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Master's Thesis

**Challenges and drivers for circular economy implementation during
buildings' middle-of-life phase**

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ABSTRACT

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Circular economy concept has gained credence in academia, business and politics, because it is proposed to be a practical model to address both environmental and economic aspects in business. The model based on idea of circular material flows, where nothing ends up as waste but is reused repeatedly. Previous circular economy literature has focused on short-lived products. Therefore, this thesis is narrowed down to building's middle-of-life phase, that covers majority of the total life-cycle of a building, being tens or hundreds of years. It is clear, that more research is needed to find out how circular economy can be implemented in property sector, which takes care of buildings' middle-of-life phase. Thus, this paper focuses on discovering the challenges and drivers for circular economy implementation in Finnish property sector. In addition, opportunities for value creation in circular economy model are examined by including sustainable value creation and role of stakeholders to the research scope. Moreover, the matter if circular economy promotes sustainability is addressed, as scholars debate whether social dimension is ignored in the model or not. The study is conducted qualitatively by using grounded theory approach. Thesis is executed in cooperation with Lassila&Tikanoja company, whose employees and stakeholders from property sector were interviewed in empirical part. The findings indicate that property sector has a lot of potential from circular economy perspective, and by implementing circular economy, companies can enhance their sustainability. Set of new challenges and drivers for implementation were revealed and the most pivotal aspects are level of digitalization, sustainability of the business model and co-creation of value. In the findings, the circle model is formed to support implementation of circular economy and sustainable value creation in building's middle-of-life phase. The co-creation of value -method holds significant role in this model, emphasising all stakeholders as co-creators of sustainable value.

TIIVISTELMÄ

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Kiertotalous konsepti on kerännyt huomiota niin tieteen, liiketoiminnan kuin politiikankin saralla, sillä se nähdään käytännöllisenä mallina, joka huomioi sekä ympäristölliset että taloudelliset näkökulmat liiketoiminnassa. Malli perustuu ajatukseen materiaalikierroista, joissa ei synny hukkaa, vaan materiaalit käytetään toistuvasti uudelleen. Aiempi kiertotalous kirjallisuus on syventynyt lyhyen elinkaaren omaaviin tuotteisiin. Siksi tämä tutkimus keskittyy rakennuksiin ja niiden elinkaaren keskivaiheeseen, joka kattaa suurimman osan rakennusten koko elinkaaresta, ollen kymmeniä tai satoja vuosia. Kirjallisuus osoittaa, että lisää tietoa tarvitaan siitä, kuinka kiertotaloutta voidaan toteuttaa kiinteistöalalla, joka huolehtii elinkaaren keskivaiheesta. Täten, tämä tutkimus keskittyy selvittämään kiertotalouden toteuttamiseen liittyviä haasteita ja ajureita suomalaisella kiinteistöalalla. Myös mahdollisuuksia arvonluontiin kiertotalous mallissa kartoitetaan ja siksi kestävä arvonluonti ja sidosryhmien rooli on sisällytetty tutkimuskenttään. Lisäksi tutkimus selvittää edistääkö kiertotalous kestävä kehitystä, koska edelleen puhututtaa jääkö sosiaalinen ulottuvuus kiertotalous mallissa huomiotta. Tutkielma on toteutettu laadullisena tutkimuksena, joka käyttää grounded theory -menetelmää. Se on tehty yhteistyössä Lassila&Tikanoja yrityksen kanssa, jonka työntekijöitä ja sidosryhmä edustajia on haastateltu empiirisessä osassa. Tulokset osoittavat, että kaiken kaikkiaan kiinteistöalalla on paljon potentiaalia kiertotalousnäkökulmasta ja toteuttamalla kiertotaloutta yritysten on mahdollista parantaa kestävyytään. Joukko haasteita ja ajureita kiertotalouden toteutukselle on tunnistettu ja niistä tärkeimmät liittyvät digitalisaation asteeseen, liiketoiminta mallien kestävyteen ja yhteistoiminnalliseen arvonluontiin. Tulosten pohjalta on laadittu ympyrämalli, joka on suunnattu tukemaan yrityksiä kiertotalouden toteuttamisessa ja kestävä arvon luonnissa rakennusten elinkaaren keskivaiheessa. Yhteistoiminnallinen arvonluonti menetelmä on tärkeässä osassa ympyrämallissa ja se korostaa sidosryhmien roolia arvon kanssaluojina.

Table of contents

1	INTRODUCTION	8
1.1	Research background	8
1.1.1	Research context	12
1.2	Research gap.....	13
1.3	Research questions, objectives and limitations	16
1.4	Research structure	17
2	THEORETICAL BACKGROUND	19
2.1	Circular economy: theoretical development, and impact on business practices	19
2.1.1	The concept of circular economy and its development.....	20
2.1.2	Implementation of circular economy	25
2.2	Sustainable value creation	28
2.2.1	The concept of sustainable value	29
2.2.2	Sustainable business models	31
2.2.3	Stakeholder theory and sustainable value creation	36
2.2.4	Co-creation of value.....	41
2.3	Sustainable value creation in circular economy context	42
2.3.1	Circular business models	44
2.3.2	Challenges of circular economy implementation.....	51
2.3.3	Drivers of circular business models and system change implementation.....	55
3	THEORETICAL FRAMEWORK OF THE STUDY	58
4	FINNISH PROPERTY SECTOR IN THE CONTEXT OF CIRCULAR ECONOMY	59
4.1	Challenges and opportunities	60
4.2	Stakeholders	61

4.3	Implementation.....	63
5	RESEARCH APPROACH AND METHOD.....	66
5.1	Research context: Property sector in Finland.....	68
5.2	Data collection.....	69
5.3	Data analysis: Grounded theory method	71
5.4	Validity and reliability.....	72
6	FINDINGS	75
6.1	Digitalization	76
6.2	Sustainability of business model	84
6.3	Co-creation of value	90
6.4	Research outcomes: model for implementing circular economy in the property sector	97
7	DISCUSSION	100
7.1	Contribution to research literature and theory.....	106
7.2	Practical contributions	109
7.3	Limitations and further research.....	110
8	CONCLUSIONS.....	112
	REFERENCES.....	114
	APPENDICES	129
	Appendix 1. Interview questions	129

List of figures

Figure 1 The life cycle of a building (adapted from RT, 2018c)	14
Figure 2 Research gap.....	16
Figure 3 Research process.....	18
Figure 4 Linear system.....	20
Figure 5 Idea of CE. (Antikainen & Valkokari, 2016, p. 7. [Adapted from Aminoff et al., 2016])..	20
Figure 6 Sustainable business model archetypes. (Bocken et al., 2014, p. 48)	33
Figure 7 Triple Layer Business Model Canvas (Joyce & Paquin, 2016, p. 10).....	35
Figure 8 Stakeholders of a firm. (Adapted from Freeman, 1984).....	37
Figure 9 Value mapping tool (Bocken, Short, Rana & Evans, 2013, p. 10).....	38
Figure 10 The stakeholder typology: one, two or three attributes present. (Mitchell, Agle & Wood 1997, p. 874)	40
Figure 11 Win-win-win potential of CE. (Korhonen, Honkasalo & Seppälä, 2018, p. 40).....	44
Figure 12 Categorization of linear and circular approaches for reducing resource use. (Bocken, Pauw, Bakker & Grinten 2016, p. 309)	46
Figure 13 A framework of the circular business model canvas. (Lewandowski, 2016, p. 21).....	47
Figure 14 Circular business model mapping tool. (Nussholz, 2018, p. 189).....	48
Figure 15 The environmental value proposition evaluation framework. (Manninen, Koskela, Antikainen, Bocken, Dahlbo & Aminoff, 2018, p. 416).....	50
Figure 16 Theoretical background	58
Figure 17 Stakeholder map. (adapted from KTI, 2016, p. 15).....	63
Figure 18 Research onion describes design choices of the thesis. (Adapted from Saunders, Lewis & Thornhill, 2009, p. 108)	66
Figure 19 The data structure of this research	75
Figure 20 Circle model for sustainable value creation through circular economy in property sector. (Inspired by Golden Circle of Sinek, 2009, p. 37-39).....	99

List of tables

Table 1 Different CE development approaches with their main objectives	23
Table 2 Examples of frameworks for CE implementation	26
Table 3 Examples of frameworks for sustainable business modelling	32
Table 4 The six levels of strategic focus. (Laszlo, 2008, p. 27)	34
Table 5 Examples of circular business model frameworks.....	45
Table 6 Six key areas for integration of the circular economy principles with the business model. (Laubscher & Marinelli, 2014)	49
Table 7 Types and examples of circular business models, categorized by ReSOLVE model. (Adapted from Lewandowski, 2016, p. 8-9).....	49
Table 8 Challenges of CE implementation	51
Table 9 Drivers for CE implementation and system change	56
Table 10 ReSOLVE framework: Built environment. (Adapted from EMF, 2016, p. 6-9).....	64
Table 11 Data gathered for the research: profiles of interviewees	70
Table 12 Identified circular CE practices and related value	78
Table 13 Recommendations how to transform attitudes and behaviour towards CE	92
Table 14 Nine methods to commit stakeholders to CE practices	96
Table 15 Challenges and drivers for CE implementation	103
Table 16 The main theoretical contributions	107

1 INTRODUCTION

This master's thesis focuses on challenges and drivers for circular economy implementation in Finnish property sector, during building's middle-of-life phase.

In this chapter the main goals and insight of this master's thesis are introduced and explained. This chapter encompasses research background, research gap, research questions and objective and limitations of the study. The structure of this thesis is also summarized in the end of the introductory chapter.

1.1 Research background

Pressure to act sustainably increases its significance continuously due to the rising environmental impacts and resource usage caused by global development and population growth (Bocken, Short, Rana & Evans, 2014). The concept of sustainability addresses environmental and socio-economic issues in a long term (Witjes & Lozano, 2016). Sustainable development (SD) principles and goals have recently emerged to the agendas of different actors like municipalities, firms, organizations and nations (Aminoff, Valkokari & Kettunen, 2016). SD is defined as *“development that meets the needs of the present without compromising the ability of future generations to meet their own needs”*, in the landmark Brudtland report *Our common future* (WCED, 1987). Reason to the growing importance of SD is the pressure that comes from society and different stakeholders, who are increasingly aware of environmental problems that have negative impacts on nature and humans (Bocken et al., 2014). About the significance of the matter indicates United Nation's *Agenda 2030 for sustainable development*, that contains seventeen *Sustainable Development Goals* (SDGS) and was put into effect in 2016 (United Nations, 2018). According to Bocken et al. (2014), to meet these targets, sustainable business models need to be developed. They (Bocken et al. 2014, p. 44) define sustainable business model as follow: *“sustainable business model aligns interests of all stakeholder groups, and explicitly considers the environment and society as key stakeholders”*. Challenge in designing this kind of business models is to gain economic value through creating environmental and social benefits (Schaltegger, Lüdeke-Freund & Hansen, 2012). Despite the challenge, Bocken et al. (2014)

believe that the importance of sustainable business models will rise in academic and business due to social pressure, climate change effects and regulation that is constantly being tightened.

When industrial revolution started, markets to disposable goods opened, as new manufacturing methods enabled higher volume production with lower costs. Disposable goods markets started to grow rapidly and stimulated throwaway-mindset. Now, our economic system leans on continuous growth and consumption, which are causing serious problems to the environment, like pollution, climate change and biodiversity loss. Nature simply cannot tolerate the impacts of current production and consumption culture where products are produced from virgin materials and just thrown away after the use. Also, population growth and growth of middle-class are strengthening negative impacts. And not only the pollution is a problem, but humankind is now facing the situation of scarce resources. (Lieder & Rashid, 2016; Bermejo, 2014) Whole situation is threatening the stability of economies and ecosystem. Even the survival of Earth to future generations is in jeopardy if current course of events remains the same. (Ghisellini, Cialani & Ulgiati, 2016)

Our prevailing economic system is linear, and it builds on take-make-use-dispose thinking, which is criticised due to its unsustainability (McDonough & Braungart, 2002). One significant problem in current model is waste. Increasing waste generation and lack of waste utilization are extremely important topics that need more attention. At present time, fully usable materials go to landfill and at the same time we are suffering from scarce resources. (Levänen, 2015) The Waste directive of European Commission (2008/98/EC) shows that 64 % of waste was not recycled or reused in 2013. The directive underlines that Union loses practically the whole potential of secondary raw materials, as they now go straight to waste streams. Union has set waste recycling targets for the member countries in order to control and minimize the waste generation. (European Commission, 2015) Important questions are, how to minimize the waste generation and how to utilize waste more efficiently. Circular Economy (CE) model, which changes the current linear production and consumption system, is proposed to provide a solution for this demand (e.g EMF, 2013; Geng & Doberstein, 2008; Ghisellini et al., 2016; Lieder & Rashid, 2016; Pomponi & Moncaster, 2017). Ghisellini et al. (2016) also argue, that a shift to more qualitative development model is needed, especially in developed countries who use relatively huge amounts of natural resources, and they see CE is a good alternative model. To meet the SDGS, it is essential to explore new business

models that are in line with the agenda and CE is one potential model that needs more studying (Lieder & Rashid, 2016).

CE is one of the sustainable business model archetypes, that Bocken et al. (2014) recommend being implemented in their article (will be discussed in detail in chapter 2.2.2.). CE model imitates nature's cyclic system that is fully balanced and happens naturally. In the nature, the nutrients from soil are consumed by plants, which transform water and carbon dioxide into oxygen and sugar by utilizing the energy of sunlight, and eventually plant is mouldered by decomposers which release nutrients back to the soil that fertilizes new plants. (Murray, Skene & Haynes, 2017; Bermejo, 2014) Bermejo (2014) thinks that circularity is one of the main principles of sustainability and it should be implemented to our economic system as well.

Ellen MacArthur Foundation (EMF, 2013, p. 7) define CE as follows:

“A circular economy is an industrial system that is restorative or regenerative by intention and design. It replaces the ‘end-of-life’ concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse, and aims for the elimination of waste through the superior design of materials, products, systems, and, within this, business models.”

As above definition shows, the goal of CE is zero-waste society where materials flow, energy is produced from renewable sources, and products and systems are designed from the beginning to allow full recycling. This is made possible with circular business models. CE is an interesting and novel concept that seems to have a lot of potential in business world because it enables continuous economic development, value creation and profitability through circular material flows without increasing the pressure on the environment (Pomponi & Moncaster, 2017). It supports sustainable development and stable society (Geng & Doberstein, 2008) and allows people to live within planet's carrying capacity (Brown & Ulgiati, 2011). Overall, CE model successfully addresses both environmental and socio-economic aspects and responses to sustainability requirements (Witjes & Lozano, 2016).

Entire nations, like China or Finland, as well as regions and companies have taken CE practices to their agenda during the last years (see, e.g. Eco3, 2018; Ministry of the Environment, 2018; SYKE, 2018; L&T, 2018; Pirkanmaa, 2018; Kesko, 2018; Sitra, 2016;

Geng & Doberstein, 2008; The Standing Committee of the National People's Congress, 2008). The Finnish Innovation Fund Sitra presented *Finnish Road map to CE 2016-2025*. It is the first national CE road map in the world. It states that Finland aims to be a forerunner in the field of CE. Road map sets several targets for the time period from 2016 to 2025. (Sitra, 2017a) In addition to national interest, research community widely accepts the concept of CE and sees it as desired to be implemented. Can be assumed, that literature of CE will grow in the future and the model continues to increase its importance. (Lieder & Rashid, 2016)

Many companies are interested of the CE concept and they demand information how to grasp the business opportunities of CE. More and more circular strategies are built, but they can be quite costly for the company (Geng & Doberstein, 2008), since it is crucial to examine the value it will provide when implemented. Different CE business models form the basis for value creation opportunities. (Nussholz, 2018) Value created or destroyed for stakeholders carries significant business opportunities and risks, and managers are forced to re-consider social and environmental sustainability in terms of value creation (Laszlo, 2008). If company aims to use CE model, it will have direct and indirect impacts on value for stakeholders. Consequently, consideration of stakeholders in value creation processes in CE model is needed. (Aminoff et al., 2016)

However, there are also researchers who question if CE contributes to the sustainability (Murray et al., 2017; Tukker, 2015; Mont, 2002). Notable uncertainty relates to triple bottom line aspect of sustainability that emphasises equally economic, social and environmental aspects. Concern stems from the observation that CE prioritizes economic and environmental benefits and only indirectly addresses social aspects (Murray et al., 2017). Therefore, sustainable value creation that covers social dimension alongside with economic and environmental dimensions (Aminoff et al., 2016), is important to take into account when examining value creation opportunities of CE business models.

Based on arguments just presented, this master's thesis focuses mainly on CE implementation and its challenges and drivers. Additionally, sustainable value creation within the CE is examined and stakeholder perspective included.

1.1.1 Research context

According to Leising, Quist & Bocken (2017), implementation of CE is in its early stages and related business models and tools still mostly need to be developed. This is the case especially in property sector, which has old traditions and innovations happen relatively slow (Fernie, Leiringer & Thorpe, 2006). It is noticed that property sector underperforms in sustainability when compared to other industries (World Economic Forum, 2016). This master thesis concentrates on this sector more specifically and since property sector forms the research context.

Construction and property sectors together form one of the most influential industry in Finland, as built environment forms over 70 % of Finland's national property and buildings' alone over 50 %. Built environment means all the environment that is built by humans. Built environment and its value creation affect directly to the national assets. (RAKLI, 2011) Rakennusteollisuus (RT) (RT, 2018a) highlights that built environment plays an important role in preventing climate change. According to them, built environment is the core of Finland's competitiveness, as it employs 20 % of the employed work force (being number one employer in Finland) and covers 70 % of the gross domestic product. On the other hand, same statistics show that built environment in Finland produces 38 % of the greenhouse emissions and uses 42 % of the energy consumption. Considering the large size of the industry, there lies great potential to enhance sustainability, as the industry can have massive positive impacts on environment and society in a big scale, as well as provide great savings for actors within the industry. (Pomponi & Moncaster, 2017; Dooley, 2017)

In Finnish property industry energy efficiency has been a hot topic for a while now. Building's CE, on the contrary, is a novel theme. (KTI, 2016) Anyway, during the last years, property sector has braced up in the field of CE and some workshops have been arranged to ponder the circular future of the sector. Some CE experiments are running right now, like Kiertotalous Sprintti by Green Building Council Finland (FIGBC, 2018), but in a big picture seems that CE practices are just in the beginning.

It is evidenced, that construction and property sectors together is the single most significant player in the world in terms of carbon dioxide emissions (CO₂) contributions (World Economic Forum, 2016). Industry is growing all the time, and International Energy Agency

(IEA, 2013) forecasts that CO₂ emissions related to built environment will double by year 2050. Besides, buildings also have other growing impacts on environment. It is expected, that buildings will use 12 % of fresh water and generate 30 % of waste by 2030 in European Union. (World Economic Forum, 2016) Forecasts indicates that all the efforts to improve situation are desired urgently. European Union has set target to cut greenhouse gas emissions by at least 80 % before 2050, when compared to the level in 1990 (European Commission, 2011). According to Confederation of Finnish Construction Industries (RT, 2018a) means to promote sustainability in built environment are diverse from decreasing emissions and energy consumption to creating new sustainable business models.

When considering the facts that built environment is a big influencer in Finland that underperforms in sustainability, it is well-grounded to focus on this sector. Sustainability has been studied much recently (e.g. Pomponi & Moncaster, 2017; Dooley, 2017), but CE is still a new concept, which business opportunities are still unrevealed in property sector. Academia believe potential of CE concept and thus it is interesting to examine the views of business side.

1.2 Research gap

Many researchers have acknowledged CE recently (e.g. Lieder & Rashid, 2016; Ghisellini et al., 2016; Antikainen & Valkokari, 2016; Murray et al., 2017; Geng & Doberstein, 2008), but research of CE concentrates mostly on short-lived manufactured products (Singh & Ordoñez, 2016). Difficulties that are essential in long life cycle products, such as buildings, are mainly ignored in current literature (Pomponi & Moncaster, 2017). Pomponi & Moncaster (2017) and Leising et al. (2017) have addressed this research gap and they focus on construction sector, mainly on construction of new buildings. This study aims to address this research gap in property sector, which considers existing buildings' use, maintenance and renovation phases. Dooley's (2017) paper focused on real estate sector from sustainability perspective. CE perspective of this study will offer novel information about property industry.

RT (2018c) divides the life cycle of building to the eight phases (figure 1), which are: 1. take of raw-materials, 2. manufacture of construction products from the raw materials, 3.

transportations, 4. transitions, 5. construction, 6. use and maintenance, 7. repairing and renovating and 8. finally end-of-life phase, which means demolition, recycling and placing the materials. Property sector encompasses steps 6. use and maintenance and 7. repairing and renovation phases of a building. Life cycle classification by Yang, Vladimirova, Rana & Evans (2014) divides life cycles to three phases: beginning of life (BOL), middle of life (MOL) and end of life (EOL) and this study utilizes this division. Property sector deals with building's MOL phase that covers major part of the whole life-cycle of a building. Usually it lasts from 50 to 150 years (RT, 2018c).

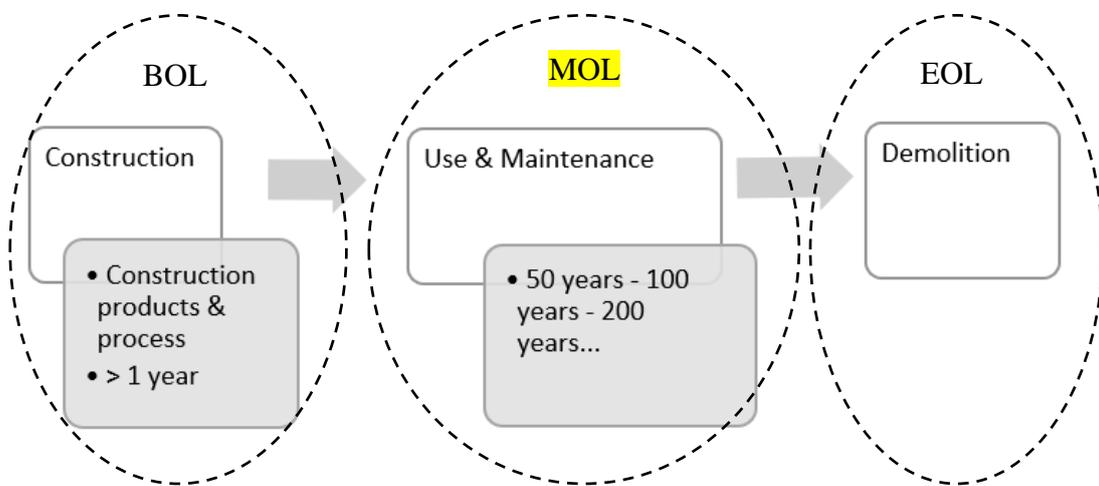


Figure 1 The life cycle of a building (adapted from RT, 2018c)

This thesis focuses on MOL phase, because in building industry, it is important to improve the existing buildings' sustainability (Dooley, 2017). It takes a long time to renew all the buildings more sustainable or build the new ones, and it is not even possible or necessary. (World Economic Forum, 2016) International Energy Agency (IEA) estimates that 75 % of existing building stock will be standing in 2050 in OECD countries (IEA, 2013). Quicker actions furthering circularity and sustainability are needed in the property sector. In addition, current practices usually consider only greenhouse emissions generated during the building stage, but what happens in MOL phase is many times forgotten, although it has lot of potential from sustainability perspective (RT, 2018b; Dooley, 2017). Durability is seen as the most efficient way to reduce environmental impacts in current situation (RT, 2018b).

Murray et al. (2017) emphasise the need for further research in the field of CE implementation in company-level. Significance of circular business models as enabler for companies aiming to circular activities is noticed (Nussholz, 2018). As stated earlier,

researchers think that knowledge, tools and business models enhancing CE implementation need to be developed further (Leising et al., 2017; Lieder & Rashid, 2016) and this is extremely crucial in property sector that has old traditions and innovations are described to happen slowly (Fernie et al., 2006). In property sector, the focus has been in energy efficiency for a long time and it has been broadly explored, while CE is rather new concept (Leising et al., 2017). This study addresses these research gaps and focus on CE implementation in MOL phase of building's life-cycle and finally aims to add knowledge by forming a model to support CE implementation within industry.

Drivers and challenges for CE implementation are in central role in CE initiatives. General understanding of drivers and challenges for CE initiatives is limited and still need further investigation (Ranta, Aarikka-Stenroos, Ritala & Mäkinen, 2018). Ranta et al. (2018) studied this subject through cross-regional comparison of China, US and Europe. This study intends to examine drivers and challenges for CE implementation in Finnish property sector.

The primary motivation for CE implementation comes from expectations of stakeholders, who in property sector call for sustainable construction and buildings, which create social and environmental value alongside with financial value throughout the life-cycles of buildings (Pomponi & Moncaster, 2017). Thus, sustainable value creation is seen as main target of CE.

All in all, this study intends to give a contribution to fill identified research gaps by examining challenges and drivers for CE implementation in buildings' MOL phase. It also deepens into the sustainable value creation opportunities for stakeholders through the CE. Research gap is displayed in figure 2. There is a need for this kind of study due to significant environmental impact of built environment and existing building stock, as well as due to the lack of studies concerning property sector's opportunities in the field of CE.

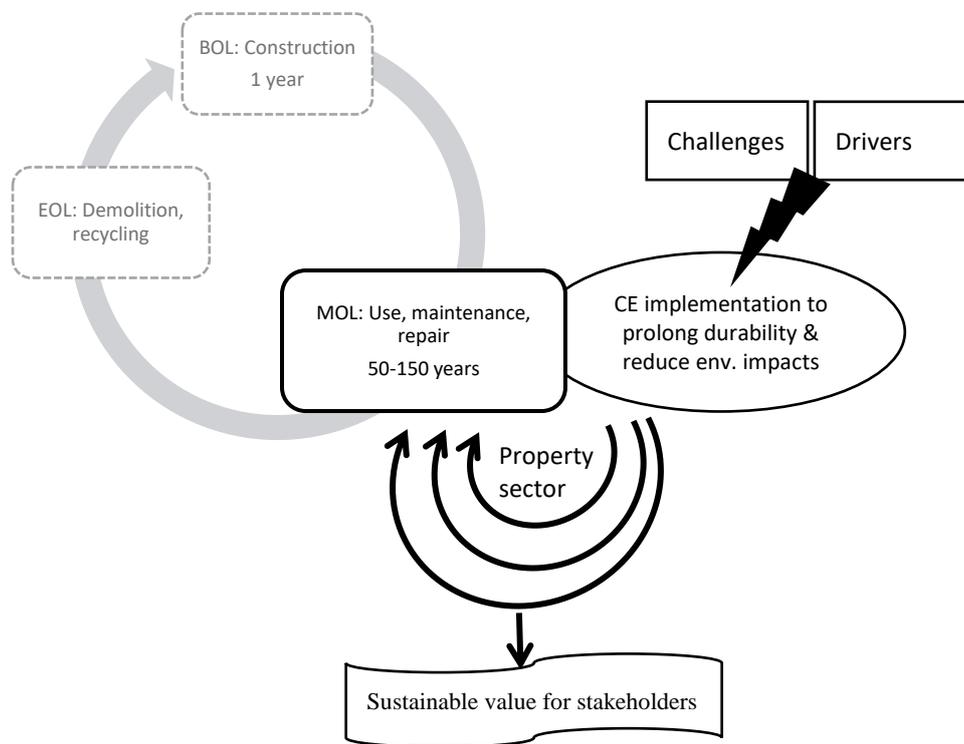


Figure 2 Research gap

1.3 Research questions, objectives and limitations

This thesis is carried out to study challenges and drivers for CE implementation and related sustainable value creation opportunities and role of stakeholders in the context of Finnish property sector. This is achieved, by exploring CE and sustainable value creation, and the role of stakeholders in them. To form profound understanding of CE as well as sustainable value creation opportunities, study encompasses theoretical background of key concepts: CE, sustainable value creation and stakeholder theory.

By analysing the results of the empirical study and reflecting the literature, study aims to answer following research question:

RQ: What are the main challenges and drivers for the implementation of circular economy business models in buildings' MOL phase?

To be able to answer the main research question four sub-questions are asked:

sRQ1. What circular business model practices are done now in buildings' MOL phase?

sRQ2. What value circular business model practices provide?

sRQ3. What is the role of stakeholders in circular economy implementation?

To answer these research questions, in-depth study of the topic is conducted. To ensure in-depth study, some delimitations have been made.

Circular economy

CE happens in many levels, but this study concentrates on CE in business context.

Building's life cycle

This study focuses to review property sector in Finland. According to RT (2018c) significant decisions that can determine the environmental impacts and possible life cycle of a building are made in the planning phase of a building, but this phase is excluded from the study due to the scope of property sector and focus in buildings' MOL phase.

Different types of buildings

There are buildings for different purposes. This study concentrates on office buildings and business premises. Dwelling houses are excluded from the study due to differences in dwellings nature (row houses, high-rise, detached houses etc.). Office and business premises buildings cover around 17 % of all buildings in Finland (RAKLI, 2014).

1.4 Research structure

In order to proceed with the research questions, the structure of the thesis is divided into theoretical and empirical parts. The next chapter introduces the theoretical background based on the literature review. First, CE concept and its development is studied, as well as the application to property industry and the notion of sustainable business models and value creation. These are the theoretical settings that are bound together in this study.

Circular economy chapter (2.1) enlightens the concept of CE and its development. Also, it describes the literature about implementation of CE. The second part of the theoretical background (2.2) examines sustainable value creation. It is divided into four subsequent chapters, that describe concept of sustainable value creation, sustainable business models, stakeholder theory together with sustainable value creation and finally co-creation of value concept. The third part of this chapter (2.3) combines above-mentioned parts and reviews sustainable value creation in CE context, encompassing circular business models as well and challenges and drivers for implementation. The third chapter presents the theoretical framework of the thesis. After that the concepts gathered in theoretical framework are studied in the context of Finnish property sector in chapter four. It consists three subsequent chapters that cover industry specific challenges and opportunities, role of stakeholders and implementation of CE.

Then the research approach and methods for the empirical part are specified in chapter five. This chapter clarifies research context, data collection and analysis method and assess the validity and reliability of the study. The sixth chapter with its subchapters are dedicated to show the findings of the interviews. The seventh chapter of the thesis discusses the empirical results in the light of previous literature and how it contributes in theoretical and practical sense. It also answers to the research question and sub-questions, and describes the limitations and further research propositions. The last chapter (8) concludes the whole thesis. Research process is depicted in figure 3.

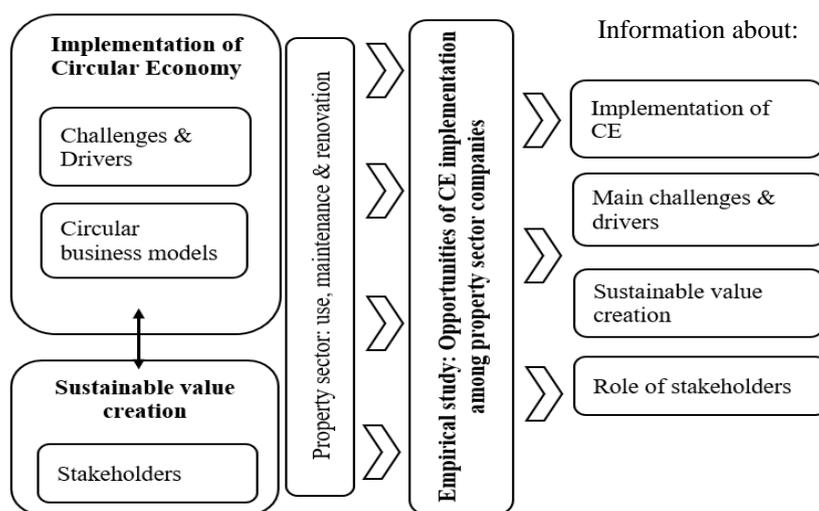


Figure 3 Research process

2 THEORETICAL BACKGROUND

This chapter is divided into three parts. At first, the idea of CE and its development are introduced as well as the concept is explained in more detail. Also, the implementation of CE is examined. The second part examines sustainable value creation by introducing the concept, sustainable business models and co-creation of value. It also brings stakeholder theory and sustainable value creation together. The third part of theoretical background deals with sustainable value creation in CE context. This part describes circular business models and challenges and drivers for implementation.

2.1 Circular economy: theoretical development, and impact on business practices

Transformation towards CE is happening due to growing consumption, technological development and modern consumers (Aminoff et al., 2016). CE is believed to promote sustainability at low or no material, energy and environmental costs. That it aims to achieve through reusing resources repeatedly in a way that allows economic growth. Earlier environmental models were perceived being mutually exclusive to traditional models that generate economic profits, but CE model has changed this assumption as it generates economic opportunities through practices such as resource efficiency and waste reduction. (Ghisellini et al., 2016) Researchers currently believe that CE model is enabler for gaining competitive advantage (Aminoff et al., 2016). Growing attention of managements and engineering scholars towards CE is coherent, as CE provides improvements to entire living and economic model when compared to current linear system (Ghisellini et al., 2016). Expectations indicate that significance of CE model will grow in future because model generates more value for unit of resource when it is used repeatedly, than in linear system (EMF, 2013).

In linear economy materials and products are made from virgin materials, used and then disposed to the landfill. Figure 4 shows the idea of linear economy. On the contrary, circular economy aims to keep materials looping through repairing, remanufacturing, sharing, reusing and recycling practices (Antikainen & Valkokari, 2016). This way it reduces use of

virgin materials and consumption. Circular model is displayed in figure 5. The subsections describe the concept, its development and implementation more specifically.

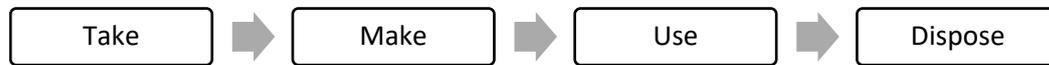


Figure 4 Linear system.

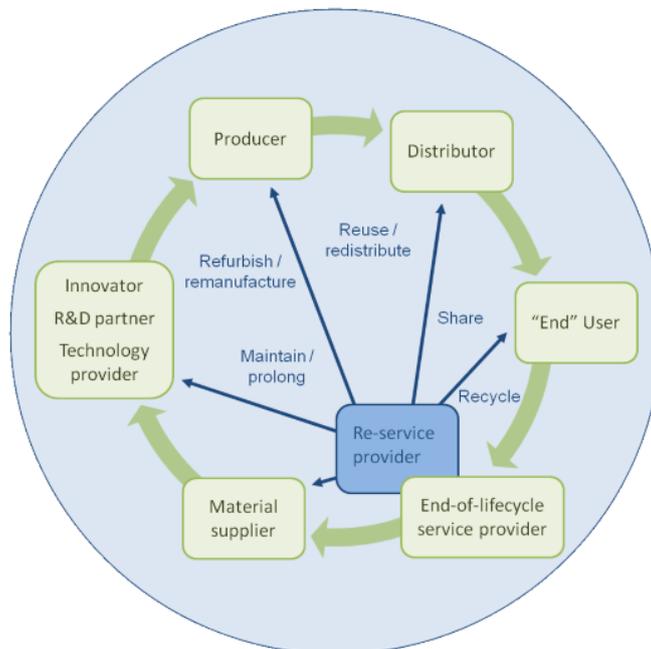


Figure 5 Idea of CE. (Antikainen & Valkokari, 2016, p. 7. [Adapted from Aminoff et al., 2016])

2.1.1 The concept of circular economy and its development

Circularity itself, is not a brand-new concept if we look back to our history. Waste as unwanted material was nearly unknown till the beginning of industrial revolution. Earlier, before industrial revolution, maintaining the purpose of an object by reparations and repurposing, were normal practices. Materials were too valuable to throw away. After industrial revolution, disposable goods' markets started to flourish. (Lieder & Rashid, 2016) Industrial economy and production and consumption system in 20th century has been characterized by waste generation and avoidance of reparation (Stahel, 2016).

There are some exceptions after World war II. The war forced to start remanufacturing in car industry, due to limited materials available (Steinhilper, 1998). This was the first sign of scarce resources within the industry, so the cars were remanufactured, and old parts repaired, to add durability of cars. Still after the wars, disposable goods' markets have continuously grown as population has grown and people are wealthier than ever. Companies are competing who can produce and sell the most. (Lieder & Rashid, 2016) Now we are in a situation where humans consume twice as much natural resources yearly than the Earth can regenerate each year (Earth Overshoot Day, 2018).

According to Murray et al. (2017), origins of CE are unclear, but after a broad review of CE definitions, can be seen that common for them is referring to cyclical closed loop system. Kenneth Boulding first presented the idea of closed-loop economy in 1966 when describing the earth as a closed and circular system with limited assimilation capacity. Later, Walter Stahel (2010) has been important researcher of closed-loop economy. CE concept based also on other scientific or semi-scientific concepts. Important researchers are McDonough and Braungart (2002), who introduced the concept cradle to cradle, which refers to idea that industry should preserve ecosystems and biological metabolism and same time maintain safe and efficient technical metabolism for quality use and flow of biological and technical nutrients. The concept of CE was first presented by Pearce & Turner in 1990's but was not actively used for a while.

Clear is, that the concept of CE traces back to different schools of thought. It roots from industrial ecology (IE) (Frosch & Gallopoulos, 1989), which idea is to integrate sustainability perspective into economic and environmental systems. It aims to move from linear to closed-loop material and energy use. Practices such as remanufacture, reuse and recycling promote a shift to this direction. (Ehrenfeld & Gertler, 1997) Industrial ecology literature has developed and new concepts have emerged since 1989. For example, concepts of eco-industrial development (EID) and industrial symbiosis have affected CE. Chertow (2000) states that EID aims to the view that healthy economy and environmental health can coexist. According to her, industrial symbiosis is geographical collaboration where separate industries operating in the same area create competitive advantage by exchanging materials, energy, water and by-products. Roots of CE are found also in ecological economics, which focus on ecological perspective. Especially ecological modernisation theory has a lot common with CE. Origins of ecological modernization are in 1980's Berlin where group of

researchers explored this field. Ecological modernisation theory is “*concerned with the relationship between industrial development and the environment*” (Murphy & Gouldson, 2000, 33). It explains how organizations have responded to the pressure about environmental problems (Barry, 2005). IE and ecological modernization use natural ecosystems as basis, suggesting that economy should work like a natural ecosystem. This means, that companies located in the same region, should share common infrastructure and services. The same idea is utilized in CE, which supports exchange of by-products and waste inside the society. This will reduce pollution and business risks in a long-term. (Geng & Doberstein, 2008) The imitation of nature approach is called biomimicry (Benyus, 1997), which is one field that has affected the development of CE.

Also, life cycle thinking and life cycle assessment (LCA) approaches have influenced development of CE. These concepts are relevant when considering the development and definition of CE as they emphasise the environmental, social and economic impacts of products over their entire life cycles. (Antikainen & Valkokari, 2016) This can be seen for example in European Union’s Circular Economy Package, which according to Antikainen and Valkokari (2016), will “*contribute to closing the loop in product lifecycles through greater recycling and re-use, and bring benefits for both the environment and the economy*”. Essentially, CE relates to sustainable development (SD) (see e.g. Scott, 2015; Lewandowski, 2016) and aims to it, or goes even beyond it, due to its mending characteristics (Murray et al., 2017).

Roots are also found in systems thinking and General Systems Theory (Von Bertalanffy, 1950) that proposes that all organisms should be considered as systems and focus on observing the relationship between organizations and environments. More recent roots are found in corporate responsibility (Murray et al., 2017), product-service systems (Tukker, 2015) and sharing economy (Preston, 2012). Other concepts loosely related to CE are i.a. eco-efficiency (Huppes & Ishikawa, 2009), eco-effectiveness (McDonough & Braungart, 2002), cleaner production (Stevenson & Evans, 2004) and performance economy (Stahel, 2010).

Table 1 gathers the approaches that have affected the development of CE. It also shows the main objective of each approach.

Table 1 Different CE development approaches with their main objectives

<i>Approach</i>	<i>Definition</i>	<i>Main source</i>
Closed Loop system	Earth is a closed and circular system with limited assimilation capacity, since economy and environment should coexist in balance.	Boulding, (1966)
Cradle to cradle	There exist technical and biological nutrient flows. System should preserve ecosystems and biological metabolism and same time maintain safe and efficient technical metabolism for high-quality use and circulation of biological and technical nutrients	McDonough & Braungart, (2002)
Industrial Ecology	Integrates sustainability perspective into environmental and economic systems and aims to move from linear to closed-loop material and energy use.	Ehrenfeld & Gertler, (1997)
Ecological modernization	Concerned with relationship between industrial development and environment. An explanation how political and economic organizations have responded to the pressure about environmental problems.	Murphy & Gouldson, (2000)
Life Cycle thinking	Emphasises the environmental, social and economic impacts of products over their entire life cycles.	Antikainen & Valkokari, (2016)
Biomimicry	Imitates nature's functions in order to overcome the challenges.	Benyus, (1997)
Systems thinking	All organisms should be considered as systems and focus on observing the relationship between organizations and environments.	Von Bertalanffy, (1950)

Lieder & Rashid (2016) identified and grouped main themes of CE development in their comprehensive review of CE development. According to them, themes of CE development are:

1. Transformation of economic structures and business rationales
2. Regenerative design and critical materials
3. Industrial ecology
4. Remanufacturing and closed-loop supply chains
5. Resource conservative manufacturing
6. Governmental CE initiatives

The word ‘circular’ relates to the concept of cycle, that describes the nature of CE. Two cycles are significant, and they are biochemical cycles and the idea of recycling of the products. Biochemical cycles describe the circulation of all natural resources, like water which evaporates from the ocean, forms clouds, rains down and runs back to the oceans. Humans have affected and altered all biochemical cycles. Cycles can tolerate specific amount of changes, thus, what is important, is the rate of the changes the cycles can cope with. Recycling refers to idea of slowing the cycles and postpone the waste output. (Murray et al., 2017) Korhonen, Honkasalo and Seppälä (2018) think that CE should imitate natural cycles and aim to preserve energy, nutrients and materials for economic use. In addition, they highlight that flows released to environment, should be in natural form, so that nature can exploit them in its own functions. This is called biomimetic, which is important characteristic of CE.

Several definitions for CE have been proposed. According to Geissdoerfer, Savaget, Bocken, and Hultink (2017), the central idea of CE is a system that strives to create value through reducing waste generation, energy consumption and the use of natural resource via slowing, narrowing and closing material and energy loops. Geng and Doberstein (2008, p. 231) understand CE as: *“realization of closed loop material flow in the whole economic system”*. Like mentioned before, EMF (2013) describes CE as a system that is restorative and regenerative by nature. The word “restorative” is important characteristic of CE, because additionally to preventive nature of the model, it also aims to fix the damages of the past by designing healthier systems (Murray et al., 2017). The CE definition that is utilized in this thesis is formed by Antikainen and Valkokari (2016). According to them (p. 6), CE model aims to *“keep materials in use for as long as possible and to preserve - or even upgrade - their value through services and smart solutions”*.

It is clear, that from the very beginning, CE has offered an alternative for traditional neoclassical economic system. Both from theoretical and practical perspective. Neoclassical economy concentrates on efficient distribution of resources in the markets and ignores the fact that resources are limited. The most fundamental difference is CE model's ability to address the environment and its functions and the relationship between economic model and the environment. (Lieder & Rashid, 2016)

2.1.2 Implementation of circular economy

Lieder and Rashid (2016) underline the need for radical changes in business operations and commitment of higher management in order to execute successful CE implementation. It is usually completed through business actions that support CE, such as business models supporting sharing instead of owning the products (Korhonen et al., 2018). Literature also indicates the importance of involving broad variety of stakeholders to the implementation process of CE (Geng, Fu, Sarkis & Xue, 2012). Further, studies show that legislative and financial supports can be beneficial for the success of CE implementation (Levänen, 2015). In the last years, there has been proposed different frameworks to implement CE. In this section, those are studied and some examples of them are presented (table 2).

The most known organizations promoting CE implementation are i.a. Ellen MacArthur Foundation (EMF), Product Life Institute, Circle Economy and Circular Society. EMF is perhaps one of the earliest and most important organizations promoting CE among industry and organizations. It was launched in 2010, in order to hurry the transition to CE. It aims to get CE to decision-makers' agendas across business, academia and government. This it intends to do through five focus areas, which are learning, business and government, insight and analysis (providing evidence about benefits), systemic initiatives and communication. EMF has several CE programmes ongoing in these focus areas. (EMF, 2018)

Table 2 Examples of frameworks for CE implementation

<i>Organization/Researcher</i>	<i>Framework</i>
EMF (2015)	ReSOLVE
No clear founder (formed in China)	3R's Principles
Geng and Doberstein (2008)	Three circles: micro, meso and macro
Lieder & Rashid (2016)	CE implementation strategy: top-down and bottom-up approach
Planing (2015)	Four building blocks
Sitra (In Finland) (2017a)	Finnish Roadmap to Circular Economy 2016-2025
European Commission (2018)	Circular Economy Package

CE concept is implemented through three circles: micro, meso and macro. This popular method for CE implementation was presented by Geng and Doberstein in 2008. Micro circle includes corporate-level initiatives such as waste minimization and service-product system. The second circle encompasses meso level initiatives like eco-industrial parks and networks. The third circle is macro level and covers social level initiatives, such as eco cities and eco regions. (Geng & Doberstein, 2008)

EMF (2015) introduced ReSOLVE framework, which presents the circular business opportunities regarding implementation. It has six principles that are 1. regenerate, which aims to healthy ecosystem by moving to renewable energy and materials, 2. share, including actions that support the utilization of products by sharing them with many users (peer-to-peer lending, second-hand and extending lifecycle through maintenance and repair), 3. optimize, covering actions increasing performance and efficiency (remove waste, leverage of big data, automation, steering and remote sensing), 4. loop, referring activities that keep materials and products in closed loops, 5. virtualize, that promotes delivering utility virtually

rather than materially, and 6. exchange, aiming to replace old materials with better sustainable materials or technologies. These practices help companies to discover suitable practices for them.

Common way to think and organize implementation of CE is through three main activities called 3R's Principles. This method was formed in China and there is not clear founder of it. Generally, China has been trailblazer in the field of CE development and implementation, as it adopted circular economy to its national strategy very early. 3R's Principles are reduction, reuse and recycle. Implementation of CE is typically started by recycling. Many scientists have examined 3Rs, but recycle principle is the most studied and used. (Ghisellini et al., 2016) The reduction aspect intends to diminish the input of raw materials, energy and waste. It is achieved through enhancing eco-efficiency in production and consumption. Activities promoting reduction are better technologies and goods, simplified packaging, simpler lifestyle and efficient household appliances. (Zhijun & Nailing, 2007) The objective of reuse principle is to use products and components again to the original purpose. There are various means to increase the level of reuse. Designing durable products that enable repeated use enhance reuse. Same way preferring take-back of products and focusing on increase the demand for reused products for example by marketing will enhance reuse principle. (Bilitewski, 2012; Prendeville, Sanders, Sherry & Costa, 2014) Reuse provides many environmental benefits as it produces less emissions and requires less resources, energy and labour than manufacturing new products (Castellani, Sala & Mirabella, 2015). Recycle principle is the most referred of the principles, although Stahel (2013) claim, that it is the least sustainable solution when compared to other principles. Hu, Xiao, Zhou, Deng, Wang, & Ma (2011) add one principle to the model: recover, and call the model 4R approach. Subsequently, two more concepts have been included to the model: redesign and remanufacturing, forming already 6R model (Ghisellini et al., 2016).

Also, Lieder and Rashid (2016) established framework for CE implementation. It is divided into *top-down and bottom-up approaches*. Top-down approach concentrates on public institutions whereas bottom-up approach deals with industry initiatives. Top-down consists legislation and policy, social awareness and support infrastructure. Bottom-up encompass initiatives regarding collaborative business models, supply chain, product design and information and communication technology. (Lieder & Rashid, 2016)

Planing (2015) claims, that implementation of CE happens through four building blocks, which are materials and product design, new business models, global reverse networks and enabling conditions. Similarly, Lewandowski (2016) states that successful implementation of CE happens through business models (Lewandowski, 2016). Sustainable and circular business models will be examined more deeply in their own chapters 2.2.2 and 2.3.1.

Earlier mentioned Finnish Roadmap to Circular Economy 2016-2025 by Finnish Innovation Fund Sitra (2017a) and European Union's 2018 Circular Economy Package (European Commission, 2018) demonstrate implementation frameworks in a nation scale.

2.2 Sustainable value creation

The second main part of theoretical background of this thesis is sustainable value creation that is examined in this chapter. In sustainable value creation, environmental and social dimensions are observed equally with economic dimension. Usually, promoting environmental performance and creating economic value are seen mutually exclusive, but this assumption is changing now. Fundamental idea of sustainable value creation is to generate value for different stakeholders. Environment and society are perceived as important stakeholder groups in this approach. (Aminoff et al., 2016)

Sustainable value creation is closely related to sustainable development (SD) and triple bottom line (TBL). John Elkington (1998) presented the idea of triple bottom line (TBL) concept, that consists environmental, social and economic dimensions, in his book *Cannibals with Forks: The Triple Bottom Line of 21st Century Business*. According to him, TBL demands broader focus on financial bottom line by including environmental and social bottom lines to the analysis. The idea of TBL, is to do business that generates financial profits but also creates value for the planet and people. TBL concept requires close cooperation of stakeholders in terms to be successful. (Elkington, 1998)

Michael E. Porter has done fundamental work in the field of value creation. He sees that value creation is the key to gain competitive advantage in the markets. Porter first introduced two forms of competitive advantage: differentiation and cost leadership, in his book *Competitive Advantage: Creating and Sustaining Superior Performance* (1985). To be able

to assess the competitive advantage, it is essential to examine the value chains. Value chain also, is introduced by Porter in 1985. He presents it as a basic tool for analysing “*all the activities a firm performs and how they interact*” (p. 45). Essential idea of value chain is to gain understanding of cost behaviour and potential or current sources of differentiation, by dividing a firm into strategically relevant activities. With the information, a firm can perform better in these activities when compared to its competitors. According to Porter (1985), differences in value chains are the key to gain competitive advantage.

Business models play the main role in value creation. Business models generally tell how business is done and value created. It reflects company’s strategy. (Magretta, 2002) According to Zott and Amit (2013), business models reveal how the value is created for stakeholders. Osterwalder and Pigneur (2010) introduced the popular idea, that business models consist three main elements which are value proposition, value creation and delivery, and value capture. Conventional business models mainly focus on profit in their value creation, and social and environmental “values” are mostly ignored. These models usually reflect mainstream neo-classical economic thinking, where profit-making and money are the most central objectives. (Bocken, Rana & Short, 2015) Jonker & Dentchev (2013) conclude that sustainable development principles are not taken into consideration in business models, because they cannot usually be expressed in monetary terms. They see that excluding social and environmental aspects from the business models have led us to the challenges we face today. Important message in their article is, that all three dimensions of sustainable development need to be taken into account and the whole value chains need to be re-considered in order to capture value. Similarly, Bocken et al. (2015) claim that focusing only on earning profit and satisfying customer needs is too narrow approach, as sustainable value creation requires balancing interests of all stakeholders.

2.2.1 The concept of sustainable value

Including sustainability perspective in value creation context is quite novel trend in the literature. Ueda, Takenaka, Vánca, and Monostori (2009) conducted a comprehensive review about the concept of value and its development. The most recent topic in the value discussion is the problem of sustainability. According to them, sustainable value is “*an*

important concept that targets not only ecological sustainability but also social and economic values” (p. 685).

According to Laszlo (2008), sustainable value has developed from stakeholder value. He sees that, stakeholder value forced managers to think outside-in the process of creating and sustaining competitive advantage. By addressing stakeholder issues and engaging stakeholders, companies can more easily anticipate changes in the markets and business environment. This reduces risks related to the business environment and creates new business opportunities. He argues, that sustainable value can only be created when it creates positive value for both stakeholders and shareholders. He introduces four value creation or destruction cases:

1. Value creation for shareholders with value destruction for stakeholders
2. Value destruction for shareholders and stakeholders
3. Value destruction for shareholders with value creation for stakeholders
4. Value creation for shareholders and stakeholders

In the first case, value is created for shareholders at the sacrifice of other stakeholder groups and it presents more value transfer than value creation. Examples of this is plastic or toxic additives in cosmetics, CO₂ emissions from coal-fired power plants, and use of child labour in garment factories. These practices create value for the shareholders but ignore other stakeholders. The second case destroys the value of both shareholder and stakeholder. For example, the companies producing genetically-modified (GMO) corn, did underestimate the power of consumers and farmers, and eventually lost large amounts of money. The third case transfers value from shareholder to stakeholder, which causes the suspicion about the viability of a company. Some non-governmental organizations require these kinds of actions without understanding that unprofitable practices are not sustainable either. In the fourth case hides the possibility to sustainable value creation. There are plenty of positive examples of sustainable value creation. For example, environmentally friendly manufacturing facilities, which use less energy and generates less waste, and which are cheaper to build at the same time, can create value for the stakeholders and shareholders at the same time and thus be sustainable value. (Laszlo, 2008)

Hart and Milstein (2003) think similarly as Laszlo (2008) and argues that firm creates sustainable value when they aim to strategies and activities that contribute to sustainability and meanwhile also generate value for shareholders. According to Hart and Milstein (2003), sustainable strategies and practices hold the potential to manage risks and costs better, improve reputation, show the growth path and ease the innovation processes which all are central for the shareholder value creation.

2.2.2 Sustainable business models

Literature of sustainable business models has grown recently and gained more attention among scholars (Bocken et al., 2015; Mont, 2002). As stated earlier, in the core of sustainable value creation is the business model, which determines the opportunities for value creation. According to Boons and Lüdeke-Freund (2013), business model's fundamental idea is to change and balance the number of diverse values. Business models are described to tell the architecture of value creation (Osterwalder & Pigneur, 2010).

Aim of the sustainable business model is to earn economic profit by delivering social and environmental benefit. This aspect seems to be key challenge when shaping sustainable business model because many times it is difficult to see how the social and environmental benefits transform to profits. (Boons & Lüdeke-Freund, 2013) One of the most used example of sustainable value creation is the car sharing service business model, where customer pay for using a car rather than buying it. Cars will be more accessible to people who earlier did not have possibility to own a car. Environmental benefits will be generated when cars are in better utilization and the need to build new cars decreases. (Bocken et al., 2015) This kind of business models are getting momentum, which can be seen in popularity of peer-to-peer lending as well as in product-service-systems (Mont, 2002).

There are different tools and frameworks for sustainable business modelling. Examples of them are gathered in table 3 and introduced next.

Table 3 Examples of frameworks for sustainable business modelling

<i>Researcher</i>	<i>Framework, tool</i>
Bocken, Short, Rana & Evans (2014)	Business model archetypes
Bocken, Short, Rana & Evans (2015)	Value mapping tool: to reconsidering of business models for sustainability
Laszlo (2008)	Six levels of strategic focus -tool: to identify sustainable value
Yang, Vladimirova, Rana & Evans (2014)	Sustainable Value Analysis Tool: to identify sustainable value creation opportunities in industrial companies
Joyce & Paquin (2016)	Triple Layer Business Model Canvas: for exploring and forming sustainable business model innovation

Bocken et al. (2014) developed sustainable business model archetypes, that indicate the way of delivering sustainability in business. Eight archetypes were formed and grouped according to main types of business model innovations formed by Boons and Lüdeke-Freund (2013): technological, social and organizational oriented innovations. Groupings and archetypes with examples are presented in the figure 6.

Technological group includes three archetypes: maximise material productivity and energy efficiency, create value from waste, and substitute with renewables and natural processes. Social group covers similarly three archetypes: deliver functionality rather than ownership, adopt a stewardship role, and encourage sufficiency. And finally, organizational business model innovation group consists two archetypes: repurpose for society/environment and develop scale up solutions. List of examples of each archetype is provided to ease the discover of suitable business model and implementation of it. Many of the possible sustainable business models require collaboration within an industry and engagement of non-industry actors. For example, creating value from waste is this kind of business model. (Bocken et al., 2014)

Groupings	Technological			Social			Organisational	
	Maximise material and energy efficiency	Create value from waste	Substitute with renewables and natural processes	Deliver functionality rather than ownership	Adopt a stewardship role	Encourage sufficiency	Repurpose for society/environment	Develop scale up solutions
Examples	Low carbon manufacturing/solutions	Circular economy, closed loop	Move from non-renewable to renewable energy sources	Product-oriented PSS - maintenance, extended warranty	Biodiversity protection	Consumer Education (models); communication and awareness	Not for profit	Collaborative approaches (sourcing, production, lobbying)
	Lean manufacturing	Cradle-2-Cradle						
Additive manufacturing	Industrial symbiosis	Zero emissions initiative	Result-oriented PSS- Pay per use	Ethical trade (fair trade)	Slow fashion	Alternative ownership: cooperative, mutual, (farmers) collectives	Licensing, Franchising	
De-materialisation (of products/packaging)	Reuse, recycle, re-manufacture							Blue Economy
Increased functionality (to reduce total number of products required)	Take back management	Biomimicry	Design, Build, Finance, Operate (DBFO)	Radical transparency about environmental/societal impacts	Premium branding/ limited availability	Base of pyramid solutions	Crowd sourcing/funding	
	Use excess capacity							The Natural Step
	Sharing assets (shared ownership and collaborative consumption)	Slow manufacturing	Green chemistry	Responsible product distribution/promotion	Localisation			
Extended producer responsibility								

Figure 6 Sustainable business model archetypes. (Bocken et al., 2014, p. 48)

Bocken, Short, Rana & Evans (2013) formed value mapping tool, which is another common method for sustainable value creation. It includes broad stakeholder perspective and since it is presented more broadly in next chapter 2.2.3., that explores sustainable value creation and stakeholder theory.

Laszlo (2008) introduces the six levels of strategic focus -tool, for identifying sources of sustainable value (table 4). There are six levels of sustainability related value in every sector. Companies have concentrated mainly on the first and second levels. The first level actions are basically fulfilling the regulations and industry standards. The second level includes process cost reductions (e.g. eliminating waste and reducing energy consumption), which save the company money and cut social and environmental impacts. The second level activities are usually the first initiatives for sustainability that companies undertake.

Table 4 The six levels of strategic focus. (Laszlo, 2008, p. 27)

<i>Level of Focus</i>	<i>Sources of Value</i>
6. Business Context	Changing the rules of the game to provide competitive advantage for sustainability strategies
5. Brand / Culture	Developing a sustainability culture and brand identity
4. Market	Addressing new markets driven by customer and societal needs
3. Product	Creating product differentiation based on technical and environmental / social features
2. Process	Reducing energy, waste or other process costs
1. Risk	Compliance-oriented management of risks and protecting license to operate

The third and fifth level activities are more rare than previous ones. There is growing group of consumers who makes decisions according to environmental and social attributes, and the third and fifth levels of the tool cope with this fact. In the third level, companies have a possibility to differentiate themselves and their products on a dimension other than price performance. In the fifth level, corporate reputation and image are developed by addressing stakeholder concerns. Sustainable company image can for example attract talented employees and higher income consumers. (Laszlo, 2008)

The fourth and sixth levels are even rarer. The fourth level deals with the markets and companies can develop new businesses based on sustainability. Examples are plant-based food products, which are conquering the markets, and insurances for low income households in developing countries. In the sixth level the whole business context is changed, and companies try to shape the practices and rules that determines how the business can be conducted. (Laszlo, 2008)

Sustainable Value Analysis Tool (SVAT) proposed by Yang et al. (2014) is one method for industrial company to identify sustainable value creation opportunities related to product-service-system development. SVAT consists four steps which are: 1. define product life cycle, 2. describe the value captured, 3. identify the value uncaptured, and 4. analyse the value uncaptured, and explore the value opportunities.

Triple Layer Business Model Canvas (TLBMC) by Joyce and Paquin (2016) is tool for exploring and forming sustainable business model innovation. Economic business model canvas is extended by two layers: environmental and social layers. The environmental layer has a lifecycle viewpoint, and the social layer builds on stakeholder perspective. All three canvases are presented in the figure 7.



Figure 7 Triple Layer Business Model Canvas (Joyce & Paquin, 2016, p. 10)

Schaltegger, Hansen and Lüdeke-Freund (2016) summarize the fundamental difference between sustainable business models and normal business models. According to them, sustainable business models must create value for more than just one or two stakeholder groups. They see that without creating value for wider range of stakeholders and environment, it is not contributing to sustainable development, regardless of business orientation of business models. This is important aspect connects stakeholders to sustainable business models and value creation.

2.2.3 Stakeholder theory and sustainable value creation

Including stakeholder perspective to firm's value creation processes connected ethics to business practices for the first time (Donaldson & Preston, 1995). R. Edward Freeman's landmark book *Strategic Management: A Stakeholder Approach* (1984) made the stakeholder theory well-known for public. Stakeholder theory sees business as a system that creates value for the stakeholders and it has affected significantly to business as general. Its origins stem from the realization that there exist wide range of other important groups than stockholders, that needs to be considered by corporations when doing business (Mitchell, Agle & Wood, 1997; Clement, 2005). Earlier business and ethics were seen as separate parts of decision-making, but Freeman called for a merge of these parts and offered stakeholder approach to help with the integration. Freeman (1984) believed that by taking stakeholders into account is the only way to sustain the value creation over time.

Stakeholder theory was bound to corporate social responsibility (CSR) by Archie Carroll (1989), who think that stakeholder theory should be used to visualize organizations and their social responsibilities (Carroll, 1991). According to Carroll & Buchholtz (2015) stakeholder approach enables management that is more ethical and sustainable. Several management tools to conduct a stakeholder analysis has been introduced. For example, stakeholder maps are used to help to visualize stakeholders within a system and actor-linkage maps show the relationships between different stakeholders (Bocken et al., 2015).

According to Bansal (2005), companies are interested in sustainability in management practices if stakeholders require more sustainable management. Many times, motivation for sustainable actions come from pressures of external stakeholders (Seuring & Müller, 2008).

There are signs that ignoring or mismanaging stakeholders can cause long-lasting and costly problems for a company (Preble, 2005). It is typical that firms focus on core business value network (e.g. customer, supplier, producer and distributor) and forget other stakeholders like environment and society. From sustainability perspective, companies should form new cooperation and co-creation networks to create sustainable value. It seems that individual company alone, can do very little in the field of sustainability. (Aminoff et al., 2016)

Laszlo (2008) argues that primary barrier for sustainable value creation is the mindset of the leaders who do not see stakeholders as a source for value creation. For example, if company leaders believe that NGO's main objective is to ruin their business, they will see quite different value in this stakeholder group than if leaders believe that they both are trying to solve the same problem. Similarly, Bocken et al. (2013) see the collaboration of wide range of stakeholders as a source of sustainability. They believe that Freeman's (1984) multi-stakeholder tool is relevant and powerful, in order to create sustainable value. It is displayed in figure 8. Based on it, Bocken et al. (2013) introduced the value-mapping tool (figure 9).



Figure 8 Stakeholders of a firm. (Adapted from Freeman, 1984)

Originally, value mapping tool was established for sustainable business modelling, which means reconsidering the business models for sustainability. This tool aims to facilitate the implementation of “sustainable business thinking” which is defined as method “to integrate social, environmental, and economic sustainability into business thinking and operation, in

a manner that generates shared value creation for all stakeholders including the environment and society” (p. 67). Objective of value mapping tool is to support companies to equal value creation for all stakeholders. Tool highlights the importance of collaboration and encourages to discuss each actor’s perspective, so that circular ideas better suit to the interests of stakeholders including environment and society. (Bocken et al., 2015)

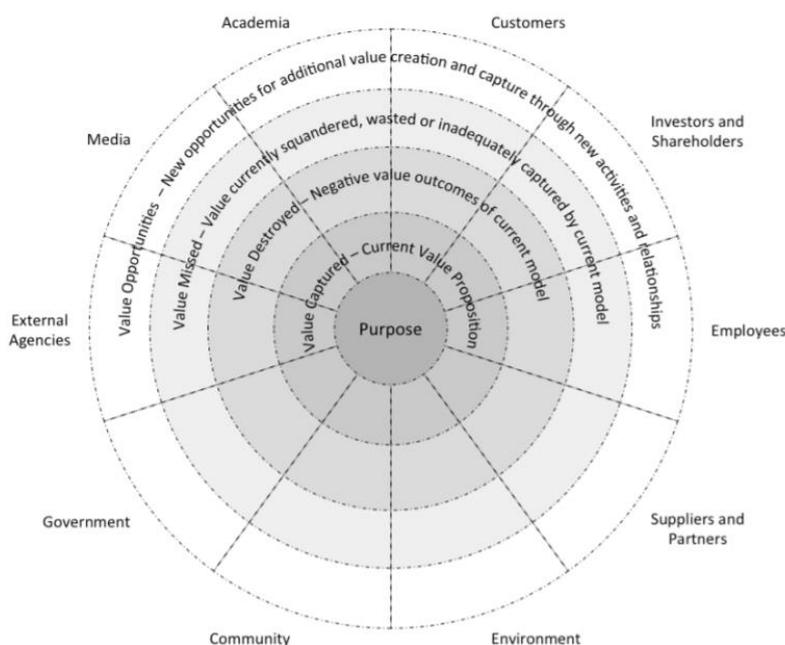


Figure 9 Value mapping tool (Bocken, Short, Rana & Evans, 2013, p. 10)

Tool supports companies in three practices (Bocken et al., 2015):

1. Understanding the positive or negative aspects of value in a network of stakeholders
2. Identifying conflicting values of stakeholders
3. Identifying opportunities for sustainable business model redesign – especially to improve societal and environmental impact – based on qualitative value judgements

Value mapping tool is sustainable as it aims to identify and reduce conflicts between the stakeholders. It targets to the best outcome for all stakeholders, by considering all the impacts of the decisions. It identifies value created, missed and destroyed for stakeholders. The tool is predominantly qualitative and do not support quantitative assessment. This has been criticized, although according to Bocken et al. (2015), IPCC (Intergovernmental Panel on Climate Change) emphasizes that decision-making on sustainability includes value and

ethical judgements, which are difficult to approach with quantitative measures. (Bocken et al., 2015)

To stakeholder theory closely relates the identification and prioritization of the stakeholders. From company's perspective, it usually is important to consider which stakeholder groups are the most significant. This is reasonable because it is impossible and unnecessary to pay equally attention to all of the groups. (Fassin, 2009; Preble, 2005) Many identification and prioritization methods have been suggested. One method is Freeman's (1984), who made suggestion to categorize stakeholders by type of change they are involved: internal and external change. Likewise, popular is primary vs secondary stakeholder identification by Clarkson (1995), where primary stakeholders are essential to corporation's survival (e.g. employees, customers, shareholders), when secondary stakeholders can influence or be influenced by the company, but they are not critical for the survival of company (e.g. NGOs, activists). Two-dimensional stakeholder matrices estimating stakeholder's power and their level of interest (see e.g. Johnson, Scholes & Whittington, 2008; Nutt, 2002), are also common methods for identifying and prioritizing stakeholders. Fassin (2009) introduced a model that differentiates three groups of stakeholders: real stakeholders, stakewatchers and stakekeepers. He believes that model helps in prioritizing between different stakeholders and shows their mutual connections.

One of the most cited study about stakeholder identification is conducted by Mitchell et al. (1997), who suggested stakeholder identification and salience theory. Salience means the degree to which decision-makers give importance to competing stakeholder claims. Their theory includes three attributes that can be used to stakeholder identification and prioritization: 1. Power to affect the firm, 2. Legitimacy of stakeholders' relationships to the firm, and 3. Urgency to which stakeholder claims need instant reaction. Authors see that all three variables matter, but earlier researchers have concentrated either on stakeholders' legitimacy (narrow view) or power (broad view). Urgency has not been considered at all, even though it can be harmful for the firm not to pay attention to this aspect.

The theory suggests managers to give priority to the stakeholder groups which have greater salience. The more power, legitimacy and urgency (attributes) stakeholder has, the greater is its salience. Authors identified eight classes of stakeholders based on different combinations of three attributes (figure 10). These classes are divided into specific areas.

Areas 1, 2 and 3 are identified low salience groups, as they have only one attribute. They are named “latent” stakeholders. These include dormant, discretionary and demanding stakeholders. The moderate salient areas are 4, 5 and 6, which are identified by their possession of two attributes. These are called “expectant” stakeholders, including dependent, dominant and dangerous stakeholders. The combination of all three variables is area number 7 which is highly salient stakeholders who are definitive. The last area (8) is non-stakeholder or potential stakeholder.

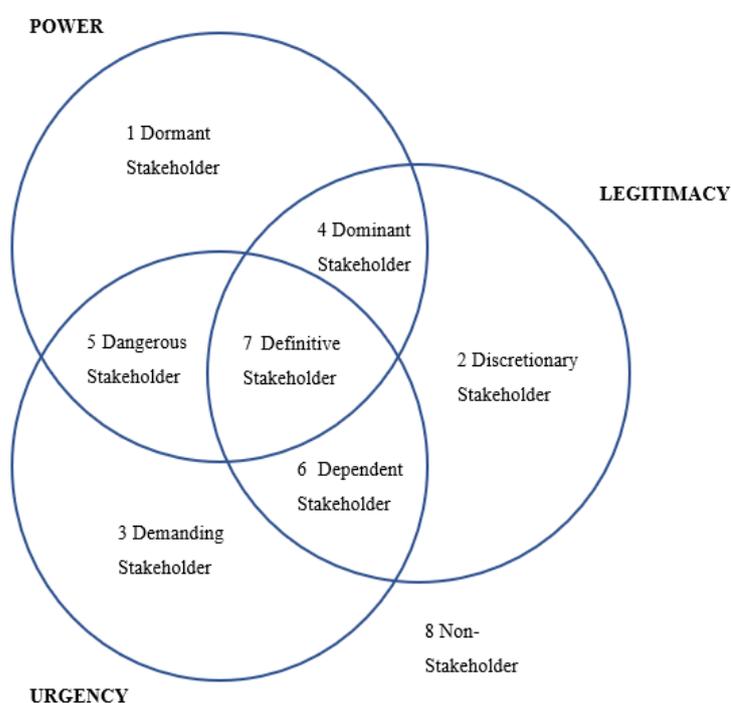


Figure 10 The stakeholder typology: one, two or three attributes present. (Mitchell, Agle & Wood 1997, p. 874)

Although tools to identify and prioritize stakeholders are popular, Bocken et al. (2015) point out, that many of these stakeholder management tools alone are unable to help with the identification of sustainable value creation. Orts and Studler (2002) criticize stakeholder theory due to its inability to include natural environment or other non-human participants as stakeholders. They emphasize the need for taking these aspects into account in corporate decision-making, even though the stakeholder theory cannot address them.

One target of criticism towards the theory is the assumption of homogenous and stable stakeholder groups (see e.g. Wolfe & Putler, 2002; Tsui, 1990). For example, role primacy categorization of stakeholder groups (customers, employees, shareholders etc.) has gathered

criticism. Wolfe and Putler (2002) argue that role-based of stakeholders can give flawed information to the firms. They see that sometimes individuals may have more alike priorities about a specific issue, despite of the fact that they are from different role-based groups. They also claim that role-based categorization demands an approach, where preferences of stakeholder groups are seen rather homogenous, which is not realistic many times. This limitation leads to simplify the organizational activities in order to satisfy stakeholders. Tsui (1990) emphasizes that responding to diverse needs of heterogeneous groups would require much more resources of a firm. Freeman (1984) note in his article that people tend to assume very quickly that one group has certain attitude and values.

2.2.4 Co-creation of value

Co-creation approach was introduced by Prahalad and Ramaswamy in 2000 in their article *Co-Opting Customer Competence*. It is rather new approach in value creation literature promoted by development of technology, particularly Internet. It is an initiative that aim to mutually valued target by bringing together different actors, such as customers and company. It removes the traditional one-way interaction where companies produce products and services for their customer at low cost and customers have small or no role in value creation. (Prahalad & Ramaswamy, 2004) This traditional approach is called company-centric view and it roots from Frederick Taylor's management approach that aims to reduce unit costs of production. Later in 1990's Michael Porter introduced value chain concept that gave managers framework to identify and manage costs of different stages of value chain. When coming to the 21th century, consumers' power has risen significantly due to Internet that allows fast, open and individual interactivity. In this environment, companies are forced to embrace a new approach to value creation where experiences are replacing products and services. (Prahalad & Ramaswamy, 2002).

Co-creation of value approach is described by Prahalad and Ramaswamy as follow: "*High-quality interactions that enable an individual customer to co-create unique experiences with the company*" (2004, p. 7). They think this method is the key to discover new sources of competitive advantage. Still important is to note that co-creation approach does not

outsource activities to customers and it is not customization of products or services (Prahalad & Ramaswamy, 2004).

Prahalad and Ramaswamy (2004) suggest the model for forming system of co-creation of value. Interaction is in the core of the model and since four building blocks of interaction are determined: dialog, access, risk-benefit and transparency (DART). To enable dynamic dialog and development of shared solutions, representatives of companies and customers need to be equal. Clear rules of engagement need to be set. Equal dialog is hard if both actors do not have same access and transparency to the information. Nowadays information is ubiquitous due to information and communications technology (e.g. internet), which makes parties more equal in access and transparency sense. Consumers are increasingly possible to assess the risk-benefit of actions and decisions due to rise of dialog, access and transparency. In this existing era of business creativity and opportunity, companies need to adjust to release the potential of co-creation of experiences and value (Prahalad & Ramaswamy, 2002).

2.3 Sustainable value creation in circular economy context

The third section of theoretical background examines sustainable value creation in CE context. This field is rather new and there are few studies examining it. At least, three relevant studies about value creation in CE model were available and they all are from recent years (see EMF, 2013; Van Renswoude, Wolde & Joustra, 2015; Aminoff et al., 2016). In general, value that is created in circular business is called circular value. It is possible to assume that circular value is also sustainable because CE tries to keep value in products as long as possible, creating directly economic, social and environmental value (Smol, Kulczycka, Henclik, Gorazda & Wzorek, 2015).

EMF (2013) studied sustainable value creation in CE and they found four principles for circular value creation through the CE model. The first one is power of inner circle, which relates to minimizing use of comparative material in relation to linear system. The tighter the circle, the less there is need for product changes in remanufacturing or reuse. Also, products will return more quickly to the use, which means more savings. The second principle is power of circling longer, meaning maximization of the consecutive cycles (reuse, recycling and remanufacturing) and time used in each cycle. The third principle is power of

cascaded use, that covers reuse through the value chain. Same product can be used for different purposes in different industries after the original usage and this way it is possible to save virgin materials that would otherwise be used for same purposes. The fourth and the last principle is power of pure circles. It encourages to maintain pure material flows, which ease the collection and improve the redistribution.

Van Renswoude et al. (2015) have parallel ideas about circular value creation. Their idea based on EMF's (2013) four principles, which were just introduced. Van Renswoude et al. (2015) suggest that there are short, long and pure cycles, cascades, dematerialized services and production on demand demonstrating the value creation method. Last two principles are added to EMF's model. Dematerialized services in value creation denote selling services instead of physical products. Production on demand eliminates production without knowing the future buyer.

Aminoff et al. (2016) have studied similarly circularity in the value creation analyses. Their study emphasises networks for co-creation of value. They formed a framework for sustainable value creation recognition. It is a systematic tool, that enables firms to identify value creation to different actors and stakeholders through circular economy. Framework includes three steps: 1. Defining the preliminary value proposition of the network, 2. Identification of actors of the network and its view (all important stakeholders to succeed in value creation), and 3. Value hunting (what value is created, destroyed and missed).

Benefits that CE provides, can be categorized to environmental, social and economic benefits the same way as sustainable development is divided to dimensions. Korhonen et al. (2018) made categorization to environmental, social and economic wins of CE model (figure 11). They describe it as a flow, that consists three phases. At first, they examine environmental and economic inputs, that lead to phase of cyclical materials flows, renewable energy sources and cascading energy flows, where social benefits are created, and the last phase covers environmental and economic outputs. The flow reveals the win-win-win potential that CE model holds. In other words, according to them, these are the sustainable values CE model can provide.

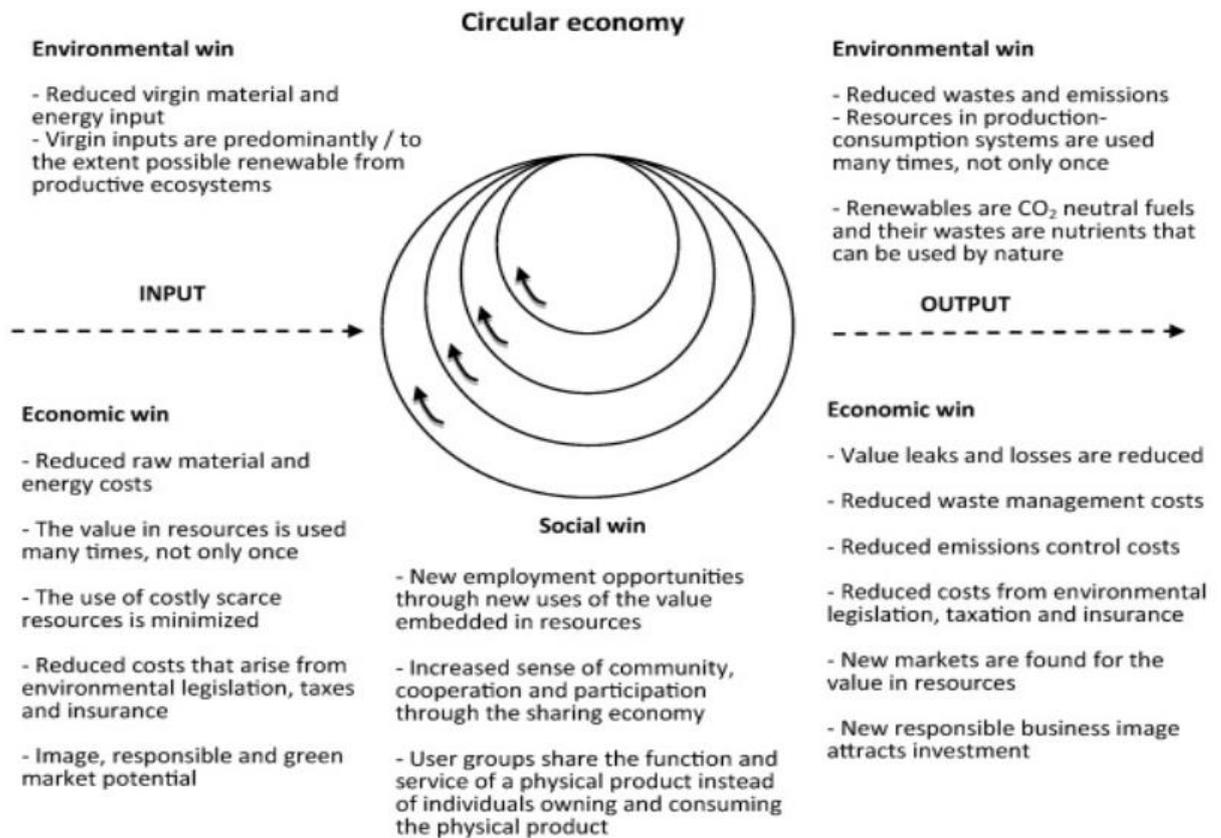


Figure 11 Win-win-win potential of CE. (Korhonen, Honkasalo & Seppälä, 2018, p. 40)

2.3.1 Circular business models

As it turned out earlier in chapter 2.1.2 and 2.2.2, business models are important part of implementation of CE. Sustainable and circular business models are close literature fields because CE is seen as a driver for sustainability (Antikainen & Valkokari, 2016). Sustainable business models were examined in chapter 2.2.2. and now business models related to CE are explored.

According to Nussholz (2018, p. 185): “aim of circular business models is to reconcile creation of commercial value with adoption of circular strategies that can prolong the useful life of products and parts (e.g. repair and remanufacturing) and close material loops (e.g. recycling).” Mentink (2014, p. 35) define circular business model as “the rationale of how an organization creates, delivers and captures value with and within closed material loops.”

Many propositions of circular business model frameworks are done last years. Examples of them are gathered in table 5 and explained in detail below.

Table 5 Examples of circular business model frameworks

<i>Founder</i>	<i>Framework</i>
Lewandowski (2016)	Conceptual Framework for designing business model for circular economy
Nussholz (2018)	Visualisation tool to map circular business models
Bocken, Pauw, Bakker & Grinten (2016)	Closing, slowing & narrowing resource loops
Laubscher & Marinelli (2014)	Six key areas for integration of the circular economy principles with the business model
Scott (2015)	7-P model
Van Renswoude, Wolde & Joustra (2015)	Business model scan

Division, proposed by Bocken, Pauw, Bakker & Grinten (2016), between closing, slowing (long product life and reuse) and narrowing (use of fewer resources per product) resource loops has become common method to classify business models. This is demonstrated in figure 12 with circular and linear flows. The division helps to acknowledge characteristics of business model.

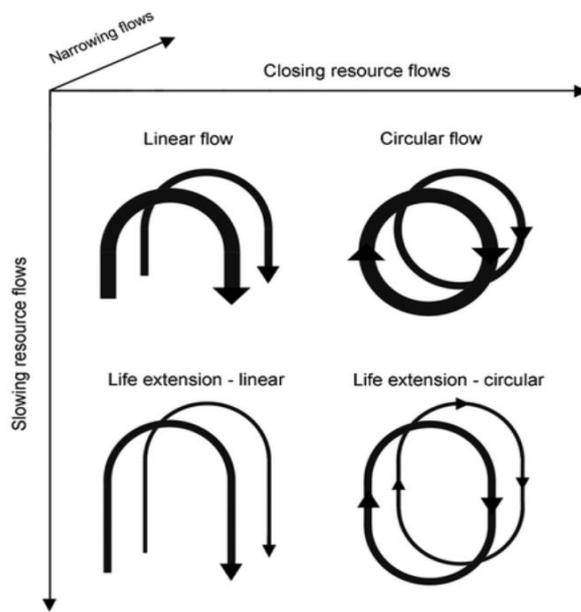


Figure 12 Categorization of linear and circular approaches for reducing resource use. (Bocken, Pauw, Bakker & Grinten, 2016, p. 309)

Kourula and Halme (2008) argue that companies should not only focus on responsibility of existing business operations but rather shape novel business models for coping with environmental and social issues. According to Lewandowski (2016), changing the existing business model to circular one is usually perceived challenging. Therefore, he introduced a universal framework to help practitioners in transition to circular business models. His framework is unique at the moment, due to its universal nature, which makes it applicable in every company. Framework identifies how CE principles apply to common business model framework by taking account the specific components relevant in CE. Then it forms circular business model canvas and identifies triple fit challenge as success factor for circular business model implementation. (Lewandowski, 2016)

Lewandowski (2016) based his framework on previously developed and valued tools. First, he studies how main CE principles: regenerate, share, optimize, loop, virtualize and exchange (ReSOLVE framework), can be adapted to business model components, which are value propositions, customer segments, channels, customer relationships, key resources, revenue streams, key activities, key partnerships, take-back system cost structure, and adoption factors. According to his literature review, two aspects: take-back system and the adoption factors, are the most significant in CE and must be included to the business models to be able to develop circular business models further. Take-back strategy can secure

business from scarce resources and volatile market prices of raw materials (Van Renswoude et al., 2015). Then the framework utilizes business model canvas (BMC) by Osterwalder and Pigneur (2010) and adjust it to circular economy version (figure 13). Circular BMC has eleven building blocks (same eleven components), which enable the development of business model that is in line with CE principles.

Partners <ul style="list-style-type: none"> Cooperative networks Types of collaboration 	Activities <ul style="list-style-type: none"> Optimising performance Product Design Lobbying Remanufacturing, recycling Technology exchange 	Value Proposition <ul style="list-style-type: none"> PSS Circular Product Virtual service Incentives for customers in Take-Back System 	Customer Relations <ul style="list-style-type: none"> Produce on order Customer vote (design) Social-marketing strategies and relationships with community partners in Recycling 2.0 	Customer Segments <ul style="list-style-type: none"> Customer types
	Key Resources <ul style="list-style-type: none"> Better-performing materials Regeneration and restoring of natural capital Virtualization of materials Retrieved Resources (products, components, materials) 		Channels <ul style="list-style-type: none"> Virtualization 	
	Take-Back System <ul style="list-style-type: none"> Take-back management Channels Customer relations 			
Cost Structure <ul style="list-style-type: none"> Evaluation criteria Value of incentives for customers Guidelines to account the costs of material flow 			Revenue Streams <ul style="list-style-type: none"> Input-based Availability-based Usage-based Performance-based Value of retrieved resources 	
Adoption Factors <ul style="list-style-type: none"> Organizational capabilities PEST factors 				

Figure 13 A framework of the circular business model canvas. (Lewandowski, 2016, p. 21)

It is crucial that building blocks fit together (Osterwalder & Pigneur, 2010). Lewandowski (2016), identified triple fit challenge between the building blocks. The first fit emerges between customer segments and value proposition. The second fit is amongst cost structure and revenue streams. The third takes place between the changes a company implements when aiming to more circular business model and adoption factors. This triple fit challenge is a success factor for circular business model implementation.

Central aspect of business models overall, is the visualization of them. Visualization shows the structures and help to understand the model, communicate about it and identify possible obstacles. (Osterwalder & Pigneur, 2010) Nussholz (2018) introduces visualisation tool to survey circular business models (figure 14). It represents the principles and cycles of circular business models, in order to extend the life cycles of products. Tool combines value dimensions (value proposition, value creation and delivery, value capture) of Osterwalder

and Pigneur (2010), together with business model principles by Richardson (2008) (offer, customer segments...) and four life cycle interventions: 1. collect and reintegrate, 2. first sale (enabling prolonged useful life), 3. additional sale(s) of the product or parts, 4. material recovery.

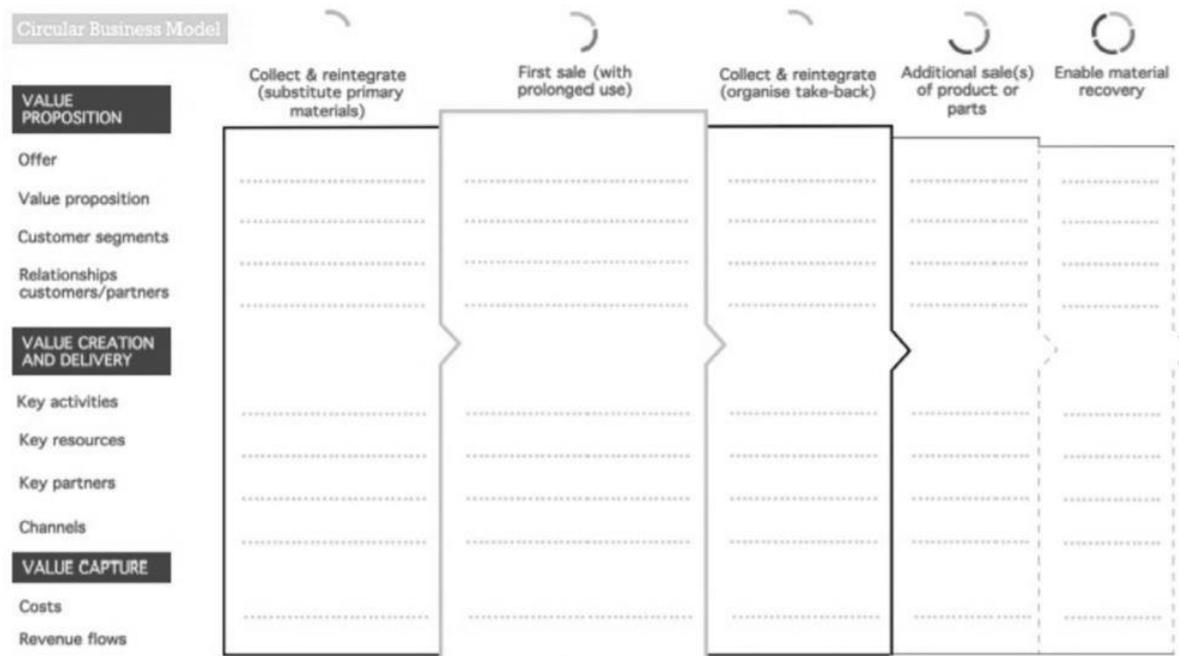


Figure 14 Circular business model mapping tool. (Nussholz, 2018, p. 189)

Van Renswoude et al. (2015) suggest business model scan, tool for enhancing transition of a company to more circular one. It has six process steps that include several questions about value proposition, design, supply, manufacturing, use, and reuse. Similarly, Scott (2015) presented 7-P model, which helps to gain understanding of CE and apply it to business practices. Model contains three steps. The first is learning and understanding the basics of CE and what it concerns, as well as deciding on establishment of sustainability as a target. The second step is about organizing and implementing mechanisms of CE to the process, product, production, preservation, people and place. The third stage covers team building and management of change that enable implementation of CE.

Laubscher and Marinelli (2014) studied integration of CE principles with business model and they found six key areas to promote CE: sales model, product design, IT/data management, supply loops, strategic sourcing for own operations, and HR and incentives. These are presented more detail in table 6.

Table 6 Six key areas for integration of the circular economy principles with the business model. (Laubscher & Marinelli, 2014)

Sales model	shift to selling services, instead of products, and collecting products after their first life
Product design, material composition	design and engineer activities try to maximize high quality and reuse of products and materials
IT/data management	keep track of products, components and material data
Supply loops	maximization of the recovery of own assets when profitable and gaining additional value by maximizing the usage of recycled materials and components
Strategic sourcing for own operations	partnerships and long-term relationships with suppliers and customers
HR, incentives	adequate culture adaptation and development of capabilities

There have been suggestions by different authors (e.g. Bocken et al., 2016; Lewandowski, 2016) how to categorize circular business models. These suggestions usually include same models but in different order with different category names. Examples of circular business models are gathered in table 7. It is adapted from Lewandowski's (2016) study where categorization of business models is based on ReSOLVE components.

Table 7 Types and examples of circular business models, categorized by ReSOLVE model. (Adapted from Lewandowski, 2016, p. 8-9)

<i>Classification criteria</i>	<i>Business model</i>	<i>Example</i>
Regenerate	Energy recovery, circular supplies, efficient buildings, sustainable product locations	Kolmenkulma Eco-industrial park, Eco3,
Share	Maintenance & repair, leasing, sharing platforms, collaborative consumption, product-service-systems, incentivized return & reuse, upgrading, bring your own device, product attachment & trust, gap-exploiter model	Patagonia, 24Rent, Ekorent, Lem-Kem, Lindström, Martela leasing, Ikea leasing, Airbnb, BlaBlaCar, Citrix pays employees for bringing own computers, Moccamaster
Optimize	Asset management, Produce on demand, Lean thinking, Waste reduction, Good housekeeping	Floow2, Venuu, Dell Computer Company

Loop	Remanufacture, Product transformation, Resource recovery, Recycling, Upcycling, Circular supplies	Aquazone, Desso, Sulapac, Zadaa, Taitonetti.fi, Tori.fi
Virtualize	Dematerialized services	Netflix, Spotify
Exchange	New technology	Prenta, Crosslam, Naava

Manninen, Koskela, Antikainen, Bocken, Dahlbo and Aminoff (2018) studied if CE business models capture environmental value propositions. According to them, assuring the CE business models' environmental benefits can be complicated, due to complex value chains or lack of data or assessment method. Therefore, they introduced the framework for environmental value proposition evaluation. Life cycle perspective as well as identification and role of stakeholders are emphasized in this framework, which is presented in visual aid in figure 15. Inner circle shows the planned environmental value propositions of CE business models.

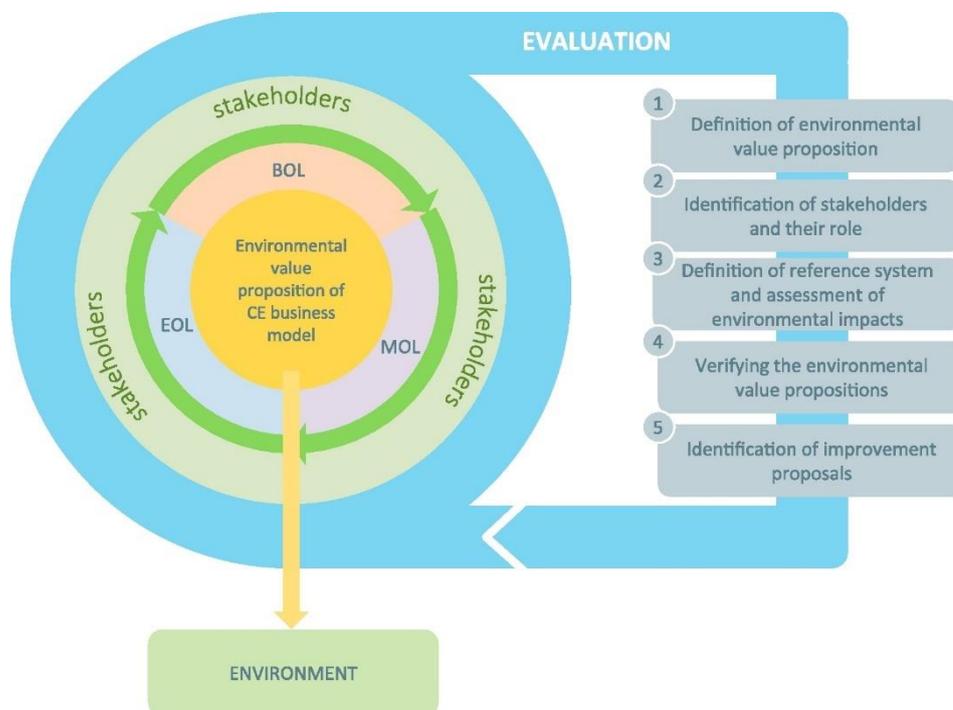


Figure 15 The environmental value proposition evaluation framework. (Manninen, Koskela, Antikainen, Bocken, Dahlbo & Aminoff, 2018, p. 416)

2.3.2 Challenges of circular economy implementation

Regardless of the benefits of CE, implementation of it to the business practices seems to be challenging. There are many reasons behind this and main challenges are identified and reviewed in this chapter. Table 8 summarizes the significant challenges.

Table 8 Challenges of CE implementation

<i>Researcher</i>	<i>Challenges of implementation</i>
Lewandowski (2016)	Failure of adoption
Geng & Doberstein (2008); Korhonen et al. (2018)	Lack of technology
Ghisellini et al. (2016)	Lack of tools and frameworks
Planing (2014)	Geographic dispersion
Sauvé et al. (2016)	Concept of CE can be conceptualized differently
Korhonen et al. (2018); Ghisellini et al. (2016)	Lack of clear business case for CE
Antikainen & Valkokari (2016)	CE can challenge and destroy the usefulness of existing networks, business models and capabilities
Robért et al. (2002)	Temporal paradoxes: tendency to seek short-term impact reduction over long-term goals
Murray et al. (2017)	Risk that social dimension will be ignored in CE model
Geng & Doberstein (2008); Xue et al. (2010); Bourguignon (2016); Planing (2014)	Lack of regulatory and public support

	Unfavourable tax regulation, lack of CE encouraging policies, multi-level governance, conflict of interests within companies, lack of financial support by government
Xue et al. (2010); Ghisellini et al. (2016); Planing (2014)	Low public awareness, low consumer and producer awareness, consumer behaviour, customer irrationality
Lieder & Rashid (2016); Korhonen et al. (2018)	Prevailing assumptions and mindset, path dependency

Previously mentioned adoption factors which enables the conditions where success of CE implementation is possible, play important role because if there occur some barriers, it is difficult to obtain profitability of closed circles. These challenges are related to general factors (e.g. sufficiently valuable materials, facile reuse, remanufacture, recycle of materials and predictable future demands), human resources, business risks, political system and legislation, and IT and data management. (Lewandowski, 2016) Generally challenges can be divided to technological, political and managerial challenges.

Technological challenges firstly relate to existing linear system that is supported by current technology. (Lewandowski, 2016) IT and data maintenance are important in CE, because they enable to keep track of material and component data. However, this is yet difficult and practices do not fully support than kind of use of data. (Scott, 2015) Technology and science are in key roles when pursuing CE. To be able to implement new technologies, financial resources and training is needed, that can become an obstacle in many cases. Correspondingly, information sharing is required, to enable spread of new technologies. (Geng & Doberstein 2008) Korhonen et al. (2018) remark that improvements to technology hide a risk of Javon's paradox, which means the situation where improved technology in fact increases the consumption of raw material as it comes more efficient and profitable.

An interesting technological challenge for implementation of CE, is geographic dispersion. It can form a barrier when collaboration between firms becomes difficult and unprofitable due to the long distances. Collaboration among companies is essential when aiming to close the material and other loops and reaching for synergy benefits. (Planing, 2014)

Managerial challenges cover different human related and tools related challenges. Implementation of CE is perceived challenging, due to mindset that people have (Lewandowski, 2016). It is essential to put effort in human resources and form good teams, goals, motivation, training programs, leadership and networks (Scott, 2015; Laubscher & Marinelli, 2014). Sauv e, Bernard & Sloan (2016) see that the concept of CE can be conceptualized differently. Especially confusion may occur between professionals from different disciplines. This can form a barrier for CE implementation.

In addition, the implementation of CE is in the beginning and there is still lack of frameworks and models supporting implementation. Recently, many tools for implementation have been introduced, but consensus of the best practices is still missing. (Ghisellini et al., 2016) This forms managerial challenges as there is not common tools and frameworks to which lean on when implementing CE.

Antikainen and Valkokari (2016) state, that CE can challenge and even destroy the usefulness of prevailing business models, networks and capabilities. According to them, companies and even industries can be reluctant to implement CE because it might demand such significant changes throughout the organization. Authors' opinion is, that many times, the newcomers can disrupt the markets and re-design value chains. It is known, that when company implements one business model, they will encounter difficulties in changing the business model (Teece, 2010).

One important managerial challenge in environmental management is tendency to seek short-term impact reduction rather than long-term strategic and inter-generational goals (Rob ert, Schmidt-Bleek, Aloisi de Larderel, Basile, Jansen, Kuehr, Thomas, Suzuki, Hawken & Wackernagel, 2002). This can forestall the use of the most beneficial practices and strategies, including use of CE model. Also, the conflict of interests within companies are discovered as barriers for circular business model implementation (Planing, 2014).

According to Mentink (2014), business models in CE (e.g. product-service-system) involve three kind of business risks. These risks are identified as managerial risks. The first relates to the fact, that some consumers prefer to own the product due to emotional attachment to the product or intangible value like social status it offers. The second relates to requirement to provide extensive descriptions and explanations when selling function-oriented services,

which can increase the transaction costs. The last is the fact that validation of circular business model holds higher business risk than verifying equivalent linear business model. (Mentink, 2014)

Managerial risks also refer to economic benefits of CE model. That has been a hot topic, as some think that there are not sure proofs, that CE would enhance economic growth (Ghisellini et al., 2016), although many parties see that implementation of CE could provide cost and other savings (e.g. reduced waste flows) (Korhonen et al., 2018, Sitra, 2016). There is a lack of clear business cases that would prove the benefits of the model (Ghisellini et al., 2016). Due to the conversation related to economic perspective, CE might show itself disorganized and unprofitable.

Murray et al. (2017) express their concern about the risk that social dimension will be ignored in CE model. They see that the model principally focuses on environmental and economic dimensions. It is pointed out that positive environmental impacts (e.g. reduced pollution and use of natural resources), which are possible to achieve through CE, will benefit people. Also, increased job opportunities will benefit people. (EMF, 2013) All three dimensions are interconnected, although it seems that social aspect is the least represented in the CE model.

Political challenges relate to lack of regulatory and public support. Major political challenge is unfavourable tax regulation from the CE perspective, that leads to situation where economic incentive to implement CE practices is low (Geng and Doberstein, 2008). Also, policies do not financially support the implementation of CE and so the implementation can be too expensive for companies (Xue, Chen, Geng, Guo, Lu, Zhang & Lu, 2010). Overall, policies encouraging CE through green manufacturing, technologies and consumption are still missing (Geng and Doberstein, 2008). CE relies on intervention of an authority, which brings out political and economic aspects (Sauvé et al., 2016). This brings out the problem of multi-governance, as implementation of CE would require collaboration and actions in many levels (international, European, national, local, business, individual) (Bourguignon, 2016).

Public participation is very important for CE implementation, because without it, efforts towards CE will remain insignificant. Significance of stakeholders in public participation is

high because management of natural resources and their fair allocation require support and cooperation of all stakeholders. (Geng & Doberstein, 2008) Planing (2014) argued that customer irrationality can form a barrier for circular business model implementation. Xue et al. (2010) emphasize that generally low public awareness is significant barrier for implementation of CE. European consumers and producers' knowledge and awareness about CE are lagging behind, which forms a problem, because in EU producers and consumers are responsible of conducting EU policies (Ghisellini et al., 2016). Liu, Zhang & Bi (2012) studied Chinese people's awareness of national CE program and found that awareness had positive correlation to their educational level. Hence, it seems necessary to invest in education, in order to increase the level of public awareness and participation.

Korhonen et al. (2018) highlights the importance of legislation when pointing out, that current environmental policy and legislation can make it difficult to utilize waste flows as efficiently as CE requires. Valuable resources are stuck in the waste flows and cannot be used due to legislation. Currently, waste is generally seen as useless and unimportant. Lieder and Rashid (2016) emphasize that educational approaches should concentrate on this problem and systematically try to change the existing assumptions towards waste and discover the potential of CE.

Assumptions and mindset generally, are undoubtedly one of the greatest challenges when pursuing to CE implementation. Current consumption practices and culture need to change, in order to grasp CE and sustainability generally. Also, the path dependency, the fact that first technologies retain market position no matter of their inefficiency, complicates the implementation of CE when better options cannot obtain the proper position in the market. (Korhonen et al., 2018)

2.3.3 Drivers of circular business models and system change implementation

CE can provide a solution to many global problems like waste problem, resource scarcity and sustaining economic benefits (Lieder & Rashid, 2016). To be able to achieve a system change from linear to circular model, business models of CE must be implemented. But what are the drivers fostering the change? Researchers have identified drivers for CE implementation. These are gathered in table 9 and carefully explained below the table.

Table 9 Drivers for CE implementation and system change

<i>Researcher</i>	<i>Drivers for CE implementation and system change</i>
EMF (2013); Stahel (2013); Ghisellini et al. (2016)	Political drivers
EMF (2013)	Competitive advantage
EMF (2013)	Risk management
Sauvé et al. (2016)	Need to solve environmental problems, momentum is now
Hill (2014)	Governmental pressure

CE can offer significant benefits for society that can work as political drivers. It is estimated that CE would increase the wealth of low income people by creating new job opportunities (EMF, 2013). According to EMF's estimation, CE could create 100 000 new jobs over the next five years. Stahel (2013) explains that CE will increase activities like remanufacturing and reuse, which are labour intensive, not resource intensive like prevailing linear take-make-use-dispose system. CE could enhance a smooth transition to more environmentally friendly living and promote different socio-economic dynamics (Ghisellini et al., 2016).

CE concept is gaining momentum now, because it helps to tackle the environmental problems (Sauvé et al., 2016). CE model has evolved from theoretical construct to an idea, that is commonly accepted and gaining support from policymakers and business people (Hill, 2014). Pressure from government for CE implementation is clear driver as we can see from China example. China that has done probably the most influential implementation so far in the field of CE, when they accepted CE as nationwide strategy towards more sustainable economy in 2009 (The Standing Committee of the National People's Congress, 2008). As stated earlier, also European Union (European Commission, 2018) and for example Finland, have taken steps to support CE. Sitra's *Road map to a circular economy 2016-2025* forecasts

that CE would bring at least three billion euros in added value to national economy. (Sitra, 2016) These facts, work as political drivers for CE implementation.

EMF (2013) has listed also benefits that CE model can provide to companies and consumers. These are risk management and economic drivers. Companies can benefit from CE many ways. Price volatility and supply risks related to scarce materials will decrease, which is also risk management and can work as a driver for the system change. Also, great costs savings in materials can be reached. Customer loyalty can improve when customers will return their products to the firm. This creates new opportunity for gaining competitive advantage. New business models and ways to serve customers can be developed, and increased interaction between the firm and customer creates new opportunities in customer relations. Moreover, better reputation is listed as one possible benefit. (EMF, 2013)

Consumers benefit from CE model through longer durability of products that will reduce the total cost of ownership. More tailored products and services will be available as relationship between the firm and customer lasts longer and more remanufacturing services are offered. (EMF, 2013)

3 THEORETICAL FRAMEWORK OF THE STUDY

CE concept has emerged during the last years and gained credence among circles of academic, politics and business. This model reorganises the prevailing economic system and promotes more sustainable one, where waste is minimized, and materials and components are reused continuously. Its origins are in different schools of thought like industrial ecology (IE), eco-industrial development (EID), ecological economics and general systems theory. Implementation of CE can be complex but by overcoming emerging challenges, there exists a lot of drivers and opportunities in this field. One interesting area is sustainable value creation within the CE model, which is also studied in this research. Sustainable value creation focuses on value creation to the stakeholders and its idea stems from the ideas of TBL and SD. Thus social, environmental and economic bottom lines are perceived equally important.

Theoretical framework in figure 16 shows the main elements and concepts of the study. The theoretical part of the study reviewed literature of CE, as well as sustainable value creation. First separately and then together. Next, these concepts are examined in Finnish property sector.

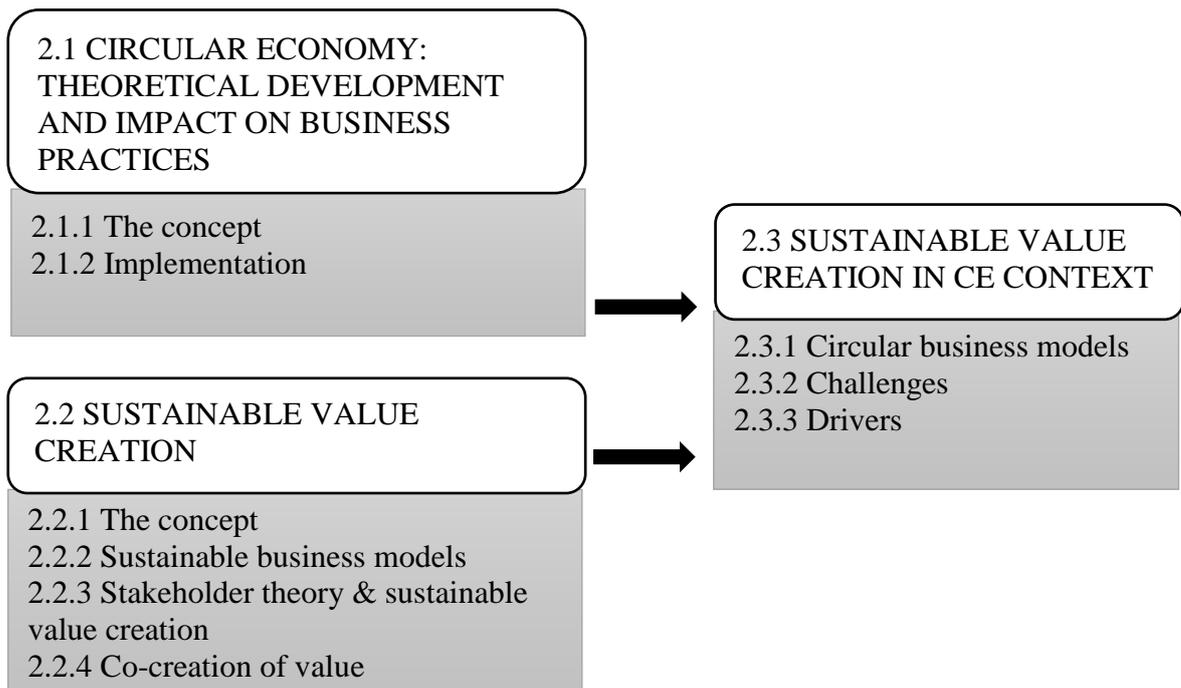


Figure 16 Theoretical background

4 FINNISH PROPERTY SECTOR IN THE CONTEXT OF CIRCULAR ECONOMY

This chapter gives an insight to current emerge of CE in property sector. It provides an overview of current CE actions, identifying challenges and drivers, stakeholder aspects and CE implementation practices.

Property sector provides an interesting research field from CE perspective. Industry has gone through significant changes during the last decades. Technological development has enabled emerge of new services and ongoing trend has been retirement of buildings' own maintenance personnel, which has caused rise of external maintenance services. Service providers have discovered new business opportunities in the field of maintenance of buildings. For example, knowledge intensive management services for buildings and premises have gained popularity. Such services include i.a. consulting services and technical and data processing services. Is forecasted, that buildings' maintenance and renovation industry will continue to grow in the future. (Lith, 2017) Interesting is also the novelty and unfamiliarity of CE concept in the industry, which can be seen from the literature, that lacks CE studies concerning property sector. According to LaSalle (World Economic Forum, 2016), property sector is lagging behind other industries in implementing environmental policies. LaSalle believes, that it would be beneficial to have mutual environmental policies in property industry.

The whole sector is expected to grow in the future due to ongoing socio-economic forces, which means population growth and more people living in urban environments. This development will make environmental impacts even more important in the property sector in the future. (World Economic Forum, 2016) Now emphasis of environmentally friendly actions has been in energy and resource efficiency of buildings and premises. Built environment is the world's largest consumer of raw materials. Due to changes in lifestyle and demographic, raw materials are becoming scarcer, and solutions related to material efficiency and material loops are required. (KTI, 2016)

Leising et al. (2017, p. 977) have defined circular buildings as follow: *“A lifecycle approach that optimizes the buildings' useful lifetime, integrating the end-of-life phase in the design*

and uses new ownership models where materials are only temporarily stored in the building that acts as a material bank.”

4.1 Challenges and opportunities

According to LaSalle (in World Economic Forum, 2016), property industry underperforms in addressing social and environmental issues. Typical are long value chains where various actors are in different level at addressing these issues causing overall drop in sustainability within value chain. Total sustainability effectiveness decreases when one part of the value chain does not give their contribution. Another problem is lack of integrated approach to buildings' making and managing. All this leads to disjointed sustainability results. (World Economic Forum, 2016) KTI (2016) found that property owners and investors experience challenges in motivating and guiding stakeholders to work towards common goals, in the field of sustainability and corporate responsibility. Also, verification and development of responsible and sustainable actions by service providers was a challenge for 60 % of respondents.

Construction and property sector together consumes over 40 % of all energy in Finland. Recently energy costs have increased, and they form 35 % of buildings' maintenance costs. At the same time as costs are rising, clear inefficiencies in practices are recognizable. For example, work and conference rooms' occupancy rates are only 50 % in Helsinki metropolitan area. Still the premises must be lightened, cooled and heated through the year, which continuously increases maintenance costs. (Sitra, 2017b) Occupancy rate problem is typical in property sector as buildings are usually used only at specific time per day.

Another big problem is empty premises. In Helsinki metropolitan area there are 2 million squares of empty or vacant office space (Mölsä, 2017). At the same time, there would be need for new dwellings in the same Helsinki area (VTT, 2016). From CE perspective it looks beneficial to transform empty office buildings into dwellings. This happens only occasionally, because building's renovation can easily be more expensive, than constructing a new building, especially outside the city centre where house prices are lower. Also, when a building is renovated, it must meet the requirements of new construction. This can be

complicated due to solutions used in old buildings (e.g. way of constructing and materials used). (Mölsä, 2017)

Opportunities of CE in property sector relate highly to the reduction of environmental impacts of buildings (RT, 2018a). Furthermore, earlier mentioned target of European Union to reduce greenhouse gas emissions by 80 % is a driver for CE (European Commission, 2011). Opportunities of CE in the sector can be linked to new business opportunities that interest companies (RT, 2018a). According to Jensen, Voordt, Coenen and Sarasoja (2014), property sector earlier focused on cost reduction alone, but now has shifted towards managing properties as a strategic resource to increase value created for the organization and its stakeholders. This is an opportunity for the sustainable value creation in CE. Jensen et al. (2012) identified six types of added value:

1. Use value (quality in relation to users' needs and preferences)
2. Customer/consumer/user value (the compromise between benefits and costs for these stakeholders)
3. Economic/financial/exchange value (the economic compromise between benefits and costs)
4. Social value (promoting positive social interaction and strengthening social identity)
5. Environmental value (Green facility management, environmental impact of facility management)
6. Relationship value (receiving high-quality services or experiencing a special treatment)

4.2 Stakeholders

Sustainability and responsibility issues have got attention in property sector in 2000s, due to growing stakeholder demands (RAKLI, 2014). This is typical in every industry, as companies are increasingly evaluated according to how they respond to stakeholder requirements (Andersen, 2007; Clement, 2005). It is clear, that firms have faced increasing pressure to act environmentally-friendly for the last decades, but recently there have been evidence of much larger movement to sustainable direction. Important point is, that the pressure comes not only from traditional stakeholders but also from social trends and general

expectations. (Waddock, Bodwell & Graves, 2002) Stakeholders have nowadays instant access to information concerning companies and their activities, which leaves no room for social, environmental or economic violations. Top management is increasingly aware of the importance of social, environmental and governance performances and how these affect the company's reputation, ability to attract new employees and drive new innovations. (Laszlo, 2008) Due to growing pressure, companies are using stakeholder approach to support corporate sustainability (Dyllick & Hockerts, 2002). Literature also indicates, that firms can achieve significant objectives, like improve their bottom line, by responding to stakeholder interests (Clement, 2005). It seems, that stakeholders are something that firm must take into account throughout its operations or otherwise they simply cannot compete in the market.

Many scientists have acknowledged that the concept of stakeholder is vague and there exists conceptual confusion (e.g. Fassin, 2009; Mitchell et al., 1997; Donaldson & Preston, 1995). Miles (2012) studied 493 articles in her research and found that a new definition to stakeholder concept came out in every 1,13 articles. The word "stake" means that "what counts" or "interest", and thus stakeholder is the one that matters to the firm (Mitchell et al., 1997). Näsi (1995) sees, that "holders" who have "stakes" interact with the firm and so enables its operations. Freeman (1984, p. 46) stakeholder definition is gained most recognition: "*Stakeholder in an organization is (by definition) any group or individual who can affect or is affected by the achievement of the organization's objectives*". Firms need to know the most essential stakeholder groups for them and many times it is necessary to prioritize them according to some criteria due to limited resources (Fassin, 2009; Preble, 2005).

In property sector, companies have responded stakeholders' sustainability demands. From social responsibility perspective, emphasis has been in providing safe, healthy, cost efficient and comfortable premises for different purposes. Social responsibility also encompasses role of industry as a big employer. From environmental responsibility perspective, building's owner has to offer necessary technical conditions to maintain energy and eco-efficient performance. Then the user of a building takes care of building's daily operations and affects environmental load that way. (RAKLI, 2014) Environmental load decreases with close cooperation between user and owner of a building (KTI, 2016). This cooperation is demonstrated in figure 17, which shows the stakeholder map of property sector. It shows

and determines the responsibilities of each stakeholder of a building in order to reduce environmental load. Service provider's role is also included to the diagram.

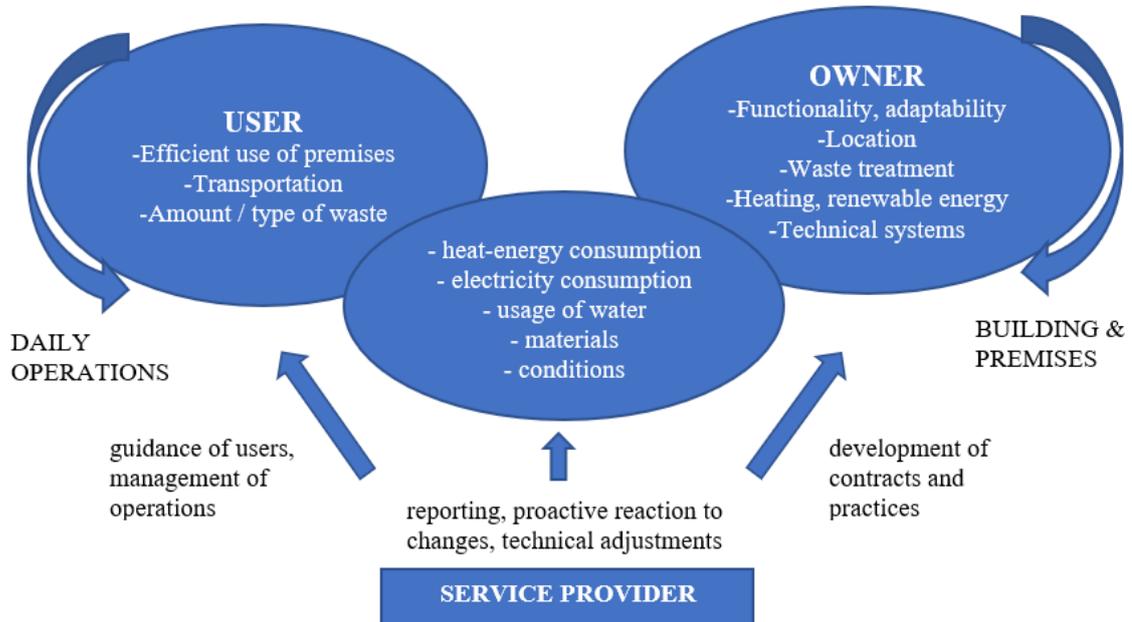


Figure 17 Stakeholder map. (adapted from KTI, 2016, p. 15)

4.3 Implementation

Regardless of novelty of CE concept, there are signs of interest towards CE in property sector. Many initiatives and projects related to CE are undertaken lately. Earlier mentioned Kiertotalous Sprintti, aims to implement CE in Finnish property sector by organizing workshops to increase the CE knowledge among actors within sector (FIGBC, 2018). One good example is EU funded project *Building as Material Banks* (BAMB), which provides great resources to the research concerning implementation of CE to built environment (Hobbs, 2017). One important output is *The Circular Economy 100* programme launched by EMF (2016) that is introduced next.

The Circular Economy 100 (CE100) innovation programme established by EMF (2016), deepened into circularity in built environment. It applied ReSOLVE framework (introduced in chapter 2.2) and identified ways to implement circular elements in built environment (table 10). Programme consists 12 built environment case studies from the industry.

Table 10 ReSOLVE framework: Built environment. (Adapted from EMF, 2016, p. 6-9)

ReSOLVE	Ways to implement circular economy
Regenerate	<ul style="list-style-type: none"> ▪ Use of renewable energy to power buildings ▪ Land restoration ▪ Resource recovery ▪ Renewable production systems (electricity/bio-gas production...)
Share	<ul style="list-style-type: none"> ▪ Residential sharing (peer to peer renting...) ▪ Infrastructure sharing (parking sharing, shared infrastructure areas...) ▪ Appliances / Tools sharing ▪ Co-housing ▪ Office-sharing ▪ Shared water consumption
Optimise	<ul style="list-style-type: none"> ▪ Industrial process, off-site production (prefabrication) ▪ Smart urban design ▪ Energy, water, material efficiency ▪ Reduction in transport
Loop	<ul style="list-style-type: none"> ▪ Optimisation of end-of-life of the building/materials (Durability, maintenance, repair, upgrades, removal, deconstruction, re-use...) ▪ Modularity of the building ▪ Remanufacturing of materials (piece-by-piece demolition, material banks, stock management...)
Virtualise	<ul style="list-style-type: none"> ▪ Tele-working ▪ Virtualisation of products & processes (digital mock-up, automated maintenance) ▪ Smart appliances (smart home systems, connected appliances, efficiency for lights...)
Exchange	<ul style="list-style-type: none"> ▪ Better-performing materials & technologies (3D-printing, building management systems...) ▪ New products and services (multi-modal transport)

As stated earlier, energy efficiency is included to the normal practices in property industry (KTI, 2016). Recent trend related to old premises and renovation, has been transformation of old buildings, such as industrial buildings, into office buildings for start-ups (Mölsä, 2017). Jukka Viitanen in Building Forum, thinks that service business models related to premises, are changing rather quickly and for example community platform development, that brings small companies into the same premises, is trending now (Mölsä, 2017).

Different kind of environmental certificates for buildings are gaining popularity in the property sector (Green Building Council Finland, 2018). The most common certificates in Finland are Finnish RTS Environmental classification, BREEAM (Building Research Establishment's Environmental Assessment Method) and LEED (Leadership in Energy and Environmental Design) (Green Building Council Finland, 2018; BREEAM, 2018; USGBC,

2018). These methods evaluate buildings and projects' sustainability level. Certificates are carried out by a third party, ensuring fair and objective assessment. This enables the easy comparison between different buildings and premises. Assessment can be conducted in every stage of building's life cycle, from design to refurbishment. (BREEAM, 2018) It is evidenced that certifications can increase the value of a property by reducing the costs, enhancing the efficiency and promoting green image of the building (World Economic Forum, 2016). Still the percentage of certificated buildings is rather low when the total building stock is observed, as there were only 120 buildings certificated in Finland in 2015 (Green Building Council Finland, 2018). Number is rising, because in 2018, there are 184 BREEAM certificated buildings in Finland (GreenBookLive, 2018).

5 RESEARCH APPROACH AND METHOD

Objective of the chapter is to introduce the research design, including the philosophy, approach, method, time horizon and techniques and procedures. There are various research methods available and decisions have been made to be able answering the research question of this study. Research onion, formed by Saunders, Lewis and Thornhill (2009), is utilized to display the design choices of this thesis (figure 18).

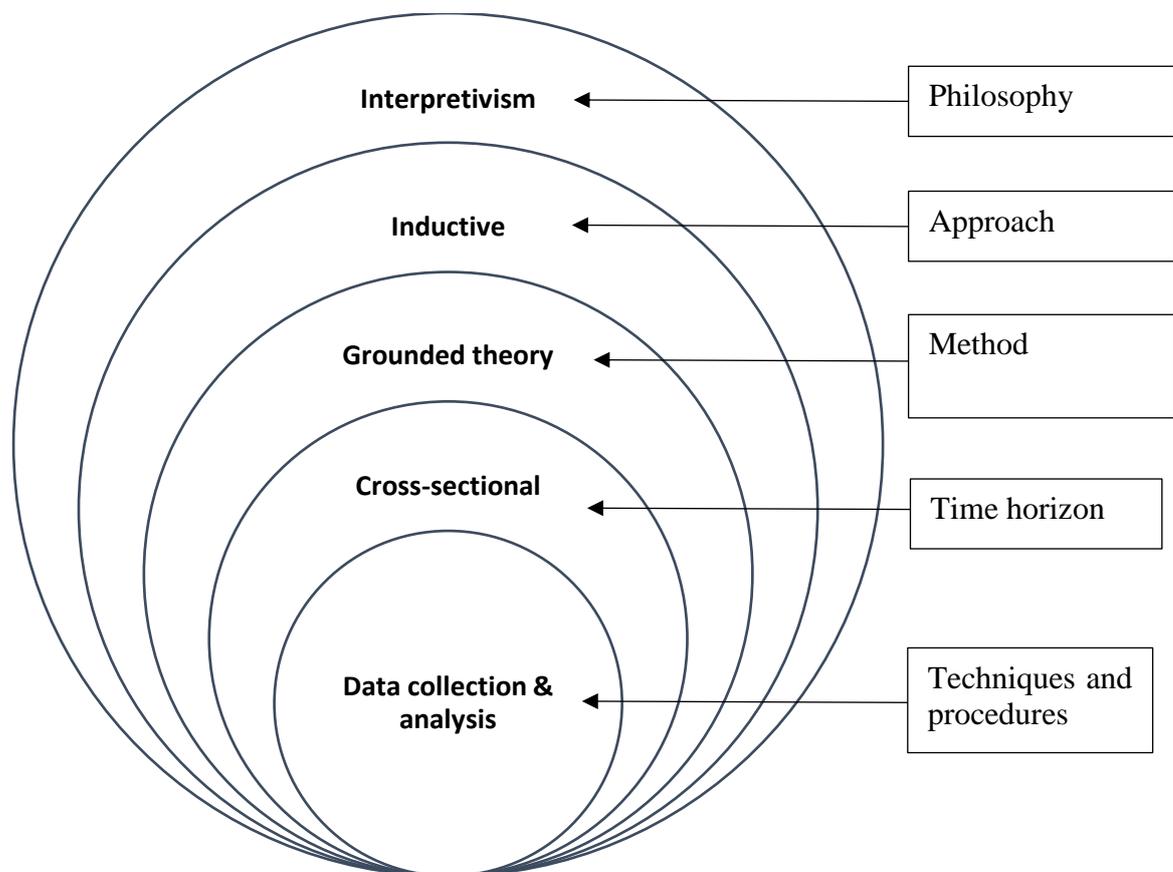


Figure 18 Research onion describes design choices of the thesis. (Adapted from Saunders, Lewis & Thornhill, 2009, p. 108)

Research philosophy: the research philosophy describes how the researcher sees the world and what establish appropriate knowledge from researcher's point of view. These personal assumptions emphasise the chosen strategies and methods. Generally, research philosophy describes a belief about the ways the data should be collected and analysed. Chosen research philosophy for this study is interpretivism, that suits to qualitative in-depth study with small sample. It is popular in business and management studies. Interpretivist is more interested in

finding meanings and rich understanding about the subject, rather than forming absolute laws. (Saunders et al., 2009)

Research approach: The research approach is inductive, which is chosen to this study, due to exploratory and qualitative nature of this research, reflected in the research question (Yin, 2009). It also supports flexible research structure that allows changes to happen during the research process. Researcher is free to alter the direction of the study as the research process proceeds. Inductive approach focuses on understanding dynamics and constructing alternative future visions. (Saunders et al., 2009) It leans on observation of empirical data and aims to generate empirical generalizations and findings from the data collected. Hypotheses are not set because the nature of the findings is not sure until the study is executed. (Adams, Khan & Raeside, 2014).

Research method: the research method in this thesis is based on grounded theory, as it is qualitative. Qualitative method is useful when purpose is to explore new phenomenon and gain new understanding about a phenomenon of which little is known at the moment (Strauss & Corbin, 1990). This is the situation in this research, as CE in property sector is marginally studied. By qualitative method it is possible to come up with new information (Strauss & Corbin, 1990), which would be beneficial in this field where limited amount of research has been conducted.

Grounded theory was first conceptualized by Glaser and Strauss (1967), but it has developed and extended to several directions that emphasize different interpretations. Fundamental idea is to gather qualitatively data, including interviews. This study is based on interviews of actors on the property sector. Data is collected from 11 companies. All interviews were recorded and transcribed verbatim. Then study proceeded to analyse data including grounded theory methods: codification, classifying, and comparing the data (Dey, 2004). This study uses codification process following the coding methodology developed by Gioia, Corley and Hamilton (2013).

Time horizon: the time horizons of the studies are divided into cross-sectional and longitudinal. When the study is cross-sectional, it concentrates on phenomenon in specific time. When the time horizon of the study is longer, and it examines phenomenon and its development over a longer period, it is longitudinal. (Saunders et al., 2009) This study is

cross-sectional, because it investigates the interviewees' perceptions of implementation of CE in given point of time. Next, the research context and techniques and procedures for data collection and analysis are presented.

5.1 Research context: Property sector in Finland

Research context of this study is Finnish property sector. Focus is in Lassila&Tikanoja (L&T) company, which operates within this sector. L&T is service company, that aims to be practical doer in the circular economy. CE is emphasised in all their business areas, making the company very interesting for this research. Company is specialized in providing environmental management services, security services and property and plant support services such as cleaning and user services and property management. L&T has five business areas, which are Facility services, Environmental services, Industrial services, Renewable energy sources and Maintenance of the technical systems. (L&T, 2018b) Facility services are the interest of this research due to the scope of the thesis. Company operates in Finland, Sweden and Russia. Company is a large and powerful operator in the sector, as it employs almost 8000 people and its turnover was over 700 million in 2017. (Kauppalehti, 2018)

Property sector's societal significance is high, which turns out from RAKLI's (2014) and KTI's (2016) publications. Sector employs over 120 000 people directly in Finland and indirectly even more. In addition, sector is important taxpayer. (KTI, 2016) Real estate property includes dwelling houses, offices, storehouses, industrial buildings and business premises. In Finland, buildings are generally rather new, as 50 % of buildings are built after 1980's. Construction investments (new construction and remanufacturing) have covered approximately 12 % of Finland's GDP in 2000s, making it clearly the biggest component of fixed investments in Finland. Investments are significant for Finland's economy and property sector plays a key role as an initiator for investments. (RAKLI, 2014)

Ownership of real estate properties is divided amongst professional large investors, small investors, public sector actors and users as owners (RAKLI, 2014). Real estate investment companies as property owners are common. Cash flows of property business can be divided into user's view and owner's view. User of a building pays for a rent that compensate the

use of premises. It covers maintenance costs and capital costs. Owner of a building takes care of distribution of turnover. Main categories are personnel expenses, investor and financier expenses, service provider expenses, taxes and other governmental fees. (KTI, 2016) Owners can highly affect the use and maintenance of the building and promote practices that are aligned with CE. These features are for example energy efficiency, design, material and waste flows and usability of the building. It seems that buildings with superior environmental performance can deliver financial benefits for the investors, as users of the building are willing to pay higher rents and renew the contracts more probably in environmentally friendly properties. (RAKLI, 2014; World Economic Forum, 2016)

5.2 Data collection

Data was gathered from 11 companies with 13 interviews. Companies that were interviewed, were determined from L&T's perspective. This group included their clients and partners, who as stakeholders of a building, are owners, users, and service providers. CE is visibly part of L&T's operations and marketing, thus can be assumed that their stakeholders might be quite aware of CE practices. The final set of interviews cover five property service providers, six owner organizations who are concentrating mainly on construction and renovation of buildings or renting and maintaining properties, and finally two user organizations from trading and technology industries.

In this study, to be able to answer the research question and sub-questions, interviews of the professionals from the fields of CE, sustainability and service development, were completed. All the interviewees work in property industry. Data gathered for the research is presented in table 11 below. It shows the type of a company, position of the interviewee as well as gender information. Data collection method was in-depth interviews which were semi-structured, meaning that road map of questions was formed beforehand, and it guided through the interviews. (Adams et al., 2014) Semi-structured interview frame was developed to be able to answer the research questions. Interview questions were open-ended that promotes discussion and follow-up questions (see interview questions in appendix 1). The characteristics of different respondents affect the interview and discussion, that requires adapting during the interviews (Saunders et al., 2009). Aim of the interviews was to get

industry specific information related to CE implementation and challenges and drivers related to it, circular business models and sustainable value creation as well as find out the role of stakeholders in implementation.

Table 11 Data gathered for the research: profiles of interviewees

<i>Type of the company</i>		<i>Position of the person who has been interviewed</i>	<i>Gender</i>
<i>Service provider</i>	L&T	Interviewee 1: Head of New Business	Male
	L&T	Interviewee 2: Business Unit Director	Male
	L&T	Interviewee 3: Corporate Responsibility Director	Male
	Service Provider A	Interviewee 4: Strategy Director	Male
	Service Provider B	Interviewee 5: Manager of Environmental Services	Female
	Service Provider C	Interviewee 6: Project Director	Male
Sum	6		
<i>Owner organization</i>	Owner organization A	Interviewee 7: Chief Development Officer	Male
	Owner organization B	Interviewee 8: Environmental Manager	Female
	Owner organization C	Interviewee 9: Project Manager of Service Development	Female
	Owner organization D	Interviewee 10: Development Manager	Female
	Owner organization E	Interviewee 11: Work Environment Specialist	Female
Sum	5		
<i>User organization</i>	User organization A	Interviewee 12: Property Manager	Female
	User organization B	Interviewee 13: Environmental Manager	Female
Sum	2		
In total	13		

Primary data was gathered by interviewing L&T and the representatives of relevant stakeholder groups. Three people from L&T were interviewed to learn their views on the subject. All the companies and their representatives are treated anonymously through the analysis. L&T is the only company whose name is public, but interviewed people are anonymous. The interviews aimed for confidential discussion, therefore the citations are kept anonymous. In addition to interviews, supervisor from L&T gave a great contribution through our conversations concerning property industry. It helped to form a better picture of

the industry. Three other service provider companies were interviewed to get external service providers' views on the subject. As stated earlier, important stakeholders in property sector are owners and users of a building. Therefore, representatives from these stakeholder groups were interviewed. Overall, five representatives of owners and two representatives of users were interviewed. The interviews gave important information regarding key themes of the thesis: challenges and drivers for implementation, sustainable value creation in CE model and role of stakeholders.

All the interviews were conducted by phone, recorded and retrospectively transcribed to written form. Duration of interviews varied from 30 minutes to 75 minutes, being approximately 46 minutes. Interviews were executed between 25th of May and 18th of June in 2018.

5.3 Data analysis: Grounded theory method

To conduct data analysis, all the interviews were transcribed and coded following content analysis methodology proposed by Gioia et al. (2013). This process starts by coding three levels of codifications. At first to the concepts, then to the themes that are combined from concepts and finally aggregate dimensions are formed from themes. Concept refers to notion that captures features that describe some phenomenon. It is important first to discover concepts in theory building. Themes are more theory-centric and link different concepts to the same subject matter. Themes are also distilled to predominant theoretical dimensions (Gioia et al., 2013). Miles and Huberman (1994, p. 56) refer coding as follow:

“To review a set of fieldnotes, transcribed or synthesized and to dissect them meaningfully while keeping the relations between the parts intact, is the stuff of analysis. This part of analysis involves how you differentiate and combine the data you have retrieved and the reflections you make about this information.”

Arrows in data structure indicate the dynamic interrelationships between concepts, themes and dimensions. The purpose is that by looking the grounded theory model, the reader understands the relevant concepts, themes and dimensions, and also relational dynamics that are made transparent. (Gioia et al., 2013)

According to Gioia et al. (2013) is typical that 50 to 100 1st order concepts emerge from the first ten interviews and this is true also in this study. All in all, there emerged around 200 1st order concepts from textual data of 13 interviews. In this point the categorization starts by seeking similarities and differences from the concepts and reducing them so that eventually there are suitable and more manageable amount of concept categories (Gioia et al., 2013). In this study number of concept categories was settled to 30.

After the categorization of 1st order concepts, attention was attached to 2nd order themes and aggregate dimensions that emerge as analysis progresses. Here the level of analysis is more abstract and multiple levels of concepts and themes must be considered at the same time. This study has overall eight 2nd order themes. When 2nd order themes were set, analysis went to even deeper, targeting is to distil 2nd order themes into aggregate dimensions. (Gioia et al., 2013) There are three aggregate dimensions in this study.

When all the concepts, themes and dimensions are set, it enables the building of data structure. This is really important step in this research approach of Gioia et al. (2013). It demonstrates how research has proceeded from raw data to the concepts, themes and dimensions. It is also presents the data in visual aid. Referring Gioia et al. (2013) this gives “rigor” to the qualitative research making it more credible.

When analysing the concepts, themes and dimensions, important step is mirror the findings to previous studies and results and see if there are some precedents and if there have emerged some totally new concepts. Transferring from data structure to grounded theory takes place next. The main goal is building inductive model that is grounded in the data and captures interviewees experiences in theoretical terms. Making clear how data relate to theory is central aspect. Also, consideration of arrows that indicate the dynamic relationships is important part. (Gioia et al., 2013)

5.4 Validity and reliability

Reliability and validity are significant factors determining the quality of the study. The process is different in qualitative research than quantitative. Reliability refers to the extent to which data collection techniques and analysis procedures produce reliable findings.

Validity of the study deals with the fact if findings are really about what they seem to be about. (Saunders et al., 2009)

Four reliability threats are identified by Robson (2002). The first is subject or participant error, that relates to the time when interview is kept. Different times of the week can generate different answers and optimal is to choose the most neutral times. Interviewees of this study were able to suggest the most suitable times for them and all of them were done during the normal office hours. The second is subject or participant bias, that refers to interviewees tendency to say what their company expects them to say. According to Robson (2002) this bias can be eliminated by keeping interviewees confident and results anonymous. This is what is done in this research to enhance reliability. The third threat is observer error, that means that different persons can ask same questions differently and get different answers. As stated earlier, like Saunders et al. (2009) say, more structured interview frame will lessen the threat, and in this study, semi-structured interview frames were used to verify answers to the same questions. The fourth threat reflects to observer bias as observers can interpret the answers differently. In coding process this means if separate researchers could get same codes. Transparent data structuring weakens this threat according to Robson (2002).

Threats to validity are similarly identified by Robson (2002) who found six main threats. The first is history that can cause misleading findings due to events happened shortly before the research. Testing is the second threat for validity, meaning that if company believes the results will be disadvantage for them they try to affect the results some way. The third is instrumentation where informants may try to manipulate the results by changing the behaviour. Mortality threat relates to informants dropping out of study, this is usually problem in long-term studies. The fifth threat mortality also link to long-term studies as some external happening may affect the research unexpectedly. The last threat is ambiguity about causal direction, where there is not a clarity of the direction of causal links. To ensure validity, interviewees of this study are chose based on their competency in this area being studied. In addition that interviewees were carefully selected, before every interview, interviewees were asked to tell about their experiences in studied area and describe their responsibilities in current position. Also, informants from many companies took part to the interviews, so that results do not represent views of only one or two company but overall eleven companies. Opinions of L&T's own interviewees might be a little polarized as the company is very active in the field of CE and employees might be more aware and well-

informed about CE issues than other actors in the sector. This has been noticed in analysis but can still affect the results. This study is not long-term research and since threats of mortality and instrumentation probably will not occur. Nevertheless, that there is always a chance for errors. Alasuutari (1995) highlights that when many interviewees refer to the same fact or answer the same way, the information can be assumed to be relatively reliable. This study aims to form analysis on the basis of this kind of answers and opinions.

In data structuring phase, interpretations play significant part, and different researchers might understand terms and paths differently. In these complex cases, data is revisited as Gioia et al. (2013) suggest, to find the right coding. In addition to this, the interviewees talked about same things with different concepts, but via analysing emerging categories and relationships, common concepts were eventually reached. Aim was to make categorisation of the concepts and themes mutually exclusive, but there still remains some slight overlaps.

Reliability and validity are also termed trustworthiness. Shenton (2004) presented strategies for ensuring trustworthiness in qualitative research. Trustworthiness can be sought through four quality criteria formed by Guba (1981): credibility, transferability, dependability and confirmability. This study aims to credibility via use of well-recognized research method, pursue to triangulation by interviewing people with different position from several companies, use anonymity of interviewees and profound examination of previous research. Transferability refers to generalizability of the results (Shenton, 2004). This study is relevant in the research context, but results cannot be transferred to other contexts. The results can be generalised to some extent within property industry, as study includes many companies and informants presenting different views in this industry (Saunders et al., 2009). But as Shenton (2004) summarizes, it is not realistic to assume that single study bound to certain context, could provide fully transferable results. Dependability is enhanced through profound description of methods used (Shenton, 2004) and semi-structured interview protocol (Saunders et al. 2009). Confirmability is improved by showing the “audit trail” that tells step-by-step how the research has been executed and why certain decisions are made. (Shenton, 2004) Research onion with explanations aimed to show the decisions made in methods and reasons behind them. In addition, data structure that will be presented in next chapter aims to give a transparent picture of how I made sense of the raw data. Also, research process was displayed in the very beginning of this thesis to demonstrate the proceeding of the study.

6 FINDINGS

Findings of the study are presented here based on data analysis and codification. Main structure is drawn in figure 19. It shows the 1st order concepts, 2nd order themes and aggregate dimension of this study. In the end of this chapter, based on the findings, the model for successful CE implementation and sustainable value creation is proposed.

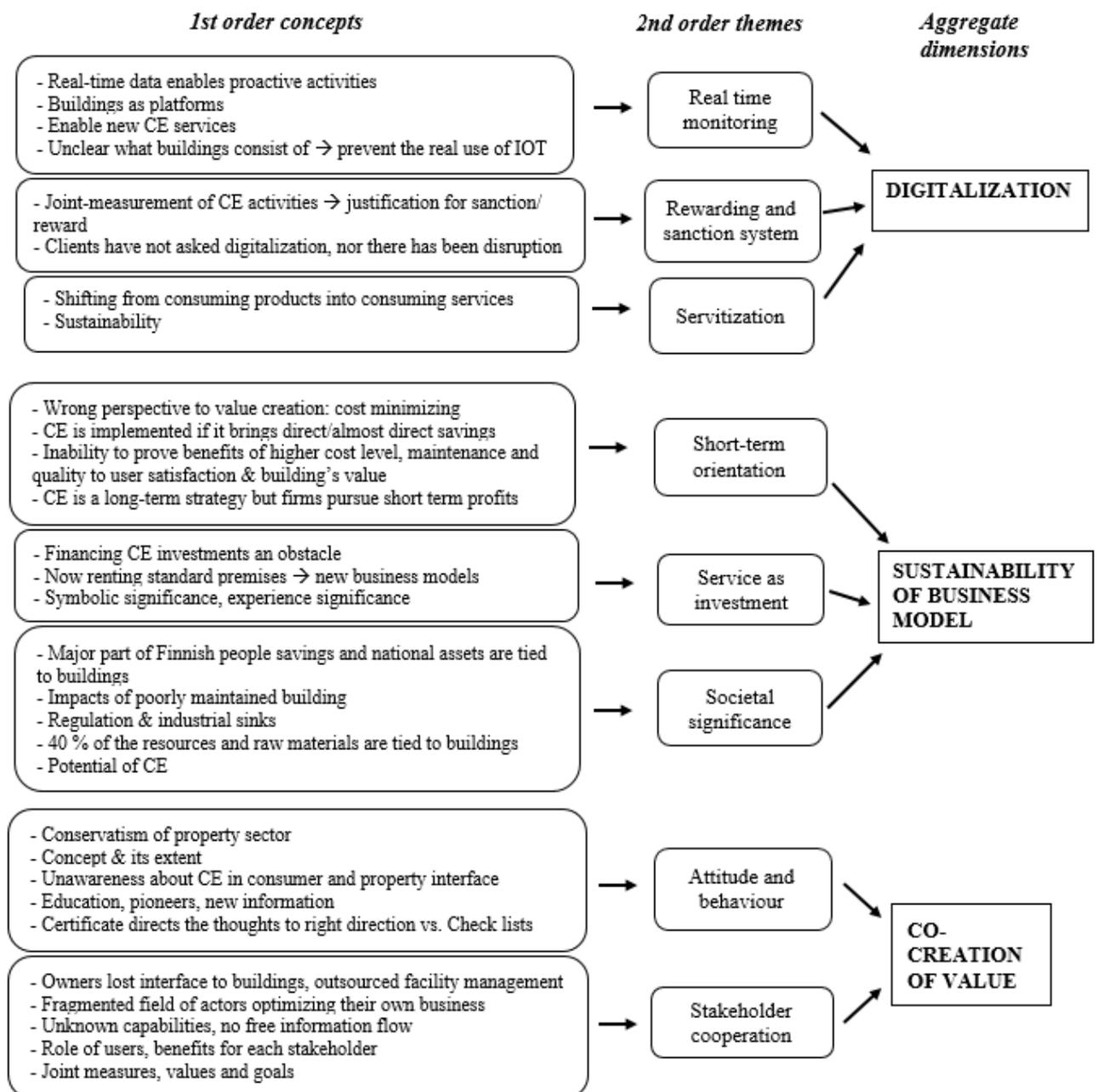


Figure 19 The data structure of this research

Main results show three aggregate dimensions: digitalization, sustainability of business model and co-creation of value. These dimensions highly affect the implementation of CE within the property industry. They also describe the main challenges and drivers for the implementation. Dimensions can be divided into eight themes and further to several concepts. These will be presented next.

6.1 Digitalization

The aggregate dimension digitalization covers three themes, which are 1.) real time monitoring, 2.) rewarding and sanction and 3.) servitization. Property industry is in transition to harness technology to better use and it can be exploited to further CE and system level change in completely different scale than now. At the moment lack of digitalization partly hinders the practices that would enhance CE.

At the moment, level of digitalization in property sector is rather low, and it holds a huge potential that needs to be exposed according to interviewees. Other industries have doubled their productivity through digitalization last years and property industry still need to take this step. Interviewee 13 enlightens the situation like this: *“Thinking of property world, the buildings are in an interesting condition, as the situation where data could be properly utilized, still has not been found.”*

Digitalization enables 1.) real time monitoring of performance of facilities and activities of people, that is the key driver for CE. The real time monitoring enables proactive actions, new services and platforms to be developed and better learning in a long term. All of the interviewees agreed that better measurement is needed to support CE within industry. Now it is difficult to prove the benefits of CE due to the lack of data. However, situation is already changing according to interviewee 5 who forecasts that: *“three years ago only few investments to CE were done so we do not have information about paybacks, but situation will improve within next three years as CE investments are done now and after couple of years we will see how the paybacks of these investments have transformed to profits”* Another important observation was the fact that price of technology decreases all the time and will further digitalization in the future.

There were various suggestions how to expose the digitalization within industry to promote CE:

Interviewee 1: *“I would like to change the business model from output oriented to joint measurement, so that when there is a contract between owner and user, they would measure success of CE activities as one part of the contract and use it as reward or penalty justification”.*

Interviewee 11: *“Data that we (people) produce is important, and it should be in better use, as it could provide us data of our circular economy behaviour, which enables shape of new rewarding systems.”* and *“Service providers could be leaders in this and offer hard facts data for property sector to foster circular economy –”*

Interviewee 7: *“There is a possibility to understand building’s conditions and situation in real time. With the data it would be possible to proactively take necessary activities so that building would never be in bad condition or resources used inefficiently.”* and *“Because we do not utilize digitalization, services are bound physically to certain places, which generates unnecessary movement, waste and vacancy rate. With digitalization we have information which resources are available, and services can be brought to home.”*

Interviewee 13: *“The number of different IOT appliances will explode in near future – there lays potential in how to utilize data coming from sensors and how to create interfaces that are open to as many actors as possible and how to intellectualize facility management services.”*

Interviewee 6: *“IOT enables that the number of sensors can be increased significantly, and that way take the wellbeing of the building under control.”*

Interviewee 5: *“Digital platforms to integrate the adjustment of building automation functionality and user satisfaction in different premises”*

Now no one has proper information of the contents and materials that buildings consist. This prevent the maintenance of comprehensive database and proper use of IOT (internet of things). Interviewee 7 explains that *“artificial intelligence could analyse the data and find*

correlations and casual links, but the whole benefit of this technology is about to become a flop, because we do not have the data about the current situation.”

As the citations show, the data can be used for developing 2.) rewarding and sanction system. It means that with the real time data and better data gathering, it is possible to form a system, that monitors the behaviour of people and conditions of a building. With the information the system provides, new contracts can be made where data is used as rewarding or sanction justification. The challenge relating to this theme, is the question who will actually do it, and what kind of impacts it has on sector. Important seems to be collaboration in order to shape measures that everybody agrees.

Interviewees were asked what CE practices or business models are done now in property sector now and what value they provide. Also, future views were enquired, and interviewees identified circular business models that could be useful in the future. Interviews gave the impression, that CE business model practices are just in the beginning, but some long-lived practices within industry are in line with CE. Interviewee 10 says that: *“During the last years new circular services have emerged, but they are so in the beginning that it is impossible to tell if they have been successful or not.”* Based on interviews, table 12 gathers circular economy practices which are done now and what value they pursue. Below, they are described more specifically.

Table 12 Identified circular CE practices and related value

<i>CE practices</i>	<i>Value pursued</i>
Resource, energy and material optimization	Financial savings, environmental benefits
Maximization of utilization rate, efficiency and value	Financial savings, environmental benefits, better rent income,
Maintenance and repair services	User satisfaction, financial savings in a long run
Environmental certificates	User satisfaction, better reputation, long-term renter → regular income for owner

Imitating old good practices	Environmental benefits
Lifecycle services for buildings	Financial savings, environmental benefits, risk management
Shared office buildings, Business parks, office hotels	Communality, user satisfaction, networking, synergies → savings, better rent income
Transformability of premises	Financial savings, environmental benefits as no need to build new buildings, risk management
Material and waste sorting, material banks, waste development services, reprocessing of waste	Environmental benefits, financial savings

Optimization practices are typical in the sector. Material and energy optimization approaches are popular in the sector, particularly energy optimization. Energy optimization initiatives cover minimization of energy usage, aiming to energy efficiency and zero-energy buildings, and production of some part of all energy needed in the building (usually renewable energy). These are usually digital services. Some see it also problematic that CE is perceived only as energy efficiency because it brings savings. Like interviewee 4 states: *“In practice, in facility management we are in cost side and circular economy is easily delimited only to energy efficiency.”*

Maximization practices refer to maximal utilization rate, efficiency and value creation. Referring to utilization rate and efficiency, interviewee 3 says that buildings should be considered more like machines and their maximum operating capacity. Machines are harnessed to maximal use in relation to their maximal operating capacity. The same practice should also be in use with buildings and premises. Business models related to maximization aim to reach better value creation.

Interviews revealed that maintenance and repair services that aim to long life cycles and keep buildings healthy are the most common CE practices within industry. Maintenance services cover for example HVAC-system (heating, ventilation, air conditioning), cleaning and waste management. Modern buildings are more complex than before, and they require

good maintenance to ensure good conditions in the building. Interviewee 3 says that: *“When the maintenance is poor, we see buildings such as schools goes to such a bad condition that there is no other alternative than demolish the whole building.”* Interviewee 6 states that practices aiming to energy efficiency has led to problems in buildings’ conditions as maintenance is run down. Good maintenance and repair lead to fewer ad hoc problems and user satisfaction. Additionally, it may provide savings in long run as fewer large problems occur, that are expensive to repair.

Life cycle services that have emerged, assess how to get all the benefits off in every phase of building’s life cycle. Prolonging the MOL phase of building is essential goal in these services. This obviously creates value for the owner as building is longer in optimal use. In addition, from national assets perspective it benefits the society and eventually environment as new resources are less needed.

Interviewees think that old times had lot of good practices that afterwards have disappeared or forgotten. For example, number of machines was questioned by interviewee 3: *“Old times had lot of good things, at that time laundry rooms were common. Now as the prices of square meters are rising, dryers and drying racks fill valuable room from that apartment. It is not reasonable that every apartment has their own machines and devices.”* Interviewee 11 tells that: *“My mum washed even plastic cheese packages because it was so rare material – plastic-free time is just behind the corner and that is something we need to consider”*. According to them, it could be useful to reconsider the old practices and modernize them back to general use in order to save room and resources.

Environmental certifications are seen as one method to promote CE, at least when starting CE practices. Many of the interviewees worked in certified building and they see that certificates oblige to pay attention to the use and control of resources. Aspect was justified like this:

Interviewee 1: *“Even to get the certificate you need to do a lot of things that promote circular economy in building’s service production”*

Interviewee 4: *“Certificates direct practices to the right direction and they can help industry to take a step forward. Maybe natural development goes like this – opening shot that makes the matter concrete.”*

Interviewee 5: *“guarantee for the user that building is efficiently and environmentally friendly managed as certificates are regularly audited and checked that they are valid”*

Interviewee 6: *“Promote because there (in certificates) points are given form certain aspects”.*

Comparison between firms is seen important benefit of environmental certificates and interviewee 5 point out that certificate provides the most advanced dialogue between service provider and owner at the moment. Still, critical comments were also presented: *“These (certificates) have one fundamental problem, they all look for the past and verify actions already made.”*, *“Certificates do not cover the entire scope of circular economy and firms are different and hardly any certificate can cover all the sectors”* (interviewee 6) and *“Little slow (certificates), filling papers and do they really affect? I do not see them as method number one.”* (interviewee 9) Some underline that building can be as good without certificate and firms can implement circular economy very innovatively outside the certificate. Certificate ensure certain condition level for the users of a building, which creates value for them. Owners are described to get good and long-term renters if the building is certified because people appreciate the certificates and they can use it to improve company’s reputation.

Different sharing service solutions are rising now. Shared office premises and business parks are getting more popular because then people are not tied to certain location and they can naturally work any place available. These complexes usually offer different working areas like meeting rooms where people can book them. This enables better utilization rate. According to interviewee 4 shared offices also enable more face to face work and reduce skype and phone meetings, as people can work wherever is the most suitable in particular day. In addition, to business parks it is possible to connect other services, like shared electric cars, playschool and networking for different actors. According to interviewees this kind of services boost user satisfaction and create synergies. For example, by providing car sharing, less parking space is needed, room is released to other use, and people are free from owning the car, which creates win-win situation.

Transformability of premises is another business model that has emerged, and it is increasingly emphasised when renovating the buildings. It means that purpose of the

premises should be easily transformed if needed. In smaller scale it means that lobby of the office building can be changed to some other use (e.g. recreational facilities) in the evening. In bigger scale if there is need for more dwellings in some area, empty office buildings can be transformed to answer this demand. Interviewee 6 remarks that *“When they do invest to the building it is impossible to know the whole life cycle of it, for example 100 to 200 years forward, when we do not even know 30 years forward, so it seems wise to leave as many doors open as possible. So, when the purpose of the building changes, premises would be rather easily transformed. That is risk management.”*

Interviewee 11 says that they provide premises to broader group than their initial purpose. This kind of solution supports community, sense of communality and networking. This is small scale eco industrial park where there are brought together not so traditional actors like academies, firms, playschools and university. In eco industrial park property assets are reused to different purposes than initial purpose was.

Material and waste sorting have existed a long time, but related business models are becoming more important. Interviewee 9 highlights the importance of materials' reprocessing and business models related to it. Waste development services that look for savings are already provided for example to housing companies. Construction sites always order a bit more materials than they need, and surplus material goes to the waste. There is created business model called material bank, to decrease this waste. Material banks gather all the waste materials together and sells it forward to other sites. According to interviewee 9, this kind of business model works in United States but in Finland there is probably material banks only inside the big construction sites or firms. Value is created for environment by taking better care of resources and reusing them.

Services that could benefit in the future were considered in the interviews and different ideas appeared. Important aspect was developing current or recently emerged business models further. Interviewees demanded for a service that could help to identify the targets that need enhancing and where CE thinking could be implemented. Interviewees desire service that could help in the utilization of materials. Also use of recycled materials was emphasised as it is now quite minimal. Interviewee 10 explains that one reason behind this is the geographic characteristics of Finland: *“Finland is a long country with long distances, so it is not economically clever to transport recycled materials.”* Further, small scale eco-industrial

parks were seen beneficial and for example connecting playschool to office complex is missing at the moment but could be really facilitating in everyday life. Increased amount of available data related to buildings (e.g. consumption information, service requests, number of user) was highlighted and how the data gathered could be used in CE services. Digitalization overall provides basics for different sharing platforms that could be developed almost infinitely.

Interviewee 7 pondered how new business models can be reconsidered and came up with three prospective scenarios. Firstly, business models can be re-evaluated without changing the business, as lots of CE improvements in current practices and services can be done through reasonable decisions (e.g. impact with less resources). Like interviewee 7 points out: *“Business does not have to change, but inside it, much more novel and reasonable solutions that are in line with circular economy can be made.”* Secondly, old businesses can be implemented in a new way that supports CE. For example, car renting service has existed a long time but when combining it with CE, new car sharing system has developed, which has revolutionized the service experience. Thirdly, there are totally new businesses, where someone takes the role of operator between seller and buyer. Digitalization enables these services.

The third theme is 3.) servitization. In the context of digitalization, it refers to ongoing trend which transforms products into services. It is seen as a driver for CE within property industry. Interviewee 7 declares that *“everywhere where resources, which are not optimally used, exist, or which are unnecessarily in the ownership of someone, will transform into services.”* Examples of servitization were already visible in the circular activities that companies are doing now. Interviewee 7 suggests, that buildings could be *“service and innovation platforms”*. This would allow rich and optimal use of the building that creates value for the users, as well as for owners. Interviewee 5 says that they have a *“platform of smart buildings”* that utilize data and IOT to provide smart solutions in buildings. There is also mentions about CE neighbourhood platform that is in progress. As can be seen, servitization closely relates to digitalization.

Different product as service systems are discussed in the interviews and they are perceived as potential services in the future (e.g. heating as a service, waste management) Implementing all-inclusive services to office buildings and malls are expected to arise in a

big scale. Interviewee 3 thinks that: *“Traditional 80-90’s office building, where everyone manages their own things is past time. Now we are heading to all-inclusive solutions where you do not have to consider cleaning, food service, maintenance etc. because all of it is included to the price per square meters.”* Traditional shopping mall is also example of old-fashioned management of premise because in there, different shops take care of their own logistics and other practices without having any synergies together. In this context, CE activities remain very minor because individual actors do them alone, for example takes old clothes back. Service provider has tried to bring a pilot project where everybody can bring their clothes to certain spot and it was successful until the management of shopping mall decided to start renting that service for being in its premises and prerequisite for its existence ended. Significance of service design was emphasised, and service providers were proposed to investigate what CE activities people see the most meaningful to execute.

One reason boosting this shift refers to megatrend sustainability and attempts to act in accordance with it. Shift from owning to buying services is in line with sustainable development as less resources are needed. Interviewees see that also CE promote servitization, so it is two-way trade. Both support each other. Interviewee 3 emphasised the need for servitization: *“The whole sector needs a lot of servitization and CE answers to that”*.

6.2 Sustainability of business model

The second aggregate dimension sustainability of business model encompasses three themes: 1.) short-term orientation, 2.) service as investment and 3.) societal significance. Dimension relates to prevailing short-term value creation perspective within industry that aims to cost minimization in order to gain savings. This leads to reduced maintenance that results as poorer conditions and value creation or retain of important national assets. Service as investment theme regards the fact, that value creation is shifting more and more to business models that offer different financing options to buyer. Current business models do not seem sustainable but there lies huge potential to increase level of sustainability of the business models within property sector.

The current business models and value creation as such, can be identified as a challenge for CE implementation. It stems from current industry practices that do not see buildings as a

source for value creation. Issue is described by interviewee 3 as follow: *"...buildings are not understood from returns and enhancement of value perspective, but they are perceived as premises that are rented very standardized to users"*. What came clear during the interviews, is that in practice money rules: *"...when we are considering where are the money and where not, circular economy perspective is left out pretty fast"* (Interviewee 4). In addition, the lack of CE knowledge is seen as one barrier in current value creation like interviewee 2 describes: *"When considering the office property segment in metropolitan area, we have over two million square meters of empty premises and one reason for this is poor circular economy knowledge as premises cannot be modified easily to future demands"*.

Seems that industry has wrong perspective to the value creation, as words of interviewee 3 reveal: *"...the main goal is to minimize costs, like it would enable better revenues"*. One part of the value creation is the retain of the value of buildings. Interviews disclosed that retainment is easily ignored, due to activities aiming to minimize costs. This reveals that buildings are not perceived as source of value, because otherwise activities like maintenance and facility management, which are now seen as costs, would be valuable and more like investments to the building's value. Interviewee 1 describes the situation like this: *"...it is also our fault that we have not been able to prove the benefits of higher cost level, maintenance and quality to user satisfaction and value of a building, and therefore we are in a situation where the owner buys always the cheapest service because he will receive the same quality. When the value of this kind of service can be proved, it turns these services into investments"*

One reason behind this is the unforgotten significance of the user. Now standard premises are rented or sold without acknowledging user needs or engaging them to the planning process. The outcome is standard premises and buildings where the value users get is just basic premises, not anything extra value, like all-inclusive services or tools personalized to them. In current situation, it is hard to enable CE actions in the building where users are the ones implementing it daily. Following citations describe the situation: *"So wellbeing of people and buildings are not separate, when the building is in good condition, it is good for people too"* (interviewee 11) and *"If a premise is disconnected from the intended use and it is considered as separate matter, then problems emerge."* (Interviewee 3)

Another thing leading to aforesaid situation is diminished role of owner. This is articulated like this: “*owner has lost interface to building and has kind of outsourced the management of building and now there are so many phases where everyone is optimizing their own benefits—*” (interviewee 3) and this: “*Few building owners know what happens in the buildings and even fewer know how to manage the building properly*” (interviewee 6). Owner do not manage buildings the same way as earlier and hires different managers to take care of operations who again hire employees and service providers. Eventually no one knows exactly what the condition of a building is.

Current business model’s value creation relates to 1.) short-term orientation. Interviewee 6 describes problem of short-term orientation as follows: “*Traditional value creation has been short-sighted and circular economy is hard to execute short-sightedly because in it you have to manage whole lifecycle of product or service and then of course in this short-sighted traditional value creation calculations are pretty simple, and they are not valid anymore (in CE)*”. It is clear that short-term orientation is one central challenge that prevents the CE implementation. Interviewees describe the situation difficult as CE is a long-term strategy, but firms pursue short term benefits. Problem partly relates to investments that must be made when implementing CE: “*Money directs a lot, and now we live the times where short-term benefits are pursued*” (interviewee 9). These are usually large investments that need approval of top management. In addition, interviewee 1 noted that we “*live the era of cheapness*” which makes the approval of CE investments even more complicated as the budgets are already very tight. It seems that CE can be implemented only if it brings direct or almost direct savings for the company. Important is ability to show and prove the benefits and payback times in numerical form. This causes difficulties as there is not much historical data about CE investments and current data of buildings is not up-to-date.

Tricky issue is the life cycle of building, which is very long, and firms operate in quarterly economy: “*In quarterly economy which now prevails, it is quite a small time in the life cycle of building. Proper maintenance of building can cost more in some quarter for the company although it would be optimal during the whole lifecycle, and there is the challenge*” (interviewee 2) and “*...particularly to this quarter economy it is hard to prove impacts of circular economy*” (interviewee 11).

Interviewee 10 sees that longer contracts would help to overcome challenges of short-term orientation. By committing contractors to take care of the maintenance of a building with contract for the next 20 years for example, it is possible to change the way of constructing to more sustainable. Like interviewee 10 says: *“In the case of life cycle project where certain number of years of maintenance is included to the contract, changes the interests... it will commit to think of the sustainable structures differently.”*

The second theme 2.) service as investment refers to business model development. In new business models, investment should be included to the service. This relates to servitization, but in business model context. Financial perspective is noticed when discussing new CE services and it seems important that new services provide different methods for financing the investment. Especially the initial investment is usually large, and companies wish for support when making them. Therefore, different service as investment solutions are perceived interesting among interviewees. Interviewee 4 sees that *“...new heating system as a service that is based on monthly fee kind of solutions are needed”*. Aim of this kind of solutions is make the buying facile as the initial investment will not form an obstacle for companies but is incorporated to the services.

Symbolic and experience significance play also important role in developing business models of CE. According to interviewee 11, people feel themselves decent individuals when they act in accordance with sustainability and CE. It creates brand and symbolic value for them and that is something that must be considered when developing business models. The same goes for companies. Experience significance refers to idea of users experiencing (e.g. seeing or hearing) their CE actions somewhere afterwards. It is awareness of where the materials end up.

In addition, interviewees recognize that people are increasingly seeking new experiences and significance of them grows all the time. Due to this, expectations related to buildings are also rising and walls solely are not enough anymore. Traditional property sector's value creation for users that provides standard premises is not sufficient for users who expect different values like symbolic, brand and experience values.

The third theme 3.) societal significance closely relates to current value creation, although it seems that this perspective might be disregarded sometimes. Major part of Finnish people

savings is tied to buildings. Importance of the buildings was emphasised from value perspective: *“Socially important sector as 70 % of Finnish national assets are tied to buildings. – investments that are done to buildings are enormous.”* (interviewee 1) and *“From value creation perspective, real estate assets are in poor management”* (interviewee 3). Interviewees calls for consideration of the influence the sector has to the society. Many agreed, that assets tied to buildings should be in better care. Interviewee 8 underlined that *“For society, it creates value in national level when them (buildings) stay in good condition.”*

Also, the environmental perspective of the sector was considered: *“Significant share of the usage of electricity and carbon dioxide emissions relates to buildings. – price of raw materials rises and energy production model changes and stability in grid alters, these things will increase importance. Pursued savings will lead to circular economy model”* (interviewee 1). Interviewee refers to the ongoing trends. Rise of renewable energy production is one that will affect the energy markets by destabilizing them. And other is price of raw materials, which is rising due to scarce resources. Circular economy helps to adapt to these issues as it leans on closed loops system where resources are used repeatedly, and no virgin materials are needed. It seemed that interviewees were aware of environmental effects of the sector, and belief that problems will force to a system change prevailed among them.

When value creation in current business models aims to gain profits in a short-term by cutting costs, it has impacts on buildings maintenance. Current value creation causes poorer maintenance and management of buildings. Interviewees perceived situation ludicrous, because major part of Finnish peoples’ savings is tied to buildings but still savings are sought from there.

The utilization rates of the office and business premises are generally rather low, as interviewee 4 wonders: *“Office buildings are 60 % of the time empty, so utilization rates are low. – Expensive premises do exist, so why to decrease the utilization rate?”* Practices promoting sharing are proposed solution for this. Maintenance of buildings is another aspect that emerged in the interviews. There appears worry about the conditions of buildings and how it affects people living and working in these premises: *“—air condition and proper maintenance are run down to gain savings, which will generate costs somewhere else.”*

(interviewee 3). For example, mouldy schools stimulate discussion because bad indoor air affects the schoolkids and teachers. Everybody agreed that maintenance is highly important for the value of a building and health and productivity of the users in that building. Interviewee 2 summarizes that: *“when building is maintained systematically, it reduces sudden disorders and eventually expenses.”* By implementing CE practices, it is possible to better the system and take better care of the national assets as well as health of the people.

Interviewees discussed about current regulation and saw it as a challenge as well as a driver for CE implementation. Regulation is important way to affect positively or negatively implementation of CE in a big scale. It is societally significant method to affect CE implementation. At the moment, frames and regulation set by public authorities like municipality are inhibiting new innovations and solutions to happen and by changing them many things could be improved. There are certain rules that need to be followed (e.g. bids), which can limit the decision making and preclude actors that act in accordance with CE. The situation is described these ways:

Interviewee 11: *“In property sector we come to large scale, in other words municipality and infrastructure and they are very regulative. It is more ping-pong game than partnership. – On the other hand, there are start-ups that can bring something new to the industry and break the norms”*

Interviewee 4: *“Regulations should be changed a bit, because now it there is usually some barrier for changing the initial purpose of the building, for example office building to dwelling or other way round. In Sweden they are much further in this, there is peak in transformations.”*

Another aspect is the demand for stricter waste regulation that supports activities that are in line with CE. The basic message was that when wasting is made expensive or impossible, it compels to new solutions and improved waste management and makes them more profitable. Interviewee 8 summarizes aptly: *“It should always be the most expensive to waste natural resources, but this is not the case at the moment. By legislation it would be possible to control wasting more effectively.”* According to interviewee 1: *“If requirements, norms and regulations tighten, then circular economy operations become more profitable, for example sorting of waste”*. This aspect also includes consideration of industrial sinks. This note is

made by interviewee 3 as follow: “*Now the industrial scale sinks are missing so that for example wood waste is exported to Poland or somewhere to Europe because we do not have chipboard industry in Finland.*” New businesses taking care of waste should be developed.

Interviewee 4 believes that “*sector can be revolutionized from that (circular economy) perspective, partly from sharing economy point of view*”. This describe the potential of CE in property sector. Heading to CE development happens due to scarcer resources and sector’s realization that new ways to operate are required. According to interviewees, 40 % of the resources and raw materials are tied to buildings, making them huge stock of resources that cannot be wasted in today’s world. Potential of CE partly depends on how well CE can be productised and servitization completed. Interviewees want to see ready-to-use services, which can offer clear benefits and co-creation of services.

6.3 Co-creation of value

The third aggregate dimension co-creation of value is identified as significant method when aiming to implement CE within property sector. It acknowledges the sustainable value perspective and aims to create equally value for all stakeholders of a building by engaging them to the creation process. Dimension consists two areas that need attention 1.) attitude and behaviour and 2.) stakeholder cooperation. It requires change of attitude and behaviour to shape better and innovative cooperation and create relationships that enable co-creation process to happen.

The role of first theme 1.) attitude and behaviour came up in almost all of the interviews, forming one of the most influential themes when targeting to CE. Attitude and behaviour theme relates to the many aspects. Firstly, the property sector is described as conservative, which hinders the system change to CE and slows down the CE innovations and implementation. Interviewees believe that a big change in attitude and behaviour is needed to be able to implement and utilize CE properly within sector. Interviewee 1 states that “*all the technology and possibilities exist and enhances, so now it is question of attitude. – it is possible to affect by informing and educating.*” Interviewee 11 makes important notion: “*Social responsibility is emphasised in circular economy*”, meaning that technology and great CE services alone cannot do the job without people acting accordingly.

Conservatism of the sector shows differently. Interviewee 7 describes situation as follow: *“In property sector, people are a bit stuck in mindset where they believe when they see something, which is maybe because there has not been disruption in the market, for example foreign competitors who would change the market totally. – neither have clients asked for a change.”*. Interviewee 2 explains that one reason why CE has not been implemented is the conservatism and non-innovativeness of the sector.

Interviewees think that actors in property sector are quite unaware of CE. *“Unawareness in consumer interface and real estate interface is a challenge (for CE implementation)”* says interviewee 12. It seems that top management is informed about CE but in operative levels subject still mainly stay abstract. Unawareness of CE highly affect the behaviour and decision making in the companies.

Challenging and important issue is how to incorporate values that are in line with CE, to the attitudes in the society where people are used to consume and throwaway. Many proportions of possible solutions for attitude and behaviour change were recommended (table 13). Education is seen as important method to increase the awareness of the issue. Pioneers and concrete cases were suggested and desired. People tend to follow the mass, so some need to show the way. Sharing information in different channels was perceived as good method to affect behaviour and attitudes. New circular business models and new CE services can also help in changing behaviour. Growth of new generations, who live in the world where there is continuous conversation about scarce resources, climate change and other sustainability issues, was also perceived as significant matter. Additionally, guiding behaviour by regulations and hard decisions is seen central mean to change behaviour. Finally, cooperation and co-creation practices are perceived central when aiming to change the behaviour.

Important notion is that, CE behaviour must be enabled to the owners who are responsible of conditions in buildings and to the users inside the buildings. Multi-purpose premises where different kind of working and behaving is possible, should be provided. This creates value for the users.

Table 13 Recommendations how to transform attitudes and behaviour towards CE

Education
Pioneers, forerunners, concrete examples
Information sharing
New services supporting CE
Growth of new generations
Regulation
Hard political decisions
Cooperative approach

Environmental certificates divide opinions when asking the interviewees if they promote CE. Some behavioural aspects involved in opinions. Interviewee 4 sees that *“they (environmental certificates) direct thoughts and doings to the right direction”* and others argue that: *“I see them more like check lists, that now we get this kind of paper. Circular economy refers to ecosystem thinking after all – this perspective is missing from current certificates”* (interviewee 11) and *“Certificates do not change the behaviour of people, so that way they do not help.”* (interviewee 9).

Another significant challenge relating to attitude and behaviour is the concept of CE and its extent. Concept is easily understood differently and many of the interviewees wanted to ask and talk about the extent of the concept. There were differences in interviewees’ opinions of what activities or business models CE concept covers. For example, other saw that energy efficiency is not a part of CE and other talked much about energy efficiency during the interview. However, interviewees are professionals from the field and they had a good knowledge what CE is, but they highlighted that it is not that clear for other actors in the field. One fundamental problem relates to CE, as it is many times understood as recycling,

like interviewee 6 clarifies: *“For too long circular economy and recycling have been synonymous, although the fact is that recycling occurs when other means do not work.”* The fact that CE is understood differently among people affect directly the attitudes towards CE, as it may show itself as complex and cause confusion.

Interviewees describe the use of CE concept within industry as follow:

Interviewee 5: *“Not talked so much in that context (CE), more is talked about adaptability, sharing platforms, sharing premises, cars and bicycles, that are the core of circular economy. Actors recognize and realize term, but less is talked with this (circular economy) term. More is talked about sustainable development indicators and energy investments.”*

Interviewee 4: *“It is a good term because it includes so much but bad because it associates with different things and what is relevant comes matter of opinion.”*

Interviewee 9: *“Broad term, an umbrella term which covers lots of things, therefore people understand it differently. Some think about sharing services and other life cycle and some recycling.”*

Interviewee 10: *“Terminology creates challenges, people do not quite know what it means. I think it suits together with business world as it has economic aspects too, and it is not against anyone’s objectives”*

Interviewee 8: *“Can be difficult to understand the term. In construction site it is clearer but in property sector not that much because they are smaller things in daily operations.”*

Some also question if the CE concept is the most suitable for the sector: *“It (circular economy) forms commercial potential, but I am not sure if it is the right term for property industry. Would cost leadership be easier approach?”* (interviewee 5) and *“Circular economy services are okay concept, but would they after all be wellbeing services, that improve humans and environment’s wellbeing.”* (interviewee 11)

Interestingly, many of the interviewees emphasised that many CE activities are already done in property industry but people (and their own employees) do not realise that they are in line with CE. This is expressed by interviewee 4 as follow: *“Circular economy term is difficult. It includes a lot of things that are normal activities in property management. It is involved*

in operation all the time some way". Even the basic business model in property industry is renting, where owner and user are different and some of the interviewees saw that is was in line with CE.

There was also important notion by interviewee 8, how the concept provokes people to think differently: *"When the term has emerged, it challenges people to consider things differently and more sustainably."* Real life examples were desired to build the common understanding of the concept.

This insight to the matter evidences that even talking about the CE does not mean the same thing to people. Thus, it clearly can form a major problem in decision making and daily operation related to CE, within property industry.

Change of attitude and behaviour towards more co-operative practices is also needed, as now cooperation is rather minimal within the industry. Co-creation requires close cooperation and relationships between the different actors. Thus, the second theme 2.) stakeholder cooperation need to be discussed.

Interviewees were asked about the role of stakeholders in implementation of CE and in value creation. All agreed that stakeholders have essential role in both. Obvious is the importance of cooperation, like citations of the interviewees 9, 1 and 8 evidence: *"If there is quarrel between stakeholders, nothing new gets done"*, *"Implementation (of CE) requires seamless cooperation"* and *"All starts with the team play"*.

However, there were some differences in opinions how well cooperation succeeds at the moment. Others think that cooperation works just fine at the moment: *"It (cooperation) is very natural, no need for special actions. If all parties behave normally, there is not any problem."* (interviewee 6) and *"Several stakeholders are doing this (circular economy), and there prevails enthusiasm about the subject. If new things are found, I believe all the actors are in."* (interviewee 12)

Others see current situation inversely:

Interviewee 5: *"There is only communication channel, properly speaking there is no other cooperation now. – property actors write fine reports for the investors where they tell how*

equality and energy efficiency have developed, and then someone reads it or not. I do not see that as very active cooperation and there is much to improve in order to achieve real cooperation. It is out of date view.” and “Now (cooperation) succeeds variably, there is such a boom in renovation and construction site that user is rarely possible to incorporated to conversations and then the situation is challenging although it is possible to generalize a bit. – Planners do not know enough what constructors can do and vice versa --.”

Interviewee 2: *“—should be developed further (cooperation), often too many players. – Different actors should approach each other and give up the confrontation.” and “(CE) Requires closer cooperation, service providers’ targets differ too much. It is fragmented field of actors and that way this circular economy will not succeed and develop further.”*

Interviewee 13: *“Property sector is difficult as there are several actors, like owners, tenants, various service providers, different managers and everyone has their own standpoint, and it complicates the flow of information.”*

It seems that cooperation includes so many actors that makes the cooperation more complicated, especially if there are not proper communication channels that incorporate all relevant parties. There were many suggestions how to improve cooperation in the future:

Interviewee 13: *“Creation of mutual paths, how all can share common goals or support others targets. – willingness is needed.” and “Shared values need to be identified.”*

Interviewee 7: *“— in order to get things done, especially changes in consuming habits and user models and service providers’ service models, we need extremely good cocreation processes and cooperation – Owner has to form a strategy and budget which enable circular economy activities.”*

Interviewee 12: *“Requires diverse cooperation but users play important role in daily implementation of CE, and this stakeholder group must be taken into account.”*

Interviewee 9: *“People need to be brought together so that everyone’s standpoint will be heard.”*

Interviewee 3: *“—shifting to more comprehensive assessment, effectiveness of operations done to the building should be joint measured and further visualized”*

Overall, joint measures, values and goals were seen important to identify and set, as well as mutual communication channels that are open to everyone. Owner is seen as enabler for CE activities and user's role as daily implementer is significant. Service providers are needed to provide services that makes acting according to CE possible. Different actors do not know capabilities of others well enough that solutions supporting CE could be applied. Co-operative approach was proposed to overcome the barriers referring to lack of cooperation.

Following citation by interviewee 3 points out that to support circular value creation, sector needs to start paying much more attention to stakeholders instead of cost management: *“Situation has led to the point, where none of the stakeholders is satisfied. Sector (property) desires totally new initiatives, so that not only costs are managed but also other things like owner's lifecycle returns and optimal conditions for user.”*

Ways to commit stakeholders to CE model were asked for the interviewees and several suggestions emerged. Nine methods can be seen important and they are gathered in table 14.

Table 14 Nine methods to commit stakeholders to CE practices

1. reward or sanction system that leans on measuring CE activities and positive competition
2. transparent project processes where responsibilities are visible to everyone
3. shared benefits to all stakeholders (e.g. now only thing user gets is the good vibes)
4. cultural story or experience-driven perspective where people doing CE activities can see impacts somewhere afterwards
5. showing the unprofitability of the current linear model
6. providing financial support for CE investments

7. preferring long-term contracts
8. forcing by regulation
9. environmental certificates

The role of stakeholders in implementing CE and in sustainable value creation is vital. Commitment methods were gathered together, and nine most important methods were identified above. Interviews indicate that the owners and users together with service providers are the core stakeholders within industry, or at least should be. In addition, municipality, investors and constructors were seen important for CE implementation.

6.4 Research outcomes: model for implementing circular economy in the property sector

Based on prior findings on the empirical part, a *circle model* for implementing CE in property sector in building's MOL phase is formed. It is inspired by Simon Sinek's *Golden Circle* (2009). The context is Finnish property sector and the model is for the use of companies within the industry. The model is divided in three layers: changing practices and routines, co-creating value, and transforming sustainable business. It is presented in figure 20.

The outer layer deals with the changing practices and routines in order to accomplish transformation to sustainable business. It is done through implementation of CE that is perceived as good method to address sustainability in business. Drivers and challenges for implementation need to be acknowledged because these are the forces affecting particularly in property sector and making it unique environment for the implementation.

The middle layer emphasises the importance of co-creation of value -method in CE implementation. It engages all the stakeholders to the value creation and helps to shape and implement circular economy business models and deliver sustainable value equally for all involved to the process. Two key issues affect co-creation of value process. Firstly, attitude

and behaviour require change, that can be achieved by means presented in table 13. Secondly, stakeholder cooperation needs to be enhanced through co-creative methods that set joint measures, values and goals and where information flow is open to every actor. Ways to commit stakeholders to CE are gathered in table 14. These two aspects are essential building blocks to be considered, in order to form active and working co-creation of value process.

All based on target to transform to sustainable business where sustainable value is created (environmental, social and economic) for stakeholders. This is identified to be the key motivator for companies to pursue and implement CE. Target is to create sustainable value to all stakeholders involved to the process (including society and environment). This is the inner circle that shows the main goal.

Must be mentioned that this suggested *circle model* is just for the start of CE implementation. It forms proper basis for closer and better cooperation between actors reaching for CE. In co-creating value, actors will affect the outcomes and success of the process.

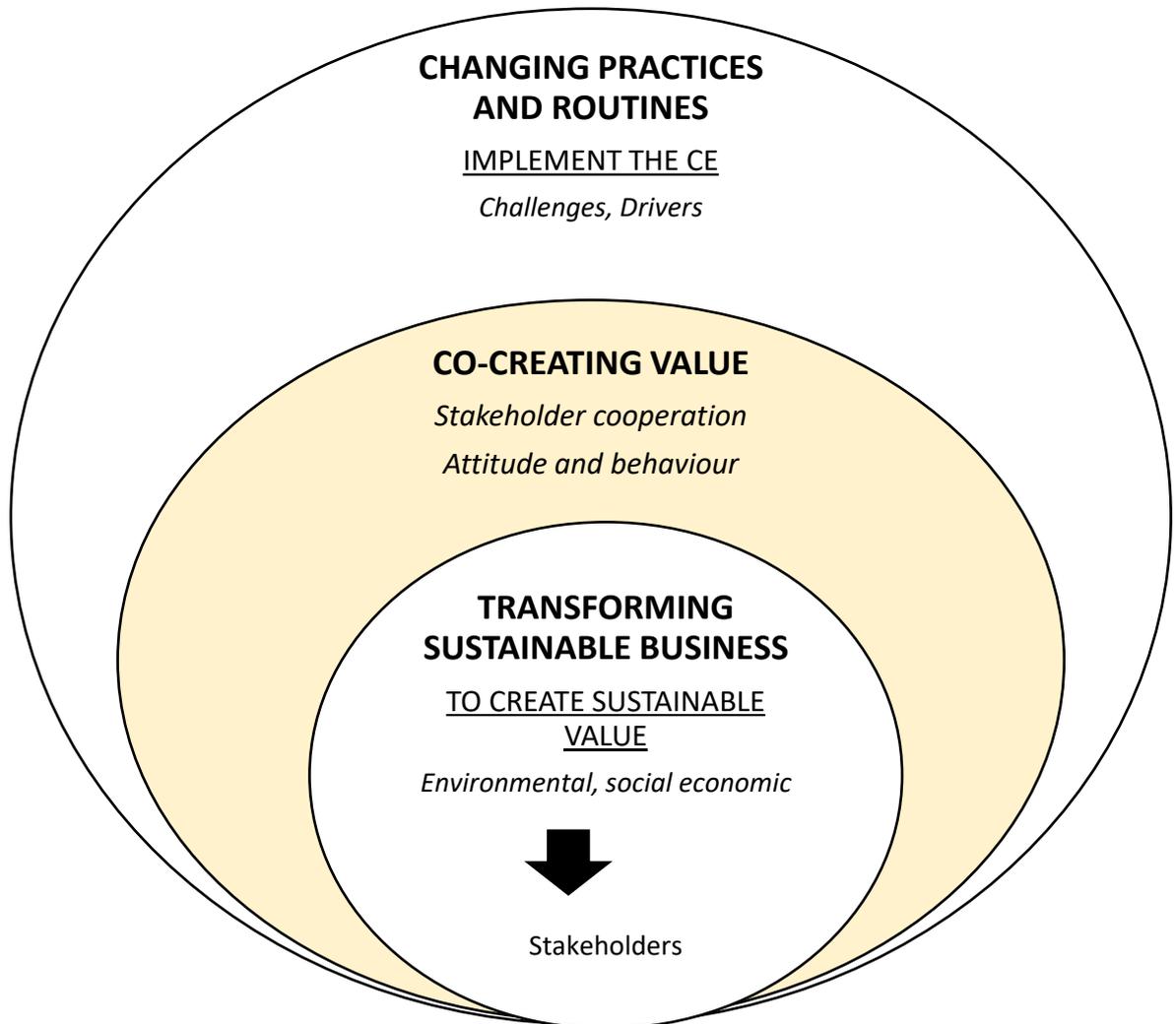


Figure 20 Circle model for sustainable value creation through circular economy in property sector. (Inspired by Golden Circle of Sinek, 2009, p. 37-39)

7 DISCUSSION

This chapter discusses the findings of empirical part more broadly, in the light of theoretical settings relating to CE and sustainable value creation. The chapter offers the summary of central results and compares them to prior research. Moreover, the theoretical and practical contributions of this study are described, and limitations and further study propositions are explained in this chapter.

Next the sub-questions and main research question are answered.

sRQ1. What circular business model practices are done now in buildings' MOL phase?

Circular business model practices were discussed to identify the concrete challenges and drivers for CE implementation. Interviewees were asked about the implementation experiences, and how they went, which provoked real life examples of implementation cases. Circular business model practices in property sector are in their early stages. Still, some of the current practices of the sector are in line with CE. Sector is service-oriented already and for example owner and user are usually different persons. Energy efficiency as a circular economy practice was emphasised all along, which is in line with the literature that note that energy efficiency has been central aspect for a long time within the property sector. More and more system as a service -kind of solutions will emerge. Level of digitalization is now rather low, but it is expected to increase considerably which will boost the development of new services.

Central problem is opinion which practices CE covers, and which are something else than CE. The definition of CE in this thesis was: *“keep materials in use for as long as possible and to preserve - or even upgrade - their value through services and smart solutions”* by Antikainen and Valkokari (2016, p. 6). Like the definition shows, it does not limit the activities which are included to CE. It is assumed that all the services and smart solutions that retain materials in use as long as possible and preserve or upgrade their value, are in line with CE. Therefore, all the interviewees' views of CE practices were noted and not limited. Identified CE practices within property sector are optimization of resources (energy & material), maximization of utilization rate and resource efficiency, maintenance and repair services, lifecycle services, transformability of premises, material and waste management

services, environmental certificates and sharing economy practices such as business parks and office hotels.

sRQ2. What value circular business model practices provide?

When discussing of the circular business model practices, value related to them was enquired. Sustainable value creation concept seemed to be unfamiliar although its dimensions: economic, environmental and social, were usually addressed by interviewees. CE was linked to these three dimensions although interviewees did not recognize the concept of sustainable value. Values the circular business practices provide were termed as “environmental benefits”, “user satisfaction”, “better reputation” and “financial savings”. Still there remains the perception that CE can challenge the economic profitability. This is result of the short-term orientation in current business models and value creation. Moreover, seems that people are reluctant to see the causal links, if they understand the building only as cost. The issue is acknowledged, and sector seems to be working to overcome it. Of all dimensions, environmental benefits are most typically connected to the circular business model practices.

sRQ3. What is the role of stakeholders in circular economy implementation?

The stakeholders have pivotal role in CE implementation, which turns out from literature review and interviews. Still, the role of wide range of stakeholders is minor in property sector. There are initiatives where stakeholders are incorporated to decision-making, and positive feedback has been received, but in larger scale stakeholder engagement or cooperation is poor. Therefore, co-creation of value method is identified as important method to pursue sustainable value creation when implementing CE. It engages all the stakeholders as co-creators and visualizes the values for each stakeholder. When considering the building, owner of it makes the investments that enable acting in accordance with CE. But user of a building is the one who implement CE activities daily. Then different service providers are usually those who actually offer CE services. Value chain includes many actors, although now the focus is on profit making for the owner. Consequently, the co-creation of value process that engages all these stakeholders could be beneficial.

RQ: What are the main challenges and drivers for the implementation of circular economy business models in buildings' MOL phase?

This study identified a set of challenges and drivers affecting CE implementation in property sector and more specifically in buildings' MOL phase. The aspects affect each other and therefore, all of them including their relationships should be considered. Challenges and drivers relate to aggregate dimensions: digitalization, sustainability of the business model and co-creation of value.

Challenges related to CE implementation and sustainable value creation in property sector according to literature review were: empty premises (Mölsä, 2017), high price of renovation versus constructing a new buildings in some areas (Mölsä, 2017), low utilization rates (Sitra, 2017b), verification of sustainable actions (KTI 2016), motivating and guiding stakeholders to common circular goals (KTI, 2016), long value chains (World Economic Forum, 2016), lack of integrated approach to managing buildings (World Economic Forum, 2016) and various actors doing their own sustainability activities which eventually drops the total sustainability (World economic Forum, 2016). This study is in line with these findings but adds more challenges to the list. In addition, this study sees that empty premises and low utilization rates are more consequences of current business methods than reasons behind the problems in CE implementation.

Studies of Hill (2014) and Levänen (2015) agreed that regulations and governmental pressure are generally main drivers for CE implementation. This study makes the same notion but identifies also bunch of new drivers for CE implementation. The literature concerning the drivers especially, was limited previously and this study provides new information relating to drivers.

Challenges and drivers are discussed next. They are gathered in table 15.

Table 15 Challenges and drivers for CE implementation

<i>Challenges</i>	<i>Drivers</i>
<ul style="list-style-type: none"> - More profitable to construct new than renovate old buildings: leading to empty premises - Long and complex value chains - Current business models and value creation that support short-term profitability and cost reductions - Conservatism affecting attitudes and behaviour - Complexity and vague extent of the concept - No disruptions or big changes in the sector → stuck in place where innovations rarely happen, low utilization rates - Brand of the company or individual matter a lot, hindering the useful cooperation between them - Doubt if CE would provide economic benefits - Lack of digitalization, data and knowledge of the materials buildings consist of - Many times, CE requires big initial investment - Motivating and guiding stakeholders to common circular goals - Verification of sustainable actions, lack of assessment methods 	<ul style="list-style-type: none"> - Co-creation of value method, in initiatives aiming to implement CE: shared goals, values and measures - Leading by example: concrete examples and successful pioneers - Increase in level of digitalization: further servitization and development of real time monitoring that enables rewarding and sanction system - New system as a service and service as investment models to support financing of CE solutions - Governmental pressure: stricter waste and environmental regulations, and reconsideration of current regulations preventing the CE actions - Governmental companies could play bigger part in leading change - Societal significance of the CE actions - Facts evidencing the weakness of current linear system - Focus on creating experiences - New tools for CE implementation

Challenges are summarized to conservatism of the sector and current business models, that support short-term orientation in value creation. These aspects hinder the implementation of

CE. Jensen et al. (2014) argued that property industry has shifted from cutting costs to more comprehensive management of properties as a strategic resource, in order to increase value for organization and its stakeholders. This study indicates that the situation does not look that bright and it seems that there is still a lot of work to do to achieve value creation perspective to the industry instead of cost reduction. So, this opportunity changed to the challenge in this study. Of the values Jensen et al. (2012) identified: use value, customer value, economic value, social value, environmental value and relationship value, interviewees of this study named all except relationship value, when I asked for what value the building can create for stakeholders. This result further emphasises the need for closer collaboration and co-creation within the property industry.

Current way to do business affect the attitudes and behaviour within sector, that form challenges of their own for CE implementation. In addition, CE as a concept is perceived to be difficult because of its multilateral nature and its vague extent in property sector. It seems that people do not understand the concept the same way, which surely will cause problems when talking about any CE practices. Careful defining of CE practices when planning cooperation and activities furthering CE is required to prevent confusion.

Besides of the complexity of the concept affecting the attitudes towards CE, there are other important aspects too. Property sector has been traditional for a long time and there have not been disruptions or other significant changes affecting the operations. Companies operate by themselves and brand of the company and individual matter a lot. Like Fernie et al. (2006) also claim, the sector is not very innovative or reform oriented due to the traditional characteristics. A change towards more innovative and collaborative approach is demanded. Now, there is too much confrontation and jealousy between firms and too little working together to achieve common goals.

Stakeholder cooperation is important matter that need to be noted. Each party acting alone describes the sector too much right now. Cooperation need to be developed systematically to create such relationships which enable successful co-creation of value process that enables implementation of CE. Co-creation of value shows as very important in order to drive the change towards CE within property industry.

Sustainable value creation concept remained unfamiliar although all its dimensions were usually considered by interviewees. When discussing of the circular business model practices, value related to them was enquired. Values of circular business practices were seen as “environmental benefits”, “user satisfaction”, “better reputation” and “financial savings”. It was debated if CE challenges the traditional economic value creation, that in the previous literature is seen as one barrier for CE implementation (see e.g. Ghisellini et al., 2016; Aminoff et al., 2016). This divides the opinions because part of the interviewees saw it as a barrier when others thought CE brings opportunities to economic value creation. Anyway, many thinks that it forms a challenge at the moment because business models do not support value creation in a long term and focus is on short-term value creation.

Despite of the doubt, potential of CE in business sense is confirmed by new business models such as business parks, multipurpose premises, waste development services and reprocessing of waste services. Anyhow, concrete examples and successful pioneers are desperately needed to support this image. These can work as drivers for the implementation of CE.

Now lack of digitalization hinders the CE implementation, although digitalization itself furthers CE. Digitalization is identified as a driver for CE implementation. It allows better real time monitoring which enables creation of rewarding and sanction system and new services. Digitalization also furthers servitization that is in line with sustainability and CE. Is expected that the sector will change a lot in the future due to higher level of digitalization. Financial perspective also closely relates to servitization and digitalization as now companies do not always have possibilities to invest in CE services due to the large initial investments they require. CE services offering different financing options are desired and can further CE implementation. Complex value chains or lack of data or assessment method (Manninen et al., 2018) are recognized as challenges for CE implementation in Finnish property sector.

Regulation is important matter that is partly a challenge as well as a driver. Earlier studies see it as main tool to foster CE (Hill, 2014; Levänen, 2015). By regulations is possible to affect in a big scale. Stricter waste and environmental regulations are desired to foster the system level change. This includes also reconsideration of the current regulations that in some cases prevent the practices that are in line with CE.

Societal significance of the CE is affecting implementation as a driver. CE would enhance the sustainable value creation within the property industry by taking better care of the buildings in a long-term. It is just difficult to prove as current business model and value creation perspective prevails. Therefore, all the facts evidencing the weakness of current linear system from value creation perspective are needed.

The important contribution of this study refers to value creation analysis within CE context, which is rather new approach in literature of value creation. This study reveals the importance of co-creation of value method (by Prahalad and Ramaswamy, 2000), when aiming to create value through CE in property sector. Co-creation approach is linked to more sustainable ways to act as it puts all the stakeholders to the same position as co-creators of value. Technology and digitalization have enabled development of co-creation platforms. (Sanders & Stappers, 2008) As the level of digitalization is about to rise in the property sector, can be assumed that co-creation of value -method will also grow in the future and its significance will increase. Prahalad and Ramaswamy (2004, p. 172) state that “*early experimenters are moving away from the old industry model that sees value as created from goods and services to a new model where value is created by experiences*”. This is happening also in property sector where, according to interviews, people are expecting much more features from the premises than before. On the other hand, co-creation process shakes up the current power structures of the companies by involving other than traditional “leading” position professionals to the process (Sanders & Strappers, 2008). This can be a challenge in conservative property industry where people are “*much in dependent of personal and company brand*” (interviewee 5). Attention needs to be targeted to four building blocks: dialog, access, transparency and risk-benefit assessment (Prahalad & Ramaswamy, 2000), to support the co-creation process. Value mapping tool from Bocken et al. (2013) can be a helpful tool in co-creation process as it aims to visualize each stakeholder’s perspective and interests.

7.1 Contribution to research literature and theory

The theoretical contributions of this study relate to CE literature. This study expanded the research of CE in property industry by studying main challenges and drivers affecting

implementation of CE, which was recognized as a research gap (Fernie et al., 2006; Pomponi & Moncaster, 2017; Dooley, 2017; RT, 2018b; Ranta et al., 2018). Moreover, study combined sustainable value creation and CE, which is a quite a new approach to the subject and this study can provide some value for this research field. All the contributions to academia are gathered in table 16.

Table 16 The main theoretical contributions

1. It is important to enhance existing buildings' circularity
2. Changing routines and practices towards more sustainable business can be achieved by implementing CE
3. CE contributes to the sustainability and creates sustainable value
4. Co-creation of value method is important principle in implementation of CE

The first contribution is done to the CE literature by examining long life-cycle products: buildings and their MOL phase. This field lacks studies and this thesis highlights the importance of this part of building's life cycle. This study indicates that great accomplishments in the field of sustainability can be achieved in building's MOL phase.

Changing routines and practices towards more sustainable business can be achieved through CE implementation. To implementation affect the challenges and drivers. These were more deeply discussed in previous section. This thesis contributes to the existing literature by confirming many of the challenges and drivers identified in earlier literature and by revealing new aspects that need attention. All the challenges and drivers are gathered in table 15.

The third contribution of this study refers to the academic concern if CE contributes to the sustainability, due to the lack of consideration of social aspects (Murray et al., 2017; Tukker, 2015; Mont, 2002). Findings of this study do not support this view. Majority of the interviewees emphasise social aspects very much. For example, community, user satisfaction and health came up very often during the interviews. The impression, that people

think that CE would actually enhance consideration of social dimension was formed. Buildings are so 'close' to people, that it can affect this result and make the social dimension more visible in property sector. Therefore, CE seems to create sustainable value.

Implementation of CE is recommended to conduct via co-creation of value method. This is how value should be created in the future. As stated in chapter 2.3, three relevant studies (Aminoff et al., 2016; EMF, 2013; Van Renswoude et al., 2015) dealing with sustainable value creation in CE context were found. In their paper, Aminoff et al. (2016) came to the same conclusion that co-creation of value is the way to achieve transition to CE. They also agreed that value within CE is developed by acting together. They did not, however, focus on any specific industry in their paper. The key element in co-creation is shared and jointly generated purpose. Aminoff et al. (2016) has divided CE co-creation network into two groups, to actors in the core business value network and other stakeholders. Same kind of division was not made in this study, although important stakeholders were identified, and it seems that owners and users together with service providers form the core business value. Especially the importance of users as forgotten stakeholder group was emphasised, and people think that users should always be part of the co-creation process. In addition, role of owners was discussed a lot and people called for a bigger participation from them. Also, service providers are in essential role as they should offer tempting and reasonable CE services and provide data to support the CE implementation and sustainable value creation. Generally, property industry has wide range of stakeholders, and networks for co-creation would be quite broad. Aminoff et al. (2016) believe that value created or destroyed to each stakeholder group involved should be considered. It is done through framework that covers three steps (introduced in chapter 2.3): preliminary value proposition, identification of actors of network and value hunting. This method can be useful in co-creation process to consider and visualize the values for each actor.

Circular value creation thoughts by EMF (2013) and Van Renswoude et al. (2015) are partly similar with this study. The first circle that refers to minimizing use of material when compared to linear system, should be as tight as possible. Property sector mostly encompasses services which are intangible, but this can be linked to optimization of use through resource efficiency. Use of buildings should consume as less resources (energy and material) as possible. In addition, with as less effort as possible, premises should be transformable to other purposes without wasting materials. The second circle is power of

circling longer which is important in property sector where buildings create the best value when their durability is high. It is done through maintenance and repair practices that promote retaining of the buildings. Third principle, power of cascaded use in property sector relates to reuse of the buildings or its parts to other purposes before or after the demolition. The fourth principle, power of pure circles emphasises when constructing or renovating the buildings. This principle is not very significant for the property sector but should be acknowledged in projects where material decisions are done. The principle of production on demand is similarly not so significant in property sector due to the characteristics of the sector that practically sells services on demand. Dematerialized services principle instead, can be connected to the sharing economy services which has emerged recently and potential of them is perceived to be great.

7.2 Practical contributions

This thesis provides several practical contributions. Practitioners can use the novel information about CE implementation and related challenges and drivers when aiming to circular activities. By practitioners, is principally meant actors within property sector focusing on buildings' MOL phase. Practitioners should increase the level of digitalization, real-time monitoring and servitization, and form the reward or sanction system to ensure CE actions. Furthermore, attention should be directed to current business models, evaluate the sustainability of them and make a shift from short-term orientation to more long-term strategic view. New business models that based on service as an investment idea should be developed to facilitate the investing in CE. Practitioners need to be aware of the significance of the sector to whole Finnish economy from national assets and value creation perspective and make responsible decisions. CE practices can help in that. By increasing awareness of CE, the attitudes and behaviour can be altered and by developing better stakeholder cooperation through transparent information flow and communication, the use of co-creation of value method is enabled. Way to commit stakeholders to the CE practices should be used. These are: reward and sanction system leaning on measurement and positive competition, transparent project processes and responsibilities, fair allocation of the benefits to stakeholders, experience-driven perspective, proving the problems of current system,

providing the financial support for CE investments through new business models or other solutions, preferring long-term contracts, stricter regulations and environmental certificates.

Industry specific challenges and drivers are important to consider in company level when pursuing CE. They are also recognized being external factors, which Lewandowski (2016) emphasised in his framework for circular business modelling. Thus, this study gives contribution to the business model forming for CE in property sector companies. Companies still need to identify their own capabilities and include take-back system to the value proposition.

CE is proved to contribute to sustainability. Thus, property sector companies aiming to sustainability can use CE as a method to proceed towards it. There is still a lack of tools for CE implementation, so this study examined existing ones and also formed the circle model (in chapter 6.4, figure 20), that helps property sector companies to implement CE and reach sustainable business. It is highly recommended to engage stakeholders to the circular business modelling and other activities aiming to CE implementation. This should be done by using co-creation of value method. It leans on digitalization and focus on creating experiences. Consideration of sustainable value and what it is for everyone in new business models is essential and it commits different parties to common goals. Especially the role of users must be underlined. Co-creation of value method gives tools to address these aspects. By changing practices and routines through CE implementation, which is enabled by co-creation of value method, it is possible to succeed in transforming sustainable business and creating sustainable value through it. By following the steps of the circle model, property sector companies can succeed in this.

7.3 Limitations and further research

Limiting factors of the thesis are specified next. Significant limitation is the size of the sample when compared to the big size of the sector. This reduces the generalizability of the results to the entire sector. Sample was determined from L&T's perspective. If study would have aimed to more generalizable results, the questionnaire to the large sample of actors within sector would have been appropriate method. But as the research field of CE in

property sector is such a novel, it was reasonable to aim for gaining deeper understanding of the issue, which was achieved through interviews.

Another limitation relates to roles of interviewees. Firstly, several stakeholder groups were left out of the study due to the scope of the thesis. Secondly, different stakeholder groups (service providers, owners and users) were unequally presented in the sample. Only two user-interviews were conducted, as owners and service providers are better represented. An initial idea was to get equal number of interviews from each stakeholder group. This may reduce the views of users to the research topic. By numbering the interviewees, I brought the aspect visible. In citations reader could easily see whose words they are.

Further, one limitation is this study focusing on Finnish property markets. This makes results not applicable to other countries. As came clear from the interviews, there are significant differences in CE laws and practices even between Finland and Sweden. Future research could find the differences in practices of different countries and how they affect the implementation of CE.

Future research could investigate with a case study the co-creation of value process within sector to gain practical results how it works. Outcomes of this kind of project would be interesting. The most interests the sustainable value recognition to each actor. This study could not identify the values for each actor very precisely, so this is one interesting research line that could benefit the companies as well as academia.

Measuring circularity and assessment of implementation of CE are continuously stated as research gaps in the literature (Elia, Gnoni & Tornese, 2017; Genovese, Acquaye, Figueroa & Koh, 2017; Di Maio & Rem, 2015; Zhijun & Nailing, 2007). The measurement of CE came up regularly also in this study, but the scope of the thesis did not cover it. However, it clearly is significant aspect that needs further research and is closely related to digitalization.

Quantitative study of the attitudes towards CE and related behaviour could provide desired knowledge of the most beneficial circular business practices. Now is unclear, which circular business practices people think are the most positive or how they would like to implement CE in property sector.

8 CONCLUSIONS

This thesis studied challenges and drivers for CE implementation in Finnish property sector which focus on buildings' MOL phase. Also, sustainable value creation through CE was examined. The theoretical background gave profound overview to the CE, sustainable value creation and combination of these two themes. Analysis revealed that CE supports sustainability and companies can use CE model when aiming to sustainable business. Co-creation of value -method is found to be the most promising when transforming to sustainable business and sustainable value creation through CE implementation. It changes the traditional value creation by engaging stakeholders as value co-creators and focuses on creating experiences instead of products. It seems important to clarify the joint-measures, values and goals and enable free information flow to all parties involved. The circle model is proposed to support companies in this process.

Challenges and drivers for CE implementation are connected in many times. They relate to three aggregate dimensions: digitalization, sustainability of the business model and co-creation of value. For example, property sector now lacks digitalization which hinders the implementation of CE, but level of digitalization is rising continuously, which will further the implementation of CE. What hinders the implementation of CE now is the conservatism of the sector and complexity of the concept, affecting the attitudes and behaviour of people within the sector. Current short-term oriented value creation of business models that aims to cost minimizing forms also significant challenge. Sector needs to increase awareness of CE to support change of attitude and behaviour towards more stakeholder engaging, innovative and cooperative. At the moment, especially the needs of users of a building are easily forgotten, which complicates the value creation for them. Therefore, co-creation of value method is recommended. Digitalization enables different co-creation of value platforms to be developed. It also furthers development of other services enhancing servitization, real time monitoring, and rewarding and sanction system that was proposed as important driver for CE implementation. Circular services in property sector have emerged and it is essential that knowledge gained from these projects will be shared to others to promote the CE implementation. People are in essential role, as excellent CE services and technology alone cannot succeed without people acting according to CE. In the end, need to be said that the property sector is important actor in Finnish society and it can have major positive

environmental, social and economic impacts by reconsidering the current operations from CE perspective.

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APPENDICES

Appendix 1. Interview questions

INTERVIEW QUESTIONS: CIRCULAR ECONOMY IN BUILDINGS

I. Circular Economy

1. What kind of thoughts does CE bring to you?
2. How does CE currently appear in property sector and is it important?
3. Does your company have environmental and social goals? Does CE respond to them?
4. Have you implemented CE or related projects?
5. CE can be challenging to understand and implement, where these challenges come from in property sector?
6. How do you see the opportunities of CE in property industry in the future?
7. What would motivate stakeholders to implement CE in property sector?
8. What do you think about the buildings' environmental certifications, do they promote CE?
9. What kind of collaboration does implementation of CE demand from stakeholders?
10. How stakeholders can be committed to implement CE in property sector?

II. Circular economy services

11. What type of CE business models are used in property sector? (Which challenges they do respond?)
12. What kind of CE services would benefit your company in the future?
13. Wellbeing of people is measured many times, but is the wellbeing of buildings and premises measured? Is the wellbeing of people and wellbeing of buildings connected?

III. Value creation opportunities in circular economy

14. How building creates value? (What kind of value is created and to whom?)
15. Does CE model challenge the traditional value creation?
16. Collaboration between stakeholders is significant aspect in CE and value creation, how this is accomplished in property sector?
17. Is there something you would like to bring up, that was not discussed during the interview?