakeholders, providing a rich and versatile empirical base for exploratory and deconstructive analysis. As extant research on CVPs rely on interview- and observation-based studies of a small number of cases (Patala et al., 2016; Skålén et al., 2015), our approach of analyzing a large breadth of cases based on documented data extends the methodological approaches used in CVP literature. Furthermore, relying exclusively on publicly available and document-based data improves the transparency, validity, and replicability of the study (Yin, 2018).

3.3. Data analysis

Our data analysis focused on understanding the architecture and innovation forms that were behind the supplier-formulated CVPs in the circular economy. In the first stage, we employed within-case analysis (Eisenhardt & Graebner, 2007) and theoretical coding (Saldaña, 2015) to identify CVP design elements (see Table 1) and different innovation forms in each documented CVP. During this stage, the first author coded initially 30 cases, after which the emerging codes were jointly discussed, and a final, revised coding protocol was agreed upon and devised. After this, the first author recoded all 74 cases, with frequent member checks from the other authors. Due to the large volume of empirical data, we used ATLAS.ti software and Excel spreadsheets to facilitate data analysis, subsequent data categorization, and constant comparison, and ultimately, development of emerging theory from the empirical data (Bazeley & Jackson, 2013).

In the second stage, we employed cross-case analysis (Corbin & Strauss, 2014) to compare the characteristics of the identified design elements from each analyzed CVP, and identify emerging categories of CVPs that shared similar properties. During this process, we simultaneously contrasted the emerging and evolving categories with insights from CVP and circular economy literatures (e.g. Bocken et al., 2016; Payne et al., 2017). This iterative and abductive analytical strategy allowed us to revise and refine emerging empirical and data-driven observations with theory-driven insights, and ultimately, develop a theory that would better match the observed reality (Dubois & Gadde, 2014). For example, during this stage, it became apparent that rather than being characterized by single underlying innovations, CVPs in the circular economy tend to be characterized by alternative value creation logics (resurrect, share, optimize, or replace value), which share similar properties and features in terms of underlying innovation and emphasized CVP design elements. About 80% of the CVPs were characterized relatively distinctly by one primary value creation logic, while about 20% featured elements from two, or sometimes three logics. In cases where CVPs reflected multiple logics, usually one logic was still dominant, and we categorized such CVPs according to the dominant logic, after reaching a mutual conclusion among the authors. In terms of findings, this means that the underlying value creation logics that characterize CVPs in the circular economy are relatively distinct, but not mutually exclusive, and it is possible for a CVP to reflect multiple value creation logics, although in most cases, one logic is clearly dominant an thus most visible in terms of design elements.

In the third stage, we used focused coding (Saldaña, 2015) to identify the CVP design elements and specific innovation forms that were typical to identified value creation logics and to ensure that we had reached data saturation (Corbin & Strauss, 2014). Table 4 in the end of the next section summarizes the results of our analytical process.

To improve the quality and trustworthiness of the findings, we employed several well-established protocols for qualitative research (e.g. Beverland & Lindgreen, 2010; Lincoln & Guba, 1986). First, we improved generalizability and transferability of the findings by analyzing an extensive set of CVPs across multiple industries, offering types, and firm sizes (see Appendix A). Second, we improved reliability and replicability of the findings by carefully describing our analytical process and framework, and by employing publicly available and documented data. Finally, we improved credibility and internal validity of the study by employing researcher- and theory-based triangulation (Flick, 2004).

4. Findings

To explore how B2B suppliers articulate value in the circular economy, we deconstructed the architecture (i.e., the configuration of the design elements) of their documented CVPs, and used cross-case analysis to identify and group similar design elements into emerging categories. As our analysis progressed, it became evident that the architectures of CVPs in the circular economy reflected four relatively distinct and fundamentally different value creation logics: resurrect, share, optimize, and replace value, which are displayed visually in Table 3.

In the following section, we discuss the value creation logics and their characteristic CVP design elements in detail, and provide illustrative examples from empirical data. Table 4 at the end of this section provides a summary of the results.

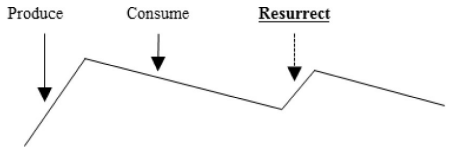
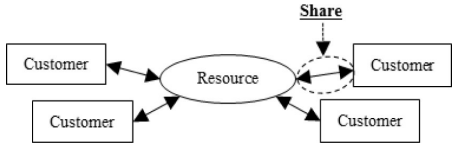
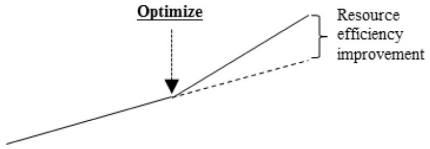
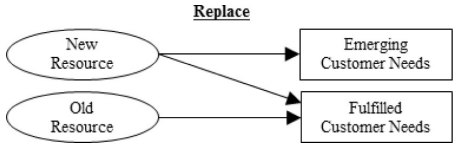
4.1. Resurrect value

The CVPs that emphasized *resurrect value* –logic (hereafter RV-CVPs) were built primarily on product and process innovations that enabled firms to restore used or disposed products and materials through recycling and/or refurbishment and return them to the market For example, by utilizing a novel process for separating plastic from household waste, Fortum (case 22, Appendix A) is able to sell recycled plastics, and by combining used materials, Pa-Ri Materia (case 46) is able to refurbish large volumes of used furniture for reuse. CVPs primarily emphasizing the resurrect value –logic were the most frequent in the dataset, representing 36 out of 74 cases.

RV-CVPs typically emphasize economic and environmental benefits to direct customers and their supply chain partners, especially in terms of lower purchasing prices with equal functionality and reduced/optimized resource usage. The key message that RV-CVPs articulate is that recycled or refurbished offerings are less expensive, yet of sufficient and/or equal quality compared to brand new products, thus alleviating and mitigating the potential low-quality stigma of used, restored, and/or non-new products. For example, Fortum´s (case 22) CVP highlights how recycling waste not only reduces waste management and incineration fees, but is also better for the environment, and Valtra´s (case 69) CVP emphasizes how remanufactured tractor gearboxes are given the same warranties as new products.

RV-CVPs are usually supplier-determined and unidirectional, highlighting novel innovations that the supplier can use to change how and what value is produced to its stakeholders. The customers' role, in turn, remains relatively passive and/or unchanged, as their buying and usage processes remain unaffected by the new CVP. In terms of focus, RV-CVPs tend to highlight equal product features and enhanced customer experiences during usage situations. For example, TouchPoint (case 65) highlights that during usage, the work clothing they produce from recycled materials can help build environmental friendliness into customers' brand image, and after usage, the same clothing can be further recycled into a new set clothing, generating savings in material costs.

Table 3
Core principles of the value creation logics.

Value creation logic	Defining characteristics	Core principle visualized
Resurrect value	Resurrecting the diminished value of resources and returning them to the market	
Share value	Sharing the value of a single resource among multiple customers	
Optimize value	Optimizing the value of a resource for a single customer	
Replace value	Replacing traditional resources with new, higher-value resources	

In terms of explicitness, RV-CVPs featured typically both weak and abstract value quantification: weak in the sense that while they did not calculate or estimate concrete cost savings, they made direct comparisons to alternative offerings in terms of price and functionality; abstract in the sense that they do not measure objective environmental impacts, such as CO2 omissions, but expressed that their offerings helped customers to "boost their green credentials" (CrisolteQ – case 8) and acquire a "sustainable, high-quality solution" that "helps to conserve natural aggregate products" (Destaclean – case 10). RV-CVPs are usually formulated at a customer segment level, addressing industry sectors where the supplier´s customers operate as incumbents, such as agriculture industry for Tracegrow (case 66), and waste management and energy industries for Watrec (case 70).

4.2. Share value

The CVPs that emphasized *share value* –logic (hereafter SV-CVPs) were built primarily on service and process innovations that enabled firms to improve distribution of or access to underutilized assets and resources, such as vehicles, industrial equipment and machinery, and surplus materials, to a broader customer and user base, thereby enhancing efficiency and utility of the existing resource base. The use of digitally enabled innovations was a typical feature of SV-CVPs, as each case in this category included a digital interface that facilitated access to shared resources. For example, by developing a new platform-as-a-service model, Sharetribe (case 54) is able to increase the number of marketplaces for second-hand products, and by offering a platform where customers can track and lease their resources to other firms, eRENT (case 18) increases the return on investment for its customers. CVPs primarily emphasizing the share value –logic were the least frequent in the dataset, representing 9 out of 74 cases.

SV-CVPs typically emphasize economic and functional benefits that are targeted primarily to direct customers and end users, especially in terms of lower upfront costs, easier usage, and increased utility. The key message that SV-CVPs articulate is that customers can enhance utility and usability of and accessibility to specific resources by sharing those resources. For example, Nettix (case 42), which helps customers rent out underutilized products and industrial equipment, emphasizes improved access to a wide range of various machinery, while 24Rent (case 1), a car leasing service, emphasizes eliminated overheads, such as maintenance and insurance costs, and flexible usage by allowing multiple pick-up and return points.

SV-CVPs are usually transitional, as they facilitate the exchange of supplier-determined offerings, but focus on delivering access and usage experiences instead of ownership. In terms of focus, SV-CVPs tend to highlight enhanced customer experiences before, during, and after usage. For example, Maapörssi (case 36) offers a digital platform where construction firms can exchange surplus soil materials; the firm highlights the availability, predictability, and convenience of facilitated exchanges in the platform. In terms of explicitness, SV-CVPs usually feature little to no objective value quantification, but highlight the increased potential for improved usability and access, as well as reduced up-front and maintenance costs. SV-CVPs are usually formulated at a customer segment level, focusing on customers who utilize similar resources. For example, eRENT´s (case 18) CVP highlights benefits to rental agencies and construction firms, while Innorent´s (case 27) CVP emphasizes benefits to local authorities.

4.3. Optimize value

The CVPs that emphasized *optimize value* –logic (hereafter OV-CVPs) were built primarily on service and business model innovations that enable firms to enhance and/or extend resource usage, thereby creating more value from fewer resources or prolonging value creation from the same resources. Most OV-CVPs offered an X-as-a-service type of exchange, where previously sold resources were now sold mostly as capacity for on-demand basis. For example, by combining oil changes and analytics into oil-as-a-service, Fluid Intelligence (case 21) is able to

Table 4
Overview of key value creation logics in the circular economy and their CVP design elements.

CVP design elements				
Value creation logic	Resurrect value	Share value	Optimize value	Replace value
Illustrative cases from data: Firm and the offering	*Fortum (case 22):* Recycled plastic products from waste	*Ekorent (case 14):* A digital platform for leasing shared vehicles	*Fluid Intelligence (case 21):* Oil monitoring and maintenance as a service	*Spinnova (case 58):* Cellulose to replace cotton in textiles
	Pa-Ri Materia (case 46): Refurbished furniture	*Maapörssi (case 36):* A digital platform for exchanging surplus soil	*Lindström (case 35):* Management and leasing of work clothing as a service.	*CrossLam (case 9):* Wood to replace concrete in building materials
	Neste (case 40): bio-diesel from bio-waste		*Valtavalo (case 68):* LED lighting as a service	
Underlying innovation forms	Product & Process Innovations	Service & Business Model Innovations	Process & Business Model Innovations	Product Innovations
Benefits	Economic & Environmental	Economic & Functional	Economic, Functional, & Environmental	Functional, Social, & Environmental
	Equal product quality for a lower price, more efficient resource usage, waste recycling	Improved utility, flexible access & usage	Lower/no investment cost, improved efficiency, decreased environmental impact	Better quality and functionality, ethical and health benefits, reduced environmental impact
Recipients	Direct customers, supply chains, environment	(Resource) users	Direct customers	Direct customers, end users, environment, society
Perspective	Supplier-determined and unidirectional	Transitional	Mutually-determined and reciprocal	Transitional
Focus	Enhanced products	Enhanced customer and usage experiences	Enhanced customer outcomes	Enhanced products and customer experiences
Quantification	Weak and abstract quantification	Little to no quantification	Strong and explicit quantification	Weak and abstract quantification
Granularity	Customer segment level	Customer segment level	Firm level	Customer segment level

optimize oil management for vehicles and power plants. CVPs primarily emphasizing the optimize value –logic represented 15 out of the 74 cases in our dataset.

OV-CVPs typically emphasize economic and functional benefits to direct customers, especially extended usage potential, longer product life cycles, and overall cost savings. The key message that OV-CVPs articulate is that customers can optimize value from existing resources through improved application. For example, Valtavalo (case 68), a LED-lighting provider, highlights how customers can optimize lighting from an equal, if not a lower number of bulbs, and Fluid Intelligence (case 21), how the same amount of oil applied intelligently can last significantly longer.

OV-CVPs are usually mutually determined and reciprocal, as the supplier offers to take care of activities performed previously by the customer, while the customer is expected to relinquish not only the responsibilities, but also information on how, when, and according to what kind of specifications they want them to the performed. In terms of focus, OV-CVPs tend to highlight improved performance outcomes, ease of operations, and reduced risk and capital. For example, Tamturbo (case 63), supplier of compressed air-as-a-service, highlights the elimination of the high investment cost, as well as the delegation of time-consuming repair and maintenance tasks, and Solnet (case 57), an electricity system supplier, emphasizes that it will take care of the design and operation of solar power systems on the customer's behalf.

In terms of explicitness, OV-CVPs featured relatively strong and explicit quantification for many types of benefits, as almost all OV-CVPs highlighted an estimated calculation of the likely range or average percentage of value that customers were expected to gain. For example, LeaseGreen´s (case 33) CVP promises an average 24% reduction in energy costs and overall 120,000-ton reduction in CO2 emissions by 2017, while Enevo´s (case 16) CVP highlights a typical 25-50% reduction in logistical costs, and Fluid Intelligence´s (case 21) CVP a typical 40-80% reduction in oil consumption. OV-CVPs are usually formulated at a firm level, as they highlight customer benefits more broadly, or to multiple potential industries. For example, Fluid Intelligence (case 21) targets all customer segments where oil usage optimization is relevant, and Martela (case 37) and Naava (case 39) any customers who use office space in general.

4.4. Replace value

The CVPs that emphasized *replace value* –logic (hereafter RpV-CVPs) were built primarily on product innovations that enabled firms to replace existing products and/or materials with more valuable alternatives. Compared to the resurrect value logic, which is centered on restoring end-of-life products and promoting refurbished products as being as good as new ones, the replace value logic is centered on replacing existing products altogether, often highlighting that the new substitutes are significantly better than the existing alternatives. For example, Spinnova (case 58) has innovated a more sustainable substitute for cotton to be used in textiles, and CrossLam (case 9) has innovated new construction elements that can be made from wood instead of concrete. CVPs primarily emphasizing the replace value –logic represented 12 out of the 74 cases in our dataset.

RpV-CVPs typically emphasize functional, environmental, and social benefits to direct customers and societal stakeholders, especially in terms of improved products features, decreased environmental impacts, and potential social improvements. The key message that RpV-CVPs articulate is that customers can gain immediate functionality and societal performance improvements by replacing existing resources with their new alternatives. For example, CrossLam´s (case 9) CVP highlights how cross-laminated timber frames can facilitate faster, more convenient, and more environmentally friendly building processes compared to "traditional beam-based frames," and Entocube´s (case 17) CVP emphasizes how insects can be a less expensive and more sustainable raw material for agricultural operators than animal meat.

RpV-CVPs are usually transitional, as they emphasize the delivery of supplier-determined offerings, while highlighting improved customer and/or usage experiences that the replacing products and materials make possible. In terms of focus, RpV-CVPs tend to highlight improved product features and enhanced customer experiences during usage situations. For example, Fescon (case 19) emphasizes longer life cycles

and long-term cost savings from fluidized bedding materials for power plants, and Sulapac (case 61) highlights the easy use and disposal of its wood-based biodegradable packaging material.

In terms of explicitness, RpV-CVPs featured usually both weak and abstract value quantification, as they did not calculate potential cost savings, but made direct comparisons to existing products and materials in terms of functionality and environmental performance. For example, Fescon (case 19) highlights "less erosion" and "lengthened change intervals" when using fluidized boiler bed material instead of traditional materials, and Spinnova (case 58) promises "a lot of water and energy savings" when using cellulose over cotton in textiles. RpV-CVPs are usually formulated at a customer segment level, focusing on specific industries that can benefit most from the replaceable materials.

5. Discussion

In this study, we analyzed how B2B suppliers use CVPs to articulate value in the circular economy. In this section, we discuss the key observations and distinctive insights that emerged from the empirical analysis.

5.1. The role of innovations in different value creation logics in the circular economy

Sustainability-driven innovations are usually considered the key means of creating value in the circular economy (Prieto-Sandoval et al., 2018), but previous research has provided only a few insights into the differential effects of different innovation forms on value creation (c.f. Boons & Lüdeke-Freund, 2013). The findings from this study shed more light on the underlying effects of specific value creation logics in the circular economy.

For example, resurrect value –logic leverages product and process innovations to bring back disposed resources that would otherwise be considered waste, such as recycled plastics, and refurbished machinery. In terms of circularity, this logic aims to generate value primarily by closing different resource loops. The underlying innovations in the CVPs that reflected this logic often focused on specific resources, such as organic waste or recycled materials, and featured usually relatively modest or moderate innovations, such as recycled clothing or refurbished equipment that brought the previously disposed resource back into circulation. *To leverage the resurrect value logic, the supplier must be able to regenerate the value of used and usually "worthless" resources cost-efficiently, as evidenced by the importance of economic benefits in CVPs that emphasized this logic.* Compared to existing literature, the resurrect value logic resonates with the principles of the circular economy (Ghisellini et al., 2016), as it is focused on finding innovative ways to reuse and recycle used and disposed resources.

Share value –logic leverages service and business model innovations to make an underutilized resource available to multiple actors. In terms of circularity, this logic aims to generate value primarily by narrowing the resource flows. The underlying innovations in CVPs that reflected this logic focused primarily on new use practices, such as equipment sharing or machine renting, and usually featured relatively novel and radical innovations, such as rental services or digital platforms that enabled actors to use the same resource in new and innovative ways. *To leverage the share value logic, the supplier must be able to enable B2B customers to move from ownership to use of shared resources in practice through a) delivering resources to the right place at the right time through services, or b) facilitating customers to exchange resources through a platform.* Compared to existing literature, the share value logic resonates with the principles of the sharing economy, which emphasizes the role of peer-to-peer transactions and community platforms to maximize the value of idle or underutilized assets (Belk, 2014).

The optimize value logic leverages process and business model innovations to derive more value from a specific resource(s) for a single customer. This reduces underutilization of resources, but through optimizing a resource use for a single actor, rather than spreading the resource to multiple actors. In terms of circularity, this logic aims to generate value primarily by narrowing resource flows by improving the efficiency and output of specific resources. The underlying innovations in CVPs that reflected this logic focused primarily on new use practices and business models, where the supplier assumes responsibility for activities previously performed by the customer. This logic featured usually relatively moderate business model innovations, such as clothing- or lighting-as-a-service models, where the actual use practices did not change as much, but responsibility shifted from the customer to the supplier, which could often perform them more efficiently. *To be able to leverage the optimize value logic, the supplier must have a deep understanding of the customers' processes, and be able to demonstrate how the customer can get more value from a resource.* Compared to existing literature, the optimize value logic seems to resonate with the principles of servitization (Kowalkowski, Gebauer, & Oliva, 2017; Spring & Araujo, 2017), which is focused on innovating new service-based offerings that provide added value to customers.

The replace value logic leverages product innovations to replace existing products or components with new materials that have longer life cycles and/or extended utilization periods. In terms of circularity, this logic aims to generate value primarily by slowing resource flows and prolonging use periods. The underlying innovations in CVPs that reflected this logic focused almost exclusively on novel resources, such as alternative building materials or renewable energy, and thus, usually featured radical innovations. *To leverage the replace value logic, the supplier must have a profound understanding on the implications of using different resources and/or materials in customers' processes, and acknowledging their impact on sustainability.* Compared to existing literature, the replace value logic seems to resonate with the principles of traditional product marketing (Kotler & Armstrong, 2018), which is focused on innovating better products or more functional product features. Table 5 summarizes the key characteristics of each value creation logic.

Overall, the replace and optimize value logics are relatively well

Table 5
Overview of the key characteristics of different value creation logics in the circular economy.

Key value creation logics in the circular economy	Underlying innovation forms	Circularity goal	Focus of innovation	Scope of innovation	Links to contemporary B2B literature
Resurrect value	Product & Process	Closing resource loops	Resource (Converting waste to a resource)	Modest/Incremental	Circular economy
Share value	Service & Business Model	Narrowing resource loops	Practice (New usage practices)	Novel/radical	Sharing economy
Optimize value	Process & Business Model	Narrowing resource loops	Practice (New operating practices)	Incremental/Moderate	Servitization
Replace value	Product	Slowing resource loops	Resource (More sustainable materials)	Radical	Product marketing

aligned with traditional B2B marketing literature. For example, the optimize value relies on close relationships with customers, which is very typical for relationship marketing literature (Morgan & Hunt, 1994). The replace value logic relies on deep understanding of customers' value-in-use (Grönroos, 2011). In contrast, the resurrect and value logics rely more heavily on facilitating better resource circulating, making them more closely aligned with circular economy literature.

5.2. Key differences between CVPs in the linear and the circular economy

The key differences between CVPs in the linear and the circular economy seem to relate to scope and perspective. In other words, CVPs in the linear economy tend to be relatively inward-looking and supplier-driven, as they are built around existing offerings that require little customer input. The CVPs emphasize improved value-in-exchange opportunities to specific business customers that are realized through superior product features, and deliver primarily economic or functional benefits. In contrast, CVPs in the circular economy tend to be outward-looking and market-driven, as they are built around novel innovations that require active participation from not only direct customers but also broader ecosystem actors. Furthermore, CVPs in the circular economy tend to emphasize new value-in-use opportunities for broader societal stakeholders that are realized through enhanced customer and usage experiences, and deliver environmental and socioeconomic value.

Overall, the distinctive features of CVPs in the circular economy compared to the linear economy seem to be well aligned with contemporary marketing literature, which increasingly emphasizes that CVPs should be actively co-created with multiple stakeholders in broader societal ecosystems (Chandler & Lusch, 2015; Frow et al., 2014). Table 6 provides a summary of the key differences between CVPs in the linear and the circular economy in terms of design elements.

5.3. CVPs as strategic tools for changing needs in the market and society

In the linear economy, CVPs have been traditionally considered supplier firms' most important strategic tools for communicating value primarily to target customers, and secondarily, albeit often tangentially, to broader stakeholders (Ballantyne et al., 2011; Payne et al., 2017). However, this view tends to be very supplier-determined, and emphasizes the value that is embedded in the supplier´s offering and is delivered to (passive) customers (Eggert et al., 2018).

In contrast, in the circular economy, the role of the CVPs shifts from narrow and supplier-determined promises of value to broader strategic messages that communicate how individual customers, related value chains, and the wider society could co-create value, if they were to adopt new innovations and related novel use practices. In other words, in the circular economy, CVPs seem to function as strategic tools that suppliers can, and do, use to actively influence, facilitate, and shape the needs in the broader market and at the societal level. This view is well in line with emerging research that considers the role of CVPs in market-scripting (Storbacka & Nenonen, 2011) or market-driving strategies (Nenonen, Storbacka, Frow, & Payne, 2015), and shifting narrow and economic cost-benefit analyses in the private sector to broader public value assessments (c.f. D'Antone et al., 2017; Nailer, Prior, & Keränen, 2019).

An important consideration is that most of the new value that CVPs in the circular economy offer can be unlocked only if multiple customers or broader ecosystems—not only individual customers—are willing to adopt the innovations that are needed to realize the underlying sustainable value potential. This makes CVPs in the circular economy genuinely reciprocal (Ballantyne et al., 2011), and shows empirically how CVPs operate as invitations from actors to other actors to engage in value co-creation in service systems (Chandler & Lusch, 2015; Frow et al., 2014).

6. Conclusions

6.1. Contributions and theoretical implications

The findings of this study contribute to three priority areas in current research. First, this study contributes to contemporary CVP literature (Eggert et al., 2018; Payne et al., 2017) by broadening the extant research, which has thus far focused primarily on the linear economy, and illuminating how CVPs manifest in the circular economy. Previous CVP studies have focused on single-case studies in specific industries (e.g. Corvellec & Hultman, 2014; Payne & Frow, 2014b). We expand this perspective by conducting an extensive analysis of 74 documented CVPs in the circular economy across multiple industries and offering types, therefore providing a comprehensive and holistic picture of the variations of CVPs in the circular economy. Specifically, we theoretically analyze and empirically deconstruct the architecture of CVPs that firms use in the circular economy. This study provides novel empirical insights into how CVPs in the circular economy are built on sustainability-driven innovations, and how firms use different CVP design elements to articulate novel value creation opportunities to customers and other stakeholders. Overall, these findings respond to several recent calls to provide a more transparent understanding of CVP elements and their configurations that promise superior value to customers (Bohnsack & Pinkse, 2017; Payne & Frow, 2014a).

Furthermore, previous studies have highlighted the need to understand how firms can design CVPs that consider environmental and social elements as a key priority (Bohnsack & Pinkse, 2017; Payne et al., 2017). To address these calls, and expand the current literature, we identify four typical value creation logics that characterize CVPs in the circular economy. Each value creation logic is built on different combinations of sustainability-driven innovations, embodies different CVP design element configurations, and highlights alternative ways to include, articulate, and signal different environmental and social elements in CVPs. This expands the current literature on sustainable value propositions (e.g., Patala et al., 2016), where the primary focus has been on the need to expand benefits and recipients, without consideration of other design elements of a CVP.

Second, this study contributes to the industrial marketing literature by demonstrating how B2B suppliers can leverage sustainability in their value communication efforts. While extant industrial marketing literature has emphasized that sustainability is a major source of competitive advantage in B2B markets (Sharma, Iyer, Mehrotra, & Krishnan, 2010; Spring & Araujo, 2017) scholars have primarily focused on how suppliers can innovate (Mariadoss et al., 2011; Varadarajan, 2017), and co-create (Lacoste, 2016), sustainable offerings with their customers and stakeholders. In contrast, only a few studies have examined how B2B suppliers can communicate the benefits of adopting their sustainable offerings to various stakeholders (c.f. Patala et al., 2016), but most of this literature is focused on branding or positioning strategies (Kapitan et al., 2019; Kumar & Christodoulopoulou, 2014; Scandelius & Cohen, 2016). The findings from this study complement previous research by showing how B2B suppliers use CVPs to communicate how the suppliers will (co-)create sustainable value for and with their customers and broader stakeholders. Compared to branding and/or positioning strategies, which usually emphasize an internal intended perspective, relatively intangible benefits, and a values-driven communication approach (c.f. Kumar & Christodoulopoulou, 2014), CVPs emphasize an external perspective, relatively tangible benefits, and a value-driven communication approach. In other words, whereas sustainable branding and/or positioning strategies may communicate that the

Table 6
Summary of the key differences between CVPs in the linear and the circular economy.

CVP design elements	In terms of CVP design, answers the question:	CVPs in linear economy	CVPs in circular economy
Underlying elements			
Firm's value creation logic	What is the fundamental value creation logic that the architecture of CVP reflects?	Differentiation advantage or cost savings	Resurrecting, sharing, optimizing, or replacing value
Core offering	On what resources or capabilities is the CVP built on?	Product/service offerings	Product, service, process, or business model innovation
Key design elements			
Benefits	What kind of benefits CVP emphasizes	Economic benefits, monetary value	Economic, environmental functional, and social benefits Environmental and socio-economic value
Recipients	To whom the CVP is targeted	Business customers or key decision makers in buyer–supplier dyads	Business customers, value chain partners, end users, and other stakeholders in broader societal ecosystems
Perspective	Whether the CVP is a unidirectional and supplier-determined promise of value, or a reciprocal and mutually determined proposal of value	Usually supplier-initiated statements, customers treated mostly as passive recipients	Usually mutually determined proposals, customers, and other ecosystem actors treated as active participants
Focus	Whether the CVP emphasizes value-in-exchange, value-in-experience, or value-in-use	Superior product features or value embedded in offerings (value-in-exchange)	Enhanced customer, outcome, and usage experiences (value-in-use)
Explicitness	How explicitly or implicitly organizations articulate their value propositions to internal and external audiences	Unique, yet unquantified offering features	Enhanced, yet mostly unquantified, customer and use experiences
Granularity	Whether the CVP is formulated at the firm, customer segment, or individual customer level	Emphasis on non-specific firm-level CVPs	Emphasis on customer-segment level

supplier is sustainable, CVPs articulate in detail how the supplier's sustainability can be translated into relevant economic, environmental, and social benefits for customers and other stakeholders, and how these benefits are realized.

Third, this study contributes to circular economy literature by illustrating how B2B suppliers can use CVPs to facilitate a systematic transition toward the circular economy. The extant circular economy literature has examined how innovations (de Jesus, Antunes, Santos, & Mendonça, 2016; Prieto-Sandoval et al., 2018) and circular business models (Goyal et al., 2018; Lewandowski, 2016; Ranta, Aarikka-Stenroos, & Mäkinen, 2018) can help to drive the transition toward the circular economy. However, scholars have rarely investigated the role of CVPs in this process (Boons & Lüdeke-Freund, 2013). To fill this gap, the findings from this study illuminate how suppliers articulate CVPs that reflect four fundamentally different value creation logics in the circular economy, and communicate how alternative logics deliver sustainable value for different stakeholders in the wider (eco)system. Furthermore, by illuminating the key differences between CVPs in the linear and the circular economy, this study develops new insights on how actors in the linear economy can "embed circular economy principles into their value propositions," which remains an important, but little understood, issue in contemporary circular economy research (Manninen et al., 2018).

6.2. Managerial implications

From a managerial perspective, this study offers several important insights into designing CVPs that highlight sustainability elements, which are likely to resonate with customers and broader stakeholders in the circular economy. First, the results illustrate that CVPs in the circular economy go beyond distinct product-service offerings and monetary benefits, and communicate how novel and often sustainability-driven innovations can unlock new value creation opportunities for diverse stakeholders in terms of wider economic, functional, environmental, and social benefits. However, to capitalize these new value creation opportunities, suppliers must emphasize several elements in the CVPs that communicate what kind of new value outcomes different stakeholders can expect, and how they will experience and realize them.

To help firms design CVPs in the circular economy, Tables 4 and 6 provide easily accessible managerial templates that can be used to analyze whether and how different elements are (or could be) visible in the firm's current CVP. For example, Table 4 illuminates how firms following alternative value creation strategies in the circular economy use specific CVP elements to communicate value, and is likely most useful to firms already operating in the circular economy. Table 6 illustrates the key differences between CVPs in the linear and the circular economy. This provides guidance on how different CVP elements change when firms shift their focus to the circular economy, and is likely most useful to firms that want to transition from the linear to the circular economy.

Second, this study indicates that CVPs in the circular economy usually reflect one of four alternative, and sustainability-driven value creation logics (resurrect, share, optimize, and replace value), and emphasize the key CVP design elements that characterize each logic (see Table 4). Managers who wish to convey sustainable or circular elements in CVPs should carefully consider which of the value creation logics they aim to follow, and ensure that their CVPs embody the design elements that resonate with the corresponding logic. This may require a drastic shift in the managerial mindset, as the value creation strategies in the circular economy emphasize novel innovations and active stakeholder participation in the external system, rather than internal offerings and passive customer insights.

Furthermore, given the relatively distinct nature of each strategy, managers might be best off by following one primary strategy, instead of trying to master many. For example, the resurrect and replace value logics involve product innovation–oriented and passive customer input elements, while the share and optimize value-oriented logics involve business model–oriented innovation and active customer input elements. In our empirical data, most of the CVPs reflected only one primary value creation logic, and this is likely because different logics were built on different innovation forms, circularity goals, and supplier capabilities (see Table 5). Thus, adopting multiple value creation logics is likely to be very resource-intensive, and has the potential downside of diluting the firm's differentiation ability and the accumulation of expertise in specific areas.

Third, the analysis revealed that the alternative value creation logics are not based on single forms of innovations, but instead, on

different combinations of product, service, process, and business model innovations that offer either new and enhanced resources or resource use practices (c.f. Skålén et al., 2015). This suggests that managers seeking to introduce or integrate new sustainability-driven innovations in their B2B offerings and CVPs should not focus on single forms of innovations (i.e., material recycling), but instead, aim to combine and bundle different innovations together to create and facilitate more holistic value experiences and outcomes value for customers and other stakeholders.

Finally, we observed two under-utilized opportunities in the analyzed CVPs in the circular economy. First, although several CVPs communicated a broad range of economic, functional, and environmental benefits to various stakeholders, only a few stressed social benefits, such as ethical or health-related outcomes. Given the increasing importance of social buying criteria in contemporary markets (Kotler, 2011; Porter & Kramer, 2011), this finding suggests that communicating social benefits in CVPs is currently an undercapitalized, yet relatively low-hanging, differentiating opportunity for many B2B suppliers. Second, although explicit value quantification is at the heart of CVPs in B2B markets, and a key tactic for reducing customers' buying anxiety (Anderson et al., 2006; Terho et al., 2012), most of the analyzed CVPs in the circular economy included low or no quantification elements. This suggests that increasing the explicitness and value quantification element should be one of the first, and likely one of the most effective ways to improve and strengthen current CVPs in the circular economy.

6.3. Limitations and suggestions for future research

Given that this study is exploratory, and based on a document analysis of publicly available CVPs of circular economy–driven Finnish B2B suppliers, the study has natural limitations, some of which open up potential avenues for future research. First, the analysis focused on the CVPs of a purposefully sampled set of B2B suppliers, and this might limit the findings. However, as we analyzed an extensive set of CVPs from multiple firms and industries, it seems likely that most of the findings can be generalized to some extent to other industries and geographic contexts. To expand the findings and the contemporary CVP literature, future studies could compare how firms use CVPs in the circular economy in different business, geographic, and cultural contexts. For example, the data allowed us to identify four emerging value creation logics in the circular economy. However, these logics are by no means exhaustive, but more likely illustrative of the strategies that B2B firms employ in the Finnish circular economy context. Other value creation strategies that emphasize aspects that were scarcely visible in the data, such as ethical or medical considerations (c.f. Frow, McColl-Kennedy, & Payne, 2016), might be feasible, and thus of interest for future research. More broadly, firms operating in business-to-business, business-to-consumer, and business-to-government contexts, or in different geographical markets, such as Europe, the US, and China (c.f. Ranta, Aarikka-Stenroos, Ritala, & Mäkinen, 2018), are likely to employ drastically different business, institutional, sustainability, and value creation logics. Comparing the implications to CVPs would be a highly important and interesting research avenue.

Second, we applied a document analysis, which enabled us to capture and analyze a broad range of diverse CVPs in written, fixed, and predetermined form. This allowed us to portray a rich picture of B2B suppliers' current CVPs in the circular economy, but this provides only a static perspective, and limited insights into how and why firms have constructed specific CVPs in the circular economy. Therefore, future studies could employ in-depth case studies and longitudinal observations to shed more light on how and why firms develop and communicate specific CVPs in the circular economy, and how firms alter different CVP elements as a response to different customer and market reactions.

Third, although CVPs play an important role as a firm's key strategic tools for communicating value to external stakeholders, aligning internal activities, and shaping broader markets (Payne et al., 2017), the analysis focused mostly on the CVPs' role as external value communication devices. Thus, future studies could adopt a firm-level perspective, and employ deep single-case or action research studies to examine how CVPs in the circular economy facilitate changes in firms' internal innovation activities toward sustainable and market-driven offerings. Another interesting alternative could be to adopt an ecosystem-level perspective (Aarikka-Stenroos & Ritala, 2017), and explore how firms employ CVPs to drive and shape other actors' behaviors in linear economy–oriented systems toward the circular economy, and how other actors in the same systems experience, perceive, and react to different CVPs.

Fourth, while firms can make firm-, segment- and customer-level CVPs (Payne et al., 2017), our findings revealed only firm- and customer segment level CVPs in CE. This is likely due to the nature of our data, which is drawn from a publicly available case repository of innovative and best practice exemplars, and fundamentally, based on supplier-driven and static descriptions of CVPs. In contrast, customer-level CVPs are usually negotiated, co-created, and revised together with the customers, requiring direct customer input. In addition, customer-level CVPs should ideally involve explicit quantification of key differentiators and cost drivers (c.f. Anderson et al., 2006), which is both sensitive and competitive information, and as such, unlikely to be displayed in a puclicly available material. Consequently, an interesting avenue for future research would be to explore how suppliers co-create customer-level CVPs in CE together with their customers, what kind of inputs different stakeholders infuse to this process, and how the expectations and perceptions, as well as the actual content of the CVP evolve over the course of supplier-customer engagements.

Finally, we employed qualitative research methods to explore how B2B suppliers articulate CVPs in the circular economy. Although the purposive sample included documented examples of successful CVPs in multiple industries, the findings provide only limited insights in terms of the effectiveness of the analyzed CVPs. Therefore, an important area for future research would be to employ quantitative research methods and cross-sectional surveys to explore the potential performance effects of different CVPs in a circular economy. Another interesting, and highly relevant, avenue would be to use field experiments and conjoint analyses to compare when and under what conditions different customers prefer CVPs that emphasize alternative value creation logics, and/or different design elements.

Overall, although there is a growing body of research on CVPs in the linear economy (c.f. Payne et al., 2017), their role in the sustainability-driven circular economy remains an increasingly important, yet little understood and critically underexplored, area. We hope that this study encourages further research and empirical inquiries into this phenomenon, especially in the B2B domain, which takes into account the broader effects of CVPs across value chains, networks, and societal ecosystems (Vargo & Lusch, 2011).

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Appendix A

Case	Offering	Industry	Firm size	Revenue
1. 24Rent	Rental of shared cars	Car rentals	1-10 personnel	1-50 M€
2. 3Step IT	IT equipment life-cycel management service	Information Technology Services	over 250 personnel	over 50 M€
3. Amerplast	Recycled plastic bags	Plastics; Packaging	over 250 personnel	over 50 M€
4. Aquazone	Waste water treatment plants	Waste treatment	1-10 personnel	1-50 M€
5. Arctic Biomaterials	Bio-based plastic	Materials	10-250 personnel	less than 1 M€
6. Betulium	Polymers from agricultural waste	Biotechnology	1-10 personnel	less than 1 M€
7. BioGTS	Biodiesel plant	Energy	10-250 personnel	1-50 M€
8. CrisolteQ	Turning metal and mining industry waste streams into recycled products	Recycling	10-250 personnel	less than 1 M€
9. CrossLam	Wooden construction elements	Construction	10-250 personnel	1-50 M€
10. Destaclean	Construction material from recycled wood fibre	Construction	10-250 personnel	1-50 M€
11. Durat	Interior design materials from plastic waste	Chemical stone products	10-250 personnel	1-50 M€
12. Ecolan	Organic fertilisers	Forest management	10-250 personnel	1-50 M€
13. Eko-expert	Recycled mineral wool	Construction	10-250 personnel	1-50 M€
14. Ekorent	Rental and sharing service for electric cars	Transportation and logistics	1-10 personnel	less than 1 M€
15. Ekox	Used IT equipment	Information Technology Services	10-250 personnel	less than 1 M€
16. Enevo	Waste Management optimization with internet-of-things	Information Technology	10-250 personnel	1-50 M€
17. Entocube	Equipment and automation solutions for insect production	Agriculture	1-10 personnel	less than 1 M€
18. eRENT	Service platform for sharing industrial assets	Software	1-10 personnel	less than 1 M€
19. Fescon	Fluidised bed material for power plants	Materials	10-250 personnel	1-50 M€
20. Finsect	Insect farming technology	Agriculture	1-10 personnel	less than 1 M€
21. Fluid Intelligence	Machinery lubrication as a service	Machinery	1-10 personnel	less than 1 M€
22. Fortum	Recycling, sorting and processing plastics into recycled material	Waste treatment	over 250 personnel	over 50 M€
23. Gasum	Biogas and nutrients	Energy	over 250 personnel	over 50 M€
24. Globe Hope	Clothing and accessories from surplus textiles	Textile	10-250 personnel	N/A
25. Gold & Green	Plant protein from oats and legumes	Food	10-250 personnel	1-50 M€
26. Infinited Fiber	Textile from recycled fibres	Textile; Chemical	1-10 personnel	less than 1 M€
27. Innorent	Movable rental facilities	Construction	1-10 personnel	less than 1 M€
28. Jarmat	Biodegradable lubricating oil	Chemical products	1-10 personnel	1-50 M€
29. Kekkila	Fertilisers from organic waste	Horticulture	10-250 personnel	over 50 M€
30. Konecranes	Warehouse management as a service	Mechanical engineering; manufacture of lifting equipment	over 250 personnel	over 50 M€
31. Kotkamills	Biodegradable paper cups and packaging	Manufacture of paper and cardboard products	over 250 personnel	over 50 M€
32. Lassila & Tikanoja	Solution for reducing food waste	Waste treatment	over 250 personnel	over 50 M€
33. LeaseGreen	Energy-efficiency solutions for buildings	Heating, plumbing, and air-conditioning installation	10-250 personnel	1-50 M€
34. LemKem	Lighting as a service	Electrical equipment	10-250 personnel	1-50 M€
35. Lindström	Work uniforms as a service	Textile rental	over 250 personnel	over 50 M€
36. Maapörssi	A recycling service for surplus excavation material	B2B administrative and support services	1-10 personnel	1-50 M€
37. Martela	Work environment as a life cycle service	Furniture	over 250 personnel	over 50 M€
38. Metener	Small-scale organic waste treatment plants	Technical services	1-10 personnel	1-50 M€
39. Naava	Green walls as furniture	Health technology	10-250 personnel	1-50 M€
40. Neste	Diesel from waste and residues	Oil; Energy	over 250 personnel	over 50 M€
41. Netled	Multi-layer farming solutions	Electrotechnical design; agriculture	1-10 personnel	1-50 M€
42. Nettix	Marketplace for renting a variety of products	Software	10-250 personnel	1-50 M€
43. Novarbo	Vertical farming solutions	Agriculture	10-250 personnel	1-50 M€
44. Palpa	Deposit-based recycling system for drinks packaging	Services	10-250 personnel	over 50 M€
45. Paptic	Bio-based material from cellulose	Materials	10-250 personnel	less than 1 M€
46. Pa-Ri Materia	Used office furniture	Furniture	10-250 personnel	1-50 M€
47. Ponsse	Reuse of old machinery in spareparts	Forestry machinery	over 250 personnel	over 50 M€
48. PureWaste	Recycled material and garments from textile waste	Manufacture of garments and accessories	1-10 personnel	1-50 M€
49. Raisioagro	Fish feed from local fish species	Agriculture	10-250 personnel	N/A
50. Rakeistus	Technology or service for recycling biowaste to fertiliser	Mechanical engineering; Industrial machinery	1-10 personnel	1-50 M€

51. RePack	Reusable postal packaging as a service	Packaging	1-10 personnel	less than 1 M€
52. ResQ	Marketplace for surplus food	Software	10-250 personnel	less than 1 M€
53. Robbes	Smart greenhouses	Horticulture	10-250 personnel	1-50 M€
54. Sharetribe	Service to establish a marketplace website	Software	10-250 personnel	less than 1 M€
55. Silmusalaatti	Sustainably grown salad sprouts	Agriculture	1-10 personnel	less than 1 M€
56. Soilfood	Recycled nutrients for agriculture	Agriculture	10-250 personnel	1-50 M€
57. Solnet	Solar power systems as a service	Electricity sales	1-10 personnel	1-50 M€
58. Spinnova	Textile fibre from cellulosic mass	Textile	1-10 personnel	less than 1 M€
59. SRHarvesting	Recycled parts of repairing tractors	Farming and forestry machinery trade	10-250 personnel	1-50 M€
60. St1	Ethanol from organic waste	Oil; Energy	over 250 personnel	over 50 M€
61. Sulapac	Wood-based packaging for cosmetics	Packaging	1-10 personnel	less than 1 M€
62. Suomen Savupiipputeollisuus	Chimney bricks from recycled materials	Construction	1-10 personnel	less than 1 M€
63. Tamturbo	Compressed air as a service	Compressor manufacturing and sales	10-250 personnel	1-50 M€
64. Tarpaper	Asphalt raw material from roofing felt	Recycling	1-10 personnel	1-50 M€
65. TouchPoint	Work clothing service	Textile	1-10 personnel	1-50 M€
66. Tracegrow	Minerals from recycled alkeline batteries	Manufacture of basic non-organic chemicals	1-10 personnel	less than 1 M€
67. UPM	Biocomposites from plastic waste	Laminate manufacturing; Forestry	over 250 personnel	over 50 M€
68. Valtavalo	Led lighting as a service	Electrical equipment	10-250 personnel	1-50 M€
69. Valtra	Remanufactured tractor gearboxes	Machinery	over 250 personnel	over 50 M€
70. Watrec	Biogas plants	Environmental technology	10-250 personnel	1-50 M€
71. Venuu	Marketplace for renting event venues	Services	10-250 personnel	less than 1 M€
72. Versofood	Vegetable protein from whole broad beans	Wholesale and retail	1-10 personnel	1-50 M€
73. Wimao	Biocomposite products from recycled materials	Manufacturing	1-10 personnel	less than 1 M€
74. ZenRobotics	Waste-sorting robot	Waste treatment technology	10-250 personnel	1-50 M€

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