

**SMALL AND MEDIUM SIZED COMPANIES IN
WOOD-BASED CIRCULAR BIOECONOMY -
BARRIERS AND PREREQUISITES TO SUCCESS**

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ABSTRACT

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<p>Abstract</p> <p>The issues caused by global warming and waning natural resources have created pressures for change and increasing interest around the use of bio-based materials in several different applications. The circular bioeconomy (CBE) is an emerging concept developed to replace the existing linear "take-make-dispose" model, which is based on creating value by maximizing the amount of products produced and sold. CBE is an intersection of circular economy (CE) and bioeconomy (BE) implying a more efficient management of bio-based resources. Especially small and medium sized entrepreneurs (SMEs) are seen to have a major role in advancing wood-based CBE in Finland and developing new products to the markets.</p> <p>The objective of this thesis is to fill in the knowledge gaps of business drivers and barriers among SMEs in the wood-based sector, since the transformation towards CBE requires advancements in understanding these factors. The literature review was conducted to gain a better understanding of the concepts of CE and BE, discover the hindering and driving factors towards CBE as well as to present theories (RBV and OHI) utilized in analysing the results. A qualitative study based on 10 semi-structured interviews was conducted to find out of what are the prerequisites to success and what kind of resources and capabilities are needed in wood-based CBE.</p> <p>The willingness to modify the traditional forest industry was seen as a central driver to CBE as well as profitable business and environmental values. Additionally, intangible resources that are hard to imitate by competitors such as company's culture was mentioned as a driving force. The results of this study revealed that success in CBE requires partnerships through which the missing set of resources and capabilities can be achieved. Moreover, the most pressing barriers were technological and the lack of credibility - both of these which can be tackled by collaborating with different stakeholders in the market.</p>	
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<p>Tiivistelmä</p> <p>Ilmastonmuutoksen ja hupenevien luonnonvarojen aiheuttavat ongelmat luovat painetta muutokselle ja kasvavaa kiinnostusta biopohjaisten materiaalien käytölle useissa eri tarkoituksissa. Kiertotalous on yleistynyt lähestymistapa, joka on suunniteltu korvaamaan nykyinen lineaarinen ”ota-käytä-hävitä” malli, joka perustuu arvon luomiseen maksimimalla hyödykkeiden tuotanto ja myynti. Kiertotalous on kierto- ja biotalouden yhdistelmä, joka hyödyntää bio-pohjaisten resurssien tehokasta hallintaa. Erityisesti PK-yrityksillä nähdään olevan merkittävä rooli puupohjaisen kiertotalouden edistämässä Suomessa ja uusien tuotteiden markkinoille tuomisessa.</p> <p>Tämä tutkielman tarkoituksena on täydentää tietämystä PK-yritysten ajureista ja esteistä puupohjaisella sektorilla, sillä siirtyminen kiertotalouteen edellyttää näiden tekijöiden ymmärtämistä. Kirjallisuuskatsauksen tarkoituksena oli saavuttaa parempi ymmärrys kierto- ja biotalous konsepteista, löytää edistävät ja estävät tekijät kiertotalouteen siirtymiselle ja esittää teorian (RBV ja OHI), joita hyödynnettiin tulosten analysoinnissa. Kvalitatiivinen tutkimus perustui kymmeneen puolistrukturoituun haastatteluun, joiden tarkoituksena oli selvittää edellytykset menestykseen ja minkälaisia resursseja ja kyvykkyyksiä tarvitaan puupohjaisessa kiertotaloudessa.</p> <p>Keskeisinä ajureina kiertotalouteen nähtiin halu muuttaa perinteistä metsäteollisuutta, kannattava liiketoiminta ja ympäristöarvot. Lisäksi, aineettomat resurssit, joita kilpailijoiden on vaikea kopioida, kuten yrityskulttuuri, nähtiin edistävänä tekijöinä. Tutkielman tulokset osoittavat, että olennaista yrityksen menestymiselle kiertotaloudessa ovat yhteistyökumppanit, joiden kautta puuttuvat resurssit ja kyvykkyydet voidaan saavuttaa. Lisäksi teknologiset seikat ja uskottavuuden puute nähtiin merkittävimpinä esteinä, joista molemmat näistä voidaan ylittää tekemällä yhteistyötä erinäisten sidosryhmien kanssa.</p>	
Asiasanat kiertotalous, kiertotalous, biotalous, kestävyys, metsäteollisuus, puupohjaiset virrat	
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LIST OF FIGURES AND TABLES

Figure 1. The difference between linear economy and CBE (D'Amato, Veijonaho and Toppinen, 2018)

Figure 2. Cascading use presented in a simple way (Odegard, Croezen and Bergsma, 2012)

Figure 3. Wood flows in Finland in 2013 (Sokka et al., 2015)

Figure 4. The links among resources, capabilities and competitive advantage (Grant, 2010 p. 117)

Figure 5. Nine elements of organizational health (Keller and Price, 2011)

Figure 6. Data analysis process (Braun and Clarke, 2006)

Figure 7: Prerequisites to success in CBE

Table 1. Internal CBE factors

Table 2. External CBE factors

Table 3. Themes for data analysis

Table 4. Recommendations for SMEs to success in CBE

LIST OF ABBREVIATIONS

B2B	Business-to-business
B2C	Business-to-consumer
BE	Bioeconomy
CBE	Circular bioeconomy
CE	Circular economy
EMAF	Ellen MacArthur Foundation
IPR	Intellectual property rights
MEAE	Ministry of Employment and the Economy
OHI	Organizational Health Index
RBV	Resource-based view
R&D	Research and development
SME	Small and medium sized entrepreneur
VRIN	Valuable, rare, hard to imitate and non-substitutable
VUCA	Volatile, uncertain, complex and ambiguous

CONTENTS

ABSTRACT

LIST OF FIGURES AND TABLES

LIST OF ABBREVIATIONS

1	INTRODUCTION	9
1.1	Background of the study.....	9
1.2	Research task and research questions.....	11
1.3	Structure of the study.....	12
2	TOWARDS WOOD-BASED CIRCULAR BIOECONOMY.....	13
2.1	Circular economy (CE).....	13
2.2	Bioeconomy (BE).....	15
2.3	Circular bioeconomy (CBE).....	16
2.3.1	Cascade use of biomass	18
2.4	Barriers and prerequisites to success in CBE.....	20
2.4.1	Internal CBE factors.....	21
2.4.2	External CBE factors.....	24
3	STRATEGY CONCEPT, RESOURCE-BASED VIEW AND OHI	28
3.1	Definition of strategy and competitive advantage	28
3.2	Resource-based view of the firm (RBV).....	30
3.2.1	Strategic alliances.....	32
3.3	Organizational Health Index (OHI)	33
4	DATA AND METHODOLOGY	36
4.1	Research approach.....	36
4.2	Data collection.....	37
4.2.1	Selection of interviewees	37
4.2.2	Conducting interviews	38
4.3	Thematic analysis.....	39
5	RESULTS	41
5.1	Internal factors.....	42
5.1.1	Organizational culture and values.....	42
5.1.2	Human resources: employees and leadership	44
5.1.3	Innovation and patents	45
5.1.4	Technological	47
5.1.5	Motivation and future visions	48
5.2	External factors.....	49
5.2.1	External orientation.....	50
5.2.2	Political and Economic.....	52
5.2.3	Market	54
6	SUMMARY, DISCUSSION AND CONCLUSIONS.....	56
6.1	Prerequisites to success and the hindering factors in CBE	56
6.2	Recommendations for SMEs	61

	8
6.3 Trustworthiness and limitations of the study	63
6.4 Future research.....	65
REFERENCES.....	66
APPENDICES.....	76

1 INTRODUCTION

1.1 Background of the study

Today's economy is exhausting our natural capital. Environmental issues such as biodiversity loss, water, air and soil pollution, resource depletion, and excessive land use are increasingly threatening the earth's life-support systems (Geissdoerfer, Savaget, Bocken and Hultink, 2017). The prevailing linear economy, which is based on the logic of take-make-dispose, is not only a source of numerous environmental issues mentioned but is also questioned in its viability by socio-economic and regulatory trends (Ghisselini, Cialini and Ulgiati, 2016). In response to the dominating linear economy, two sustainability-oriented concepts, namely circular economy (CE) and bioeconomy (BE), have been presented as ways to shift the current economy towards a more efficient and waste recycling one. The aim of CE is to maximize the full life-cycle and value of materials and products in the economy by keeping them at their highest utility and value at all times (EMAF, 2013). BE, in turn, links together various sectors of primary production, such as agriculture, fisheries, forests, and industrial sectors, which convert bio-resources to bio-products such as food, chemicals, materials and energy (Arasto, Koljonen and Similä, 2018). These concepts have received increasing attention among researchers and policymakers (e.g. Geissdoerfer et al. 2017; Ghisselini et al., 2016; Staffas, Gustavsson and McCormick 2013), while they are also well accepted at industry level, since they are entrusted to cherish cost reductions, competitiveness and innovation (Korhonen, Hurmekoski, Hansen and Toppinen, 2018).

The increasing awareness of environmental issues and resource scarcity has resulted in the growing interest towards the usage of bio-based materials in various different applications (Teuber, Osburg, Toporowski, Militz, and Krause, 2016). Also, the stringent legislative policies are forcing diverse industries to look for new materials from renewable sources instead of the traditional materials derived from non-renewable resources (He, Hou, Xue and Zhu, 2013). Forest industry is experiencing substantial transformation due to major changes in global markets pushed by demographic changes, population growth, increased GDP, climate change and concerns of natural resources. Moreover, the era of mass production in manufacturing industries is changing into the era of smart production. (Arasto et al., 2018) New kind of textiles, plastics, pharmaceutical and cosmetics are examples of materials produced by forest sector that can help to transform traditional economic sectors such as energy, construction and manufacturing (Näyhä, Hetemäki and Stern, 2014).

In order to companies being able to compete and success in the rapidly changing environment requires upgrading their business strategies, models and capabilities to meet the changing business environment (Grant 2010). Grant (2010) states that organizational capabilities focus on how companies deploy their available resources to achieve competitive advantage. The capability perspective is rooted from Resource Based View (RBV) of the company, which claims that every company has a specific set of assets that can be used to build competitive advantage. Corporations are granted with resources and capabilities and thus they have the possibility to drive the change towards a more sustainable economy. (Grant, 2010)

The study by Näyhä (2019a) highlights that new forest-based businesses are needed in Finland in the transition to sustainable bio and circular economies. According to Watkins (2014), arrangements to improve co-operation between actors are of great importance to encourage innovation in novel ways to reuse residues and create new by-products in the production and supply chain. Especially small and medium sized entrepreneurs (SMEs) could have a significant role together with bigger companies and research partners to form business ecosystems that will develop new products to the markets (Arasto et al., 2018). These future products will require specialized services (design, research and development, consulting, marketing, sales, etc.) that further multiply the economic and environmental impact and the capacity to generate employment (Näyhä et al., 2014). According to Hetemäki and Hurmekoski (2016) the critical question is not about what can be made of forest biomass, but rather what will be made, on what scale, where and driven by what.

Several scholars have proposed that the BE should also adopt guiding principles from the CE, for instance product design related to material and energy efficiency, durability and recyclability. The combination of these two concepts is called circular bioeconomy (CBE) (Antikainen et al., 2017) and it is redirecting the strategic planning of many industrial companies (McCormick and Kautto, 2013). The Nordic countries have a significant potential to implement CBE, particularly jointly with the needed renewal of the forest sector, where structural changes leads to turbulence in global markets and the need to renew the traditional management culture is a main challenge (D'Amato et al., 2017; Hetemäki et al., 2017; Korhonen et al., 2018).

Recent studies (see f.ex Lacy and Rutqvist, 2015; Ghisselini et al., 2016; Stahel, 2016) claim that even though many businesses have proclaimed their support for the CE, its implementation still appears to be in early stages. There is also a lack of analysis of the overall CBE concept (D'amato et al., 2017). Additionally, the study by Kirchherr et al. (2018) mentioned as a limitation that the authors have not covered the differences that may exist regarding CE barriers from sector to sector or business model to business model. This is the point of departure of this thesis as the aim of this paper is to examine the current factors that hinder the

usage of wood-based streams and find the prerequisites to success in CBE. In order to get the CBE transition going, businesses need to overcome these barriers and take the necessary next step to speed up the process. The scope of this paper is focused on the forest-based sector.

1.2 Research task and research questions

This thesis is an assignment from VTT Technical Research Centre of Finland and is part of an ongoing “Puusta Pidemmälle” project. The project’s participants are a diverse group of businesses, research institutes and educational organizations. The aim of the project is to test a fast-paced experimentation and innovation models that enable businesses operating in forest-sector, designers and marketers to jointly develop new business ideas for wood products that will highlight the quality instead of quantity as the key characteristic of wood products. The exports of forestry goods in Finland have traditionally focused on bulk production of wood products, cellulose and cardboard. The future vision, however, is that biomass obtained from forests will be increasingly utilized in high-value products such as textile fabrics, plastics, medicines, cosmetics, chemicals and smart packaging. During the aforementioned project, opportunities for promoting wood-based products’ in CE will be explored as well as a life cycle calculator for wood products will be implemented and a marketing concept for the CE will be designed for all companies involved. (Sitra, 2018)

The aim of this thesis is to examine the participating Finnish SMEs operating in forest-based sector. The scope of this thesis particularly focuses on the forest-based side streams and biomass and the purpose of the results is to identify the current issues that slow down the process of utilizing them. This thesis is neither focusing only on system-level approaches nor individual responsibilities to address environmental issues. Rather it focuses on corporations and their role in utilizing these forest-based streams for further use. The study investigates the whole chain, from the acquisition of the material to the commercialization and marketing of a product. Specifically, this thesis applies RBV theory from strategy literature to investigate the resources and capabilities that are required for organizational change. The results will be interpreted partly utilizing the Organizational Health Index (OHI) framework. Additionally, the barriers and prerequisites found from the literature are compared to the barriers emerged from this research to find out if there occur similarities.

Main research question is the following:

- Under what prerequisites does the company utilizing wood-based biomass have the possibility to succeed in CBE?

For a better understanding, the main question is complemented with the following sub-questions:

- What are the barriers for SMEs in utilizing wood-based biomass, particularly side streams, in CBE?
- What kind of resources and capabilities the companies should have to enable continuous innovation and success?

1.3 Structure of the study

The structure of this thesis is as follows. The first chapter introduces the reader to the subject by clarifying the background and objectives of the study as well as the research task and questions. The second and third chapters, towards wood-based CBE and strategy chapters form the theoretical framework for the thesis. In the second section wood-based CE and BE with related drivers and barriers towards CBE are presented. The third section, in turn, concentrates on strategy concept and related theoretical approaches more precisely resource-based view (RBV) and Organizational Health Index (OHI). In section 4, the research method, data collection and data analysis are described. Results of this study are presented in the chapter 5. Then the summary and discussion chapter will follow and to conclude the thesis, recommendations for SMEs are conducted to re-evaluate the findings of the research. Finally, evaluation of the trustworthiness and the limitations of the study as well as recommendations for future research are presented.

2 TOWARDS WOOD-BASED CIRCULAR BIOECONOMY

2.1 Circular economy (CE)

The CE concept, with a purpose of providing a sustainable alternative to the dominant “take, make and dispose” economic model, has received growing attention among policymakers, companies and researchers globally (Ghisselini et al., 2016; Geissdoerfer et al., 2017). CE is seen to have its origins in the ideas of ecological and environmental economics and industrial ecology (Ghisselini et al., 2016). The current understanding of CE and its practical applications to economic systems and industrial processes have evolved through bringing together various features and contributions from the concepts that share the idea of cyclical closed-loop systems (Geissdoerfer et al., 2017). Today, various definitions of CE have been proposed (D’Amato et al., 2017) and one of the most renowned definition (Geissdoerfer et al., 2017) is provided by the Ellen MacArthur Foundation (EMAF, 2013, p.7), which introduces CE as “an industrial system that is restorative or regenerative by intention and design. It re-places 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.” Kirchherr et al., (2018) formed a meta-definition of CE based on an analysis of 114 definitions of CE. That definition takes into account in addition to the previous mentioned aspects the following; “...with an aim to accomplish sustainable development, which implies creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations” (Kirchherr et al., 2018, p. 224-225).

Aforementioned study by Kirchherr et al. (2018) identified core principles of CE which include the “4R” framework (reduction, reuse, recycle and recover), the waste hierarchy and a systems perspective. These different “R” frameworks are seen as key tools in implementing CE into action (Ghisselini et al., 2016; Kirchherr et al., 2018). The framework forms a hierarchy describing how to treat resources and material as the main feature with the first R (reduce) is considered as priority to the second R (reuse) and so on (Kirchherr et al., 2018). The waste hierarchy principle, in turn, is a legislative framework of the European Union’s Waste Framework Directive 2008/98/EC, which aims at encouraging sustainable use of residues by striving to clarify the waste status of certain materials and by delimiting its scope of application just to materials defined as waste. The directive aims to prioritize the most desirable action to reduce and manage waste (i.e. starts by preventing and minimizing, followed by reusing and recycling and lastly recov-

ering and disposing). In other words, it guides European Union's waste management in delivering best overall environmental outcome. (EU, 2008; Ghisselini et al., 2016; Kirchherr et al., 2018) The third core principle of CE refers to the focus on a long-term system change at all macro, meso and micro levels (Kirchherr et al., 2018; van Buren, Demmers, van der Heijden and Witlox, 2016).

There are plenty of global policies and economic instruments for CE (Ghisselini et al., 2016). Europe, together with China have been the forerunners in policies on CE. China was the first country in the world to adopt a law for the implementation of CE in 2008. Since then others have followed; in 2015, the European Commission published "Closing the loop - An EU action plan for the Circular Economy" package with an ambitious approach. The package was enhanced in 2018, when the European Commission adopted new measures such as an EU Strategy for Plastics in the CE; A communication on options to address the interface between chemical, product and waste legislation; A report on critical raw materials and the CE; and a Monitoring framework on progress towards a CE. (European Commission 2018) Finland was the first country in the world to publish a road map to a CE in 2016. The road map was facilitated by Sitra in cooperation with ministries, the business sector and other key stakeholders. The roadmap includes five focus areas: sustainable food system, forest based circles, technical circles, movement and logistics and shared actions. According to the road map, Finland will become a leading bio- and circular economy country because of the high-class forestry. Additionally, new commercial goods, services and co-operations as well as development in digital technologies are going to bring a global competitiveness. (Sitra, 2016)

The aims of CE include improvements in material and energy efficiency, realization of the potential of industrial symbiosis and increase in the use of side streams and wastes as valuable raw materials. Since the underlying idea of industrial symbiosis is the transformation of one industry's by-product into a resource for another industry, there is a high importance in inter-sectorial dynamics and co-operation. (Ghisselini et al., 2016) Closing the loop patterns, which are a central part of CE, requires companies to restructure their supply chains and to take into account the impacts of every production decision on downstream characteristics and the final ecological recovery (Winkler, 2011). This is also a central part of the concept of industrial ecology, which have a focus on connections between companies and products and draws distinction between these linkages and natural ecosystem functions (Ehrenfeld, 2004). When considering traditional forest industry, it has lived by the principles of CE for a long time. Modern pulp and paper mills operate with an integrated approach, utilizing industrial by-products. For instance, waste liquors and waste wood such as black liquor, bark, sawdust and recycled wood can be utilized in heat and energy production. The heat and electricity is shared with municipal power plants. Additionally, chemical industry plants, waste management facilities and sewage treatment facilities often

emerge around pulp and paper mills and these symbiotic industrial settings provide various economic, environmental and social benefits compared to standalone production. Thus, it is able to utilize wood raw material in a resource efficient way, which is CE at its best. (e.g. Korhonen, Savolainen and Wihersaari, 2001; Mabee, 2011; Näyhä, 2019a)

2.2 Bioeconomy (BE)

The term of BE has appeared in policy documents and later in scientific literature in the early 2000s (Pülzl, Kleinschmit and Arts, 2014). The concept is increasingly associated as playing a key role in the development towards a sustainable society (Bugge, Hansen and Klitkou, 2016). De Besi and McCormick (2015 p.1) have portrayed BE as "an economy based on the sustainable production and conversion of renewable biomass into a range of bio-based products, chemicals and energy". This definition shares some conceptual alignments, such as the use of renewables and biological resources with other researches of BE (see e.g. O'Callaghan 2016; McCormick and Kautto 2013). However, it does not take into account the economic point of view as for example definition by Finnish Bioeconomy Strategy does. That definition states that BE will create new economic growth and jobs while protecting the environment (Ministry of Employment and the Economy (MEAE), 2014). Nevertheless, Bioökonomierat (2015) has conducted a global review of BE strategies, which emphasizes the innovation capacity building by increased cross-sectoral collaboration, use of scientific knowledge, and emerging technologies for the development of new bio-based processes and sustainable products and services. Implementing BE strategies is seen to lead to new bio-based value chains and cross-sectoral processes, while meeting grand societal challenges (Bioökonomierat, 2015; McCormick and Kautto, 2013).

The expanding global market provides new opportunities for BE products, services and expertise. The main products of BE are bio-based products and bioenergy. (McCormick and Kautto, 2013) In Finland, bioenergy already accounts for about 26% of the total energy consumption and the utilization of bioenergy and biofuels is predicted to continue growing due to national and EU-level strategies and policies in energy and climate change mitigation. However, in order to achieve the sustainability criteria in BE, the use of natural resources need to be optimized in the most efficient way, taking into account material efficiency and value added. Also, long-term and indirect impacts on the environment, climate and welfare need to be considered in order to ensure sustainable use of biomass. (Arasto et al., 2018)

In 2012, the European Commission launched its BE strategy, which highlights the sustainable management of natural resources, sustainable use of resources and

biomass sustainability. The strategy is structured around investments in research, innovation and skills, reinforced policy interaction and stakeholder engagement as well as enhancement of markets and competitiveness. (European Commission, 2012) Finland has a large forest areas and a deep-rooted traditions in utilizing forest-based resources and it is seen that companies in wood-based industry will have a significant role in producing high-tech and high value-added products together with the traditional forest products and bioenergy (MEAE, 2017). The Finnish BE strategy was published in 2014 and it promotes a sustainable BE having the focus on a low-carbon and resource efficient society. The key goals of the strategy are for instance the sustainable use of biomass, creation of new businesses, the efficient use of side-streams and utilization of clean technologies. (MEAE, 2014)

In the transition to BE, wood-based sector has been argued to play a vital role (Hagemann, Gawel, Purkus, Pannicke and Hauck, 2016; Ollikainen, 2014) and some forest companies have been branding themselves as pioneers of the BE. Hagemann et al. (2016 p.2) define wood-based BE as "a bio-based circular economy that uses lignin-containing and, therefore hard parts of stem, branches and twigs of plants such as trees and scrubs". Actually, the main components of wood include cellulose, hemicellulose and lignin which are the most abundant natural polymers on Earth (de Arano et al., 2018). Round timber, pulpwood and forest residues make the largest portion that can be utilized from forests while smaller parts of wood biomass originate from short rotation coppice and landscape residues. Moreover, by-products and waste from wood processing and recycled wood are used for material and energetic purposes. (Hagemann et al. 2016) The Finnish forest-based BE is strongly connected to industrial wood, currently to produce mainly sawn timber, fibre products, power and heat. The aim is to utilize all fractions of wood in products at high as value as possible and to take advantage of low-value residues and side streams as energy. (Arasto et al., 2018) According to study by Näyhä et al. (2014) wood-based products are likely to gain markets, particularly in construction, textiles, chemicals, plastics, and transportation fuels. Also, the niche markets such as food additives and pharmaceuticals will utilize wood as a raw material.

2.3 Circular bioeconomy (CBE)

One of the core ideas of CE according to Murray, Skene and Haunes (2017) is to mimic biological processes through technological systems. However, perhaps because of the popular butterfly figure of CE introduced by Ellen McArthur, which clearly separates technological and biological cycles of CE, many publications of CE leave out the bio-based sector and concentrates on the circularity of plastics, minerals and metals (Geissdoerfer et al., 2017). However, CBE is a new economic paradigm which increases the reliance on renewable, biological resources with

superior resource efficiency and circular material loops. The emerging CBE concept seeks to address the limitations of the individual concepts of CE and BE. A CE aims to design products for re-use and remove waste, while BE seeks to substitute fossil-based, non-renewable materials with renewable and bio-gradable solutions. (Antikainen et al., 2017) However, the CBE is not only about adopting the circularity principles, such as providing bio-based products with longer lifespan, higher endurance and free of toxicity (Antikainen et al., 2017; Hetemäki et al. 2017), but rather it is described as “more than BE or CE alone” (Hetemäki et al. 2017, p.14) (Figure 1).

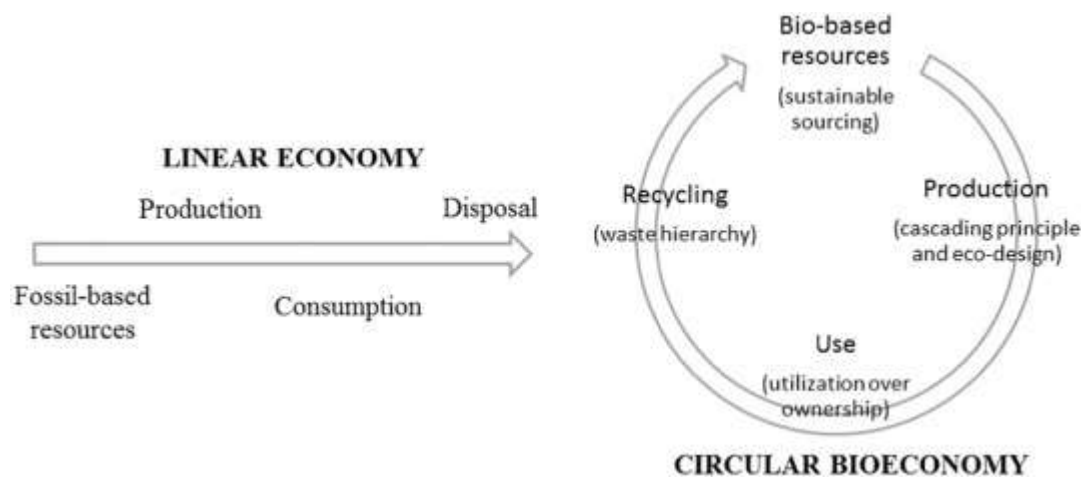


Figure 1. The difference between linear economy and CBE (D’Amato, Veijonaho and Toppinen, 2018)

SMEs have been seen as key actors in order to move towards CBE as they are more flexible, dynamic and capable of generate the required innovations compared to traditional larger forest companies (Hansen, 2016). Agriculture, forestry and related industries have key role in the implementation of the CBE (D’Amato et al., 2018) and by providing renewable biological resources, these industries provide convenient platform for the needed research and innovation processes (Bugge et al., 2016). There are, however, major challenges that CBE may face. As an example, the amount of biomass that can be produced has its limits and maximizing the production and collection of the biomass can conflict with other social or environmental goods and services. Thus, the BE must fully develop circularity principles. (de Arano et al., 2018)

The study by Virchow, Beuchelt, Kuhn and Denich (2016) presents the concept of “biomass-based value web” which development has been seen as a goal when linking the BE principles with the principles of CE. According to this concept, the cascade use of biomass and the by-products from the processing of biomass enables an interlinkage of various value chains. In order to change the current view on how to utilize bio-based materials and products more circularly, demands

cross-sectoral collaboration within and between different actors (Vis, Mantau and Allen, 2016).

2.3.1 Cascade use of biomass

Bio-based materials can have a crucial role in climate change mitigation through temporary carbon storage (Jørgensen, Hauschild and Nielsen, 2015) and by cascading the biomass-derived product, can further increase this potential. Cascading of woody biomass has increasingly been discussed and analysed in EU bio-based industries (Olsson et al., 2016). Action Plan by European Commission (2015) encourages cascading use of renewable resources with various reuse and recycling cycles in a CE. The definition of cascading biomass refers to an efficient utilization of biomass by using biomass from one product again in another purpose. In single-stage cascade, the second use is straight for energy whereas in multistage cascade, the biomass is reused at least once again in some product before utilized in energy production. (Vis et al., 2016). Figure 2 presents the cascading use in a simplified way.

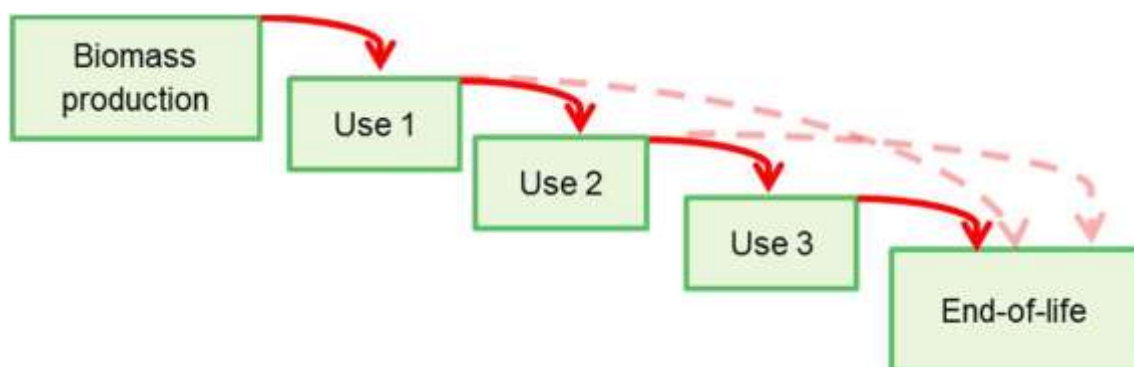


Figure 2. Cascading use presented in a simple way (Odegard, Croezen and Bergsma, 2012)

The Ellen MacArthur Foundation (EMAF, 2013, p.25) has defined cascading of components and materials in CE as “putting materials and components into different uses after end-of-life across different value streams and extracting, over time, stored energy and material coherence. Along the cascade this material order declines (in other words, entropy increases).” Odegard et al. (2012), in turn, have presented three different approaches to cascading. According to them, the first approach, cascading in time, refers to sequential use of biomass. In other words, reusing or recycling a bio-based product and keeping the energy production at the end of the lifecycle. Traditional examples of cascading in time are paper recycling and particleboards but also more innovative solutions are possible such as bioplastics. The second approach, cascading in value, prioritize the maximum

value of the whole life cycle of biomass by optimizing the use of biomass for multiple services. The last approach, cascading in function, optimizes co-production. (Odegard et al., 2012)

Biorefineries can be seen as an example of cascading as they involve both conventional waste-to-energy strategies as well as new ways to utilize “waste wood” such as in chemicals or bioplastics. The added value can be financial, but also it can mean increased environmental and social value. As an example, producing furniture from wood absorbs carbon from long periods and that may increase the environmental value of the wood. Furthermore, the economic value is higher than in a situation where the wood is burned for electricity generation and also it most likely employs more people in higher skilled jobs. Considering the cascade use concept, any residual biomass that is left after the production of the furniture will be utilized bioenergy purposes and thus maximizing the efficient use of the biomass. (Philp and Winickoff, 2018)

Both wood products with long lifetime and wood used for bioenergy are supporting the mitigation of climate change when they are used for substituting non-renewable materials. However, material use and energy use are competing against each other. (Keegan, Kretschmer, Elbersen and Panoutsou, 2013) In Finland bioenergy generation is supported by subsidies (MEAE, 2017) and these subsidies may corrupt markets and limit efficient cascade use of wood (Dammer et al., 2016) Although, the use of subsidies has enabled to achieve policy targets for renewable energy as wood-based fuels cover 88% of Finland’s total renewable energy generation, still when considering longer term benefits, cascaded products could improve resource efficiency and contribute to positive social and economic development. (Dammer et al., 2016) However, biomass is still a limited resource despite its renewable nature. Therefore, it is essential to use it wisely and in a sustainable way. Bioenergy are often seen as carbon neutral, as the carbon dioxide that is released during combustion is assumed to be compensated by the carbon dioxide that have been absorbed when the trees have grown. However, the sustainability of utilizing wood in energy purposes have been questioned because of the long-time scales to regenerate forest biomass. (Arasto et al., 2018) In fact there has been a debate in the media and for instance the head of the Environment Ministry-appointed Finnish Climate Panel has raised its concerns related to wood-based biofuels, stating that their environmental load is four times higher than that of fossil fuels (Sutinen, 2018).

Defining materials as co-products, by-products, residues or wastes depend on the context and is not straightforward. In European Union’s Waste Framework Directive (2008/98/EC), the concept of waste has been defined as “any substance or object which the holder discards or intends or is required to discard”. The directive also have criteria for defining by-products and end-of-waste, the latter one describing when a waste material are not waste anymore after recovery.

Ghisselini et al., 2016; Stahel, 2016). To make the process towards CBE easier, the key enablers and obstacles must be identified. For organizations it is worthwhile to study barriers as it allows them to identify specific bottlenecks among the many potential factors preventing innovation from happening. However, according to de Jesus and Mendonca (2018) generally there is a mixture of factors that either hinder or ease the transition to CBE. Thus, the same factor can be a barrier and a driver and in this thesis the term “factor” is used instead of dividing them into drivers and barriers. In fact, it was found difficult to categorize things as there are various ways to do it and different factors are often interlinked. However, in order to identify the different factors businesses may face in commercialization of circular products or services, a wide range of studies were reviewed on the field of CE, BE, CBE, new business models and innovations. The author selected aspects that are relevant especially for SME sized businesses. The framework was created based on the literature to categorize the factors that either hinder or drive towards CBE. In the first part of this chapter the internal factors have been divided into three main groups (cultural, informational and technological factors) and then into subgroups as can be seen from Table 1. Additionally, the external factors, namely co-operational, market and economic and political factors are presented later in this chapter in Table 2.

2.4.1 Internal CBE factors

Cultural	<ul style="list-style-type: none"> • Organizational culture and vision • Management and employees
Informational	<ul style="list-style-type: none"> • Understanding and perception
Technological	<ul style="list-style-type: none"> • Recycled materials

Table 1. Internal CBE factors

Cultural

In the theoretical part of this thesis, cultural factors include the company's culture and vision as well as its management and employees. Factors related to company's environmental culture refer to the attitudes and habits the company have towards implementing CBE practices. The "wrong" kind of culture can be damaging. However, for new start-up companies it is relatively easy to adopt CE principles, as their company culture develops from the scratch compared to the existing companies where changing traditional practices can be challenging. (Rizos et al., 2016) Examples of challenges related to the implementation of CE and company's culture are hierarchical systems preventing flexibility and innovation, silos between departments (Liu and Bai, 2014), lacking skills and capabilities as well as incompatibility with existing operations (Rizos et al., 2016). According to Hansen, Juslin and Knowles (2007) the traditional production orientation of many organizations is problematic as if the metrics how employees are rewarded are based on volume recovery that is precisely what they will focus on. Kirchherr et al. (2018) conducted a study of CE barriers with 208 survey respondents and 47 expert interviews. According to their study, cultural barriers, especially "operating in a linear system" and "hesitant company culture", seem to be the most pressing CE barriers that slow down and in the worst case derail the transition towards a CE. According to Bocken and Short (2016) and Kok, Wurpel and Ten Wolde (2013) a vision that concentrates on circularity can be an internal driver for circular business and can allow companies to attract talented employees. Also, having circularity embedded in strategy, vision and culture can enhance employees' engagement.

Respectively, the study by Rizos et al. (2016) found out that the most frequently mentioned driver towards CE is the company culture and especially the attitudes of the management and employees. According to their study, majority of SMEs being interviewed thought that the mind-set and commitment of the workforce is an important aspect to ease the transition to CE. From the management point of view, often in SMEs the manager is also the owner of the company who has significant power of the strategic decisions and some managers have positive attitude towards CE while some not. A major bottleneck for SMEs is the management's resistance to change as well as the attitudes and behaviour of employees. Whereas some employees get excited and motivated by working at environmentally conscious company, others may be unwilling to change the business-as-usual operations and even perceive sustainability practices as an extra workload. (Rizos et al., 2016) Also, the managers with a strong risk aversion (Liu and Bai, 2014) and with a business logic of taking small safe steps in development may hinder the development of CE (Ritzén and Sandström, 2017).

Informational

Informational factors refer to the understanding and perception of the concept of CBE. According to the study by Antikainen et al. (2017), there occurs two practical challenges for implementation of CBE, namely the lack of CE design in bio-based products and the lack of recycling and recovery of products. The study by de Jesus and Mendonca (2018), in turn, claims that the general awareness of CE and the required skill base is lacking. There may occur lack of knowledge how to transform the company's current operations into circular business - e.g. how to replace the existing materials with recyclables. Also, there is a lack of common understanding of the terms "bioproduct" and "sustainability". If there is no coherent strategy to promote the development of bio-based products and lack of recognising the benefits that these products can bring, bio-based products will be difficult to market. (BIO-TIC, 2015) According to the study by Stern et al (2018), one of the main challenges forest-based bioeconomy is facing is how to successfully materialize the move from bottom low added to top high value added products, where volumes in terms of market demand are much smaller. An important issue is to be able to handle the verification of the concrete realization of environmental and social value and for that study by Manninen et al. (2018) has presented a need for introducing a reference system, which would increase the awareness of CE and also motivate the companies towards it. When considering the challenges relate to marketing of a new product in general, companies may fail to obtain sufficient and relevant market information, fail to use it properly, insufficient knowledge of the market and inability to establish both local and international sales and distributions (Pellikka, Kajanus, Heinonen and Eskelinen, 2012).

Technological

Having a functioning technology is compulsory for the successful transition to CBE (see e.g. Preston, 2012). According to the study by de Jesus and Mendonca (2018, p.81) "technical bottlenecks stand out as the perceived source of the greatest challenges". For instance Mathews and Tan (2011) state that without technology is not possible to make industrial closed-loop connections technologically viable. Technological barriers identified from the literature include challenges to handle and operate with recyclable materials, maintaining quality of products made from recycled materials, missing infrastructure to handle recycled materials and lack of databases which would be needed to identify recycling data and possibilities to access materials (Ghisselini et al., 2016; Rademaekers, Asaad and Berg, 2011; Rizos et al., 2016). Additionally related to technical barriers to cascade use of wood, Vis et al. (2016) presented in their study quality of collected waste wood, the cleaning of recovered wood waste and the amount of pollutant materials in the wood. Also there is a lack of cost effective methods to detect and sort mixed waste wood (Vis et al., 2016).

2.4.2 External CBE factors

In addition to internal factors, there occurs some external barriers and drivers considering companies transition towards CBE. In this thesis, the author has listed the fundamental factors that hinder or support the commercialization of new products in CBE. As can be seen from the Figure 5, the factors include co-operational, market as well as economic and political factors.

<p>Co-operational</p> <ul style="list-style-type: none"> • Supply and demand network
<p>Market</p> <ul style="list-style-type: none"> • Preference and demand • Lack of references
<p>Economic and political</p> <ul style="list-style-type: none"> • Cost of materials • Funding • Governmental support

Table 2. External CBE factors

Co-operational

Related to networking, the literature on CE have presented several challenges such as lack of channel control, confidentiality for individual companies, trust among partners as well as increased dependency on partners (Rizos et al., 2016). According to the study by Rizos et al. (2016) more than half of the sampled SMEs mentioned the lack of support from the supply and demand network as the main barrier to the adoption of CE. It refers to the dependency of SMEs on their suppliers' and customers' level of engagement in sustainability activities (Rizos et al., 2016). For instance, the company may find it impossible to change from linear business model to circular if its cooperation partners are unwilling to make the required investment and adjustments (Lahti, Wincent and Parida, 2018). Additionally, lack of collaboration reduces the number of available resources and prevents the establishment of supply chains meeting the requirements of CE. (Rizos et al., 2016) Another barrier related to co-operation is the lack of efficient channels that facilitate take-back flows to enable reuse, remanufacturing and recycling.

Also, it is a major barrier if the logistics of products manufactured from waste or by-products are too complex (i.e. economically unprofitable and environmentally consuming). (Reim, Sjödin and Parida, 2019)

Feedstocks form the basis for all bio-based products and the challenge is to ensure consistent quality of supply of sustainable feedstock. These resources can be challenging to mobilize from rural regions, which are often remote and may not have sufficient infrastructure. Also, the high costs of pre-treatments, storage and transportation may hamper the utilization of those resources. (Bezama, 2016) Furthermore, the study by Bezama (2016) found out that there is a lack of dialogues between product designers and waste industry. Bezama (2016) also pointed out that the current lifecycle assessment systems is not able to analyse vertically and horizontally multi-layered industrial networks brought by circularity.

Market

In general, when new technologies or products are launched in the market, they often face challenges such as lack of demand and awareness of the new product and high initial costs which may lower competitiveness against established markets, for instance the fossil fuel industry. According to study by Vandermeulen, Van der Steen, Stevens and Van Huylenbroeck (2012) consumer awareness of BE products is relatively low and their advantages may be difficult to communicate as in many cases they have same features as fossil-based products but are more expensive. Additionally, companies may struggle with commercialization because consumers may not yet be aware of the wood-based products and their attributes such as reduction of weight of materials and products or the use of environmentally friendly product components (Vandermeulen et al., 2012).

On the other hand, according to the study by Antikainen et al., (2017) wood has a highly positive reputation which leads consumer attitudes, interests and preferences being favourable for wood, for instance in construction. Wood-derived products provides business opportunities for both new and existing large- and small-scale companies (MOEA, 2017). The possibility to utilize forest-based side streams, offers SMEs a great possibility to enter novel and larger markets. SMEs have a chance to become forerunners in CBE because of their greater flexibility, dynamism and capability of generating the required innovations, which larger and traditional companies operating in forest sector are often lacking. (Hansen, 2016) Also, lignocellulose materials from wood processing and pulp and paper industries are often low cost, abundantly available and generally they comply with environment sustainability goals (Hassan, Williams and Jaiswal, 2019).

Economic and political

The existing literature has highlighted both the cost of “green” innovation and business models as well as low virgin material prices, especially when the cost of recycled materials are higher, as major barriers to the adoption of sustainability

practices (e.g. Rizos et al., 2016; Kirchherr et al., 2018). The development path and commercialization require a large amount of R&D, money and time. In many cases, experimental pilot production is needed to speed up the development and to reduce the market and technology uncertainty to be able to reach the acceptable level for larger investments. (MEAE, 2017) However, despite the ability to reduce the uncertainty with the piloting operation, the lack of financial resources is a common phenomenon identified in the product-innovation literature as the “Valley of Death”, in which resources are commonly found more easily during the research and development phase in comparison to the commercialization phase (D’Amato et al., 2018).

Furthermore, the studies by D’Amato et al. (2018) and Reim, Sjödin, Parida, Rova and Christakopoulos (2017) claims that revenues from CBE products and services have not reached the same stage of profitability as their alternatives, and SMEs often are heavily dependent on public support for research and development. Additionally, access to finance and suitable sources of funding is essential for SMEs seeking to improve their performance and/or introduce an innovation. However, the smaller the company is the more difficult it is to understand and assess various funding options. (Rademaekers et al., 2011) In bank financing, SMEs and especially new small businesses may face difficulties in obtaining the collateral or guarantees the bank requires and also banks often consider financing SMEs as risky business (Hyz, 2011).

High initial costs and market uncertainty can limit the transition to CE and especially SMEs may have difficulties in financing the innovation involved in the transition to CE (de Jesus and Mendonca, 2018). According to Björkdahl and Börjesson (2011), since the early 1990s, the amount of long-term investments in forest-based manufacturing companies have been declining due to poor return to shareholders and thus the focus has shift to short-term financial results. High economic uncertainty is one of the main reasons for CE development to fail, as defining and measuring the long-term benefits of CE is remarkably challenging. (Rizos et al., 2016) The upfront costs, the expected payback period and the indirect (time and human resources) costs are important especially for SMEs, as they generally are more sensitive to additional financial costs from green business activities compared to large enterprises (Oakdene Hollins, 2011; Rademaekers et al., 2011). In fact, the previous mentioned indirect costs are in great importance as they are seen as critical obstacles in SMEs in the implementation of green innovations due to SMEs’ shortage of time and human capital (Oakdene Hollins, 2011). Companies operating in business-to-business (B2B) markets may face considerable switching costs in commercialization of the BE (van Lancker, Wauters and van Huylenbroeck, 2016). Additionally, companies selling directly to end-users may struggle if consumers do not pay any premiums for bio-based products or services (Hagemann et al., 2016).

The research by Stewart, Bey and Boks (2016) found four different types of barriers that legislation and policies can cause when implementing sustainability approaches. The barriers can be found in complex and changing regulations, or a low legislative pressure in the context of production, product and supply chain approaches or regulation may become an obstacle for innovation. In addition, the lack of control was seen as hindering the ability to implement sustainability to the operations. In today's global world where companies have partners in several countries, inconsistency in regulations may interrupt or even terminate circularity (Planing, 2015). Even if a company finds a way to enter a market, bio-based products may face a long journey to commercialization due to regulatory constraints before being able to reach consumers and end users (BIO-TIC, 2015). For example, tax systems, if the price of fossil-based materials is much cheaper in relation to bio-based materials, the customer demand decreases (Oghazi and Mostaghel, 2018). Additionally, there is no policy pull for example for bioplastics like there was for biofuels, which enables the production of biofuels to exceed seven million metric tons in the EU by 2020. To compare, the amount of bioplastic is expected to reach one million metric tons by 2020 in EU. These numbers represent mostly agricultural feedstock, yet wood-based feedstock can be significant in a countries with a lot of forests. (Pöyry Inc, 2016). Nonetheless, the political commitment for CE (European Commission, 2015), and the issues with plastic waste such as ocean pollution, may change this trend in the future.

All in all, increased global markets and stricter environmental regulations can be also seen as examples of drivers that encourages businesses to find alternatives for traditional business (Zhu, Geng, Sarkis and Lai, 2011). Also institutional factors such as governmental support through directional laws (e.g. processing toxic wastes) and regulations play a key role in a journey towards CBE. A recent example of legislation limiting certain applications was EU's regulations to limit the use of non-renewable plastic bags (Directive (EU) 2015/720), which opens new possibilities for substitute products. Furthermore, subsidies and supportive taxation can lower the risk of establishing new business around CE. (Velis and Vrancken, 2015)

3 STRATEGY CONCEPT, RESOURCE-BASED VIEW AND OHI

This part first introduces the definition of strategy and the competitive advantage. As a basis for this thesis, resource-based view (RBV) and Organizational Health Index (OHI) are portrayed. From a RBV of the company, it is important to get closely acquainted with the internal organization of a company and its resources to fully understand how competitive advantage is determined within companies (Wernerfelt, 1984). OHI, together with RBV and the previous listed barriers and drivers, is used as a framework to analyse the results of the qualitative study.

3.1 Definition of strategy and competitive advantage

There is no one simple and universally accepted definition of strategy (Mintzberg, Ahlstrand and Lampel, 1998). There are, however, various views on what strategy is and how it is formulated. Strategy is a pattern of action resulting from intended or unintended strategies (Mintzberg, 1978) and it includes cultural, organizational and human performance aspects (Mintzberg, Ahlstrand and Lampel, 1998). Mintzberg (1978) claims that strategy should be considered as something more complex than just a simple plan of action and he identified the following strategy perspectives: a plan to getting somewhere; a pattern of actions; a position, reflective of one's decisions; a perspective in a form of a vision; a ploy, that is, a specific movement intended to outwit the competitor. These different perspectives have availed the development of the definition of strategy in a wider perspective and have diminished the idea that strategy is only about planning activities (Mintzberg, 1978). Furthermore, strategy can be seen as a link between the company including its goals and values, resources and capabilities as well as its structures and systems and its external environment. The firm's external environment comprises its competitors, customers and suppliers. (Grant, 2010) An important task for managers is to design learning processes that enhances the understanding of the internal and external forces that have an impact on the company operations. According to Grant (2010), successful strategies include four common elements, namely, long term, simple and consistent objectives, a profound understanding of the competitive environment, an objective appraisal of resources and an effective implementation.

In order for business organizations to be successful, they need to create superior competitive advantage compared to the other companies operating in the same industry (Prunea, 2014). Porter (1996, p.64) has stated that "a competitive strategy is about being different. It means deliberately choosing a different set of activities

to deliver a unique mix of value". According to Porter (1980) competitive advantage is a result of one out of two strategic approaches; low cost advantage or differentiation advantage. The aim of low-cost strategy is to achieve a more profitable business than competitors by minimizing and controlling costs and increasing the utilization of the capacity. Differentiation strategy, in turn, seeks to gain competitive advantage by providing a product or service which is seen as more valuable than the competitor's. (Porter, 1980) Barney (1991) differentiates between competitive advantage and sustained competitive advantage, where the first one appears in a situation where a company is implementing a value creating strategy that cannot simultaneously be implemented by any present or potential competitors. The latter one includes the same attributes as the first one, but in addition it presupposes that other companies are unable to duplicate the benefits of this strategy (Barney, 1991, p.102). Both of the authors share the idea of differentiation what makes companies competitive.

As more and more new participants are entering the markets, also the competition is expected to increase (Prunea, 2014). The continuously tightening markets as a result of the increased competition has the tendency to increase the efforts required from companies to cope financially in the markets as the aim of the business is to create value not only for customers but also extract some part of that value in the form of profit to the company (Grant, 2010). Modern business companies need to recognize their internal strengths and weaknesses and furthermore be able to utilize them effectively against the company's external threats and opportunities in order to grow their market share and compete. That is, they need to create a competitive business strategy to be able to answer the ever-increasing market competition (Grant, 2010; Barney, 1991). In emerging and technology-based industries, innovation is a vital source of competitive advantage and play a key role in strategy formulation (Grant, 2010).

The main differences between SMEs and large companies related to strategies are the type of strategies used, the extent to which the company uses strategic planning tools and the time horizon of a strategy. SMEs are found to plan ahead for a shorter time period (less than five years) compared to the large companies. However, since long-term planning provides a clear direction, SMEs can profit from it by focusing on proactive approach in strategic planning to effectively compete with the large companies. (Siddique, 2015) Additionally, Hansen (2016) claim that SMEs differ from large organizations mainly because of the SMEs characteristics such as reactivity, fire-fighting mentality, resource limitations, informal strategies and flexible structures.

3.2 Resource-based view of the firm (RBV)

The roots of the idea of viewing a company as a bundle of resources was pioneered by Penrose in 1959. Penrose stated that it is the heterogeneity of the productive services available from its resources that give each company its unique character. The significance of the resource perspective in strategic management field was broadly recognized when Wernerfelt (1984) published its work that suggested evaluating companies in terms of their resources could lead to insights that differ from traditional perspectives. (Grant, 1991; Penrose and Pitelis, 2009; Wernerfelt, 1984). Studies of companies' performance when using RBV have discovered differences both between companies in the same industry (Hansen and Wernerfelt, 1989) and within the narrower groups within industries (Cool and Schendel, 1988). This indicates that the company's individual, firm-specific resources on performance can have a significant potential and lead to competitive advantage (Mahoney and Pandian, 1992).

Various definitions and classifications of resources have been presented in the literature. Wernerfelt (1984, p.172) classifies resources to anything that can contribute to a strength or a weakness of a given company. The resources, according to Barney (1991, p.101), in turn, include all assets, capabilities, organizational processes, company attributes, information and all potential that allows the company to recognise and implement strategies that improve the company's efficiency. These resources can be categorized as physical capital resources (physical technology, plant and equipment, access to raw materials, geographic location), human capital resources (experience, relationships, training etc.) and organizational capital resources (formal systems and structures and informal relations among groups) (Barney, 1991). While Hall (1992) has classified resources as tangible such as human, financial and physical resources and intangible such as reputation, organization know-how and patents. With intangible resources Hall (1992) refers especially to assets and competencies where the former is divided into legal assets (e.g. contracts, licences, patents, trademarks, copyrights etc.) and non-legal assets (e.g. reputation, supplier network, databases) and the latter into know-how and organizational culture. Furthermore, Grant (2010), presents the categorization of organization's internal resources to the groups of tangible, intangible and human resources (Figure 4). Despite the fact that organization's business operations would not happen without tangible resources, tangible resources do not contribute to competitive advantage as much as the intangible resources do (Grant, 2010; Cater and Cater, 2009). The characteristics of intangible resources are their difficult imitability, limited transferability between companies and unavailability for purchase from the input markets. However, it needs to be noted that individual resources do not confer competitive advantage but by combining them creates organizational capability (Grant, 2010). While the resources are the source of company's capabilities, capabilities are the main source of its competitive advantage as can be seen from Figure 4.

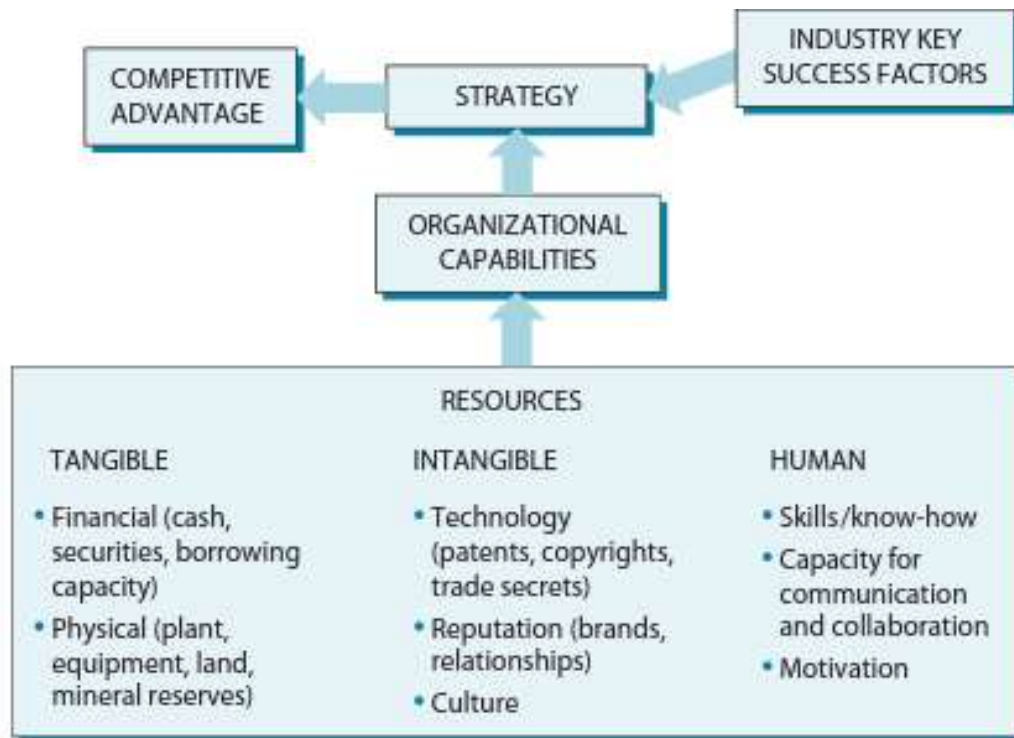


Figure 4. The links among resources, capabilities and competitive advantage (Grant, 2010 p. 117)

For resources to become the basis of competitive advantage, they must facilitate value creation, be better than its rivals and also discourage imitative efforts from rivals (Barney, 1991; Wernerfel 1984). From RBV perspective, it is assumed that companies are heterogeneous in respect to their resources and these resources may be imperfectly mobile across companies. In this context, it is important to define the resources that carry the potential to generate competitive and sustained competitive advantage. According to Barney (1991), the resource characteristics needed for sustainable competitive advantage should be valuable, rare, hard to imitate and non-substitutable. If resources have these characteristics, they can be viewed as strategic assets and therefore the company is able to develop resource-based advantages that can be sustained over time. This is the definition of the so called VRIN-framework. (Barney, 1991, p.105-106) In an environment characterized by constant change, companies may struggle with the continuous need to develop, acquire and upgrade their resources and capabilities to maintain competitiveness and growth. Key to this is to identify the origin of the resources and capabilities that determine the company's sustainable competitive advantage. The more difficult it is to buy, sell, or imitate the company's resources and capabilities, the more enhanced is the strategic value of them. For instance, it is not possible to trade nor easily replicate by competitors the invisible assets such as tacit organizational knowledge or trust between management and employees since they are tightly embedded in the organization's history. Such company-specific and in many cases tacit assets develop slowly over a period of time. (Amit and Schoemaker, 1993)

The specific combination of resources for any company is a result of its history (and thus its current set of resources), a company's strategy, and the degree to which the company's strategy fits the external environment, particularly in regard to its competitors (Black and Boal, 1994). Researchers have pointed out that intangible resources such as organizational culture, staff expertise and a brand are more probably to be the source of a company's sustainable competitive advantage than tangible resources such as production lines or physical assets as tangible resources can be more easily be identified, duplicated and transferred (Hatch and Dyer, 2004). In today's dynamic environment, the traditional sources of competitive advantage such as technology and financial capital are no longer relevant. Instead, partners can offer access to those resources as the resources can be considered global and scalable (Prahalad and Krishnan, 2008).

The dynamic capabilities approach has evolved in order to gain an understanding of the sources and methods of value creation used by companies who operate in environments where rapid technological change occurs. The framework refers to organization's capability to build, integrate and reconfigure the internal and external organizational resources, skills and competences in the ever-changing market environment. Fundamentally, dynamic capabilities are part of the RBV theory and a major component in explaining the companies' competitive advantage. (Teece et al., 1997) Dynamic capabilities can be defined as the organizational processes that are used to modify the resource base in situations where rapid and unpredictable change happens (Amit and Schoemaker, 1993; Eisenhardt and Martin, 2000). Resource management thus is an example of dynamic capability. Other examples include acquisitions, product innovation and development, alliance formation, research and development, organizational restructuring and other types of strategic and organizational management (Eisenhardt and Martin, 2000). However, dynamic capabilities do not lead to competitive advantage by themselves. Instead, it is the resource configurations that are built utilizing dynamic capabilities that provide the advantage. Furthermore, the nature of capabilities varies depending on the velocity of the market. In principle, in markets that changes fast, companies should create a stream of short-term unpredictable advantages by adding, recombining and dropping resources, and rapidly taking the benefit of the opportunities. (Eisenhardt and Martin, 2000) Additionally, according to Schoemaker, Heaton and Teece (2018) dynamic capabilities, business model renewal and leadership should be tightly linked to each other in order to develop the needed innovation in a complex and constantly changing business environments.

3.2.1 Strategic alliances

According to Dyer and Singh (1998) RBV has its focus on how individual companies generate return and there occurs an incentive to maintain the proprietary knowledge and innovation within the company and conceal it from the competitors. According to the RBV, alliances are originated when companies are in need

for additional resources they cannot acquire through market transaction (Yasuda, 2005). If a company is lacking a resource or capability that it needs for accomplishing its strategy, it can either produce the resource or capability on its own, purchase it from the markets or make it together with a partner company. Grant (2010, p.402) has defined strategic alliance as “a collaborative arrangement between two or more firms to pursue agreed common goals”. These alliances comprise a variety of collaborative relationships such as joint research, technology-sharing arrangements, shared manufacturing, joint marketing, joint distribution arrangements and vertical partnerships, to mention few (Grant, 2010).

According to Doz and Hamel (1989), there are three main purposes for strategic alliances. First, companies in an alliance combining their resources, favourable market positions, knowledge and other abilities may together create more value than they would separately. Second, alliances provide companies a channel for learning new skills and competencies from other companies, which would otherwise require a lot of time and money or even be impossible to develop. Third, co-operating with potential competitors can be an effective strategy for neutralizing threats. The way how a company build its networks can have a huge impact on the competitive advantage and even more in the alliances a company is able to participate. In today’s dynamic environment successful companies are not only increasingly adding value through a specific activity or part of a value chain, but also reinventing value by competing in a different level. The focus is not anymore in the company and industry level but instead it has shifted to a level of value-creating systems. Companies in these systems create value together with all stakeholders; suppliers, partners in alliances and customers. (Normann and Ramírez, 1993)

A local example of strategic alliances in forest industry is the Metsä Group’s bioproduct mill in Äänekoski which started its operation in 2017. At the heart of Äänekoski biorefinery is pulp production around which there is a business ecosystem. In the business ecosystem several SMEs operate together within the same facilities with Metsä Fibre with an aim to use wood in a resource-efficient way, following the principle that one producer’s waste becomes other producer’s raw material. Research-based spin-offs, start-ups and SMEs operating there constitute a core element in the business ecosystem producing for instance electricity, heat, transportation biogas, biocomposites, chemicals and forest fertilizers. (Palahi and Hetemäki, 2017)

3.3 Organizational Health Index (OHI)

It is common that organizations focus on driving organizational performance – a set of strategic goals which are measured by financial and operational metrics.

However, fewer organizations put as much effort on managing their organizational health even though it is just as important as focusing on the traditional business performance drivers. Health is the ability of an organization to align around a clear vision, culture and strategy as well as to develop, deploy and retain the right skills and capabilities. The aim is to effectively execute against its goals as well as to renew the organization's focus over time by responding to the market trends. In order for companies to achieve sustainable excellence, they need to actively manage both their performance and their health. (Keller and Price, 2011)

The Organizational Health Index (OHI) is a proprietary survey developed by McKinsey and Company, which assess how healthy an organization is and what managers are doing or should do to influence the organization's health. The measurement survey includes nine characteristics of organizational health that influence organizational performance (Figure 5). According to McKinsey and Company, "the healthiest companies are more than twice as likely to earn above their industry's median profit margin" (Keller and Price, 2011). In order to achieve organizational excellence and make the change happen, the following five questions need to be answered (Keller and Price, 2011):

1. Aspire: Where do we want to go?
2. Assess: How ready are we to go there?
3. Architect: What do we need to do to get there?
4. Act: How do we manage the journey?
5. Advance: How do we keep moving forward?

Exhibit 2.2

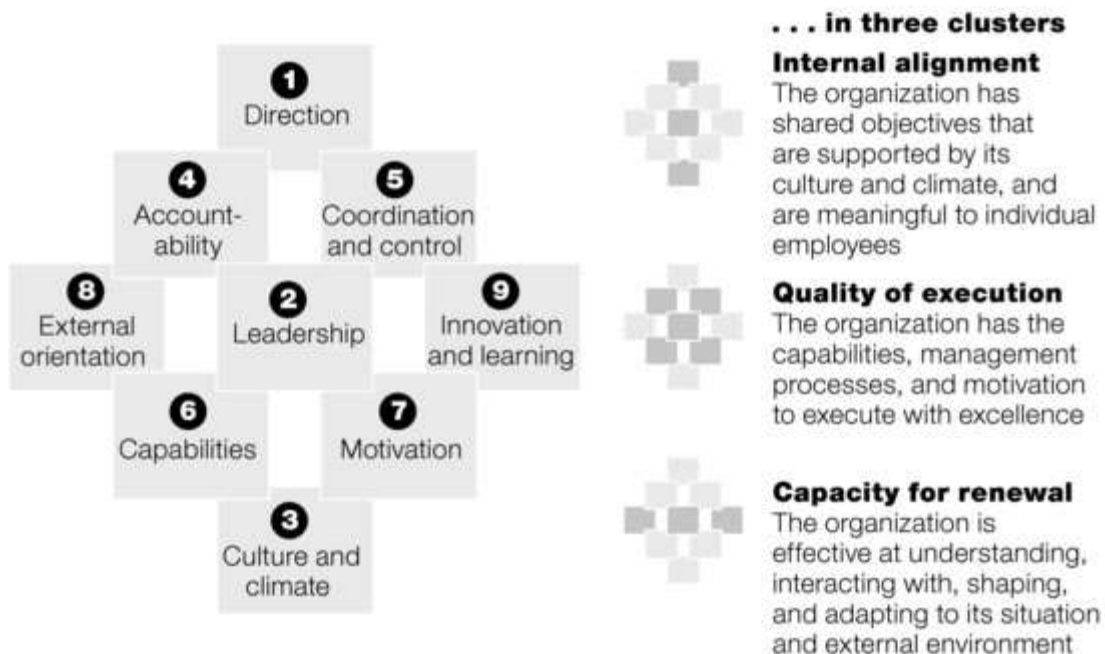
Nine Elements of Organizational Health

Figure 5. Nine elements of organizational health (Keller & Price, 2011)

Even though companies can learn helpful things from others, the recipe of excellence in an organization is related to its context: its history, the capabilities, its external environment and its aspirations (Keller and Price, 2011). Actually, de Smet, Schaninger and Smith (2014) claim that adding the wrong practices to the recipe can be harmful to the organization as well as concentrating on too many practices can diminish the organization's probability to achieve top health and success.

4 DATA AND METHODOLOGY

The aim of this part is to explain the chosen research methodology and provide rationale behind these choices. The chapter begins with describing the chosen research method and the data collection methods will follow. Data collection methods will include the reasoning behind the selection of interviewees and how the author conducted the interviews. Further, the thematic analysis will be presented.

4.1 Research approach

This study makes use of the qualitative research approach. Qualitative research approaches are recognized as effective tools in business administration and management research. The approaches in qualitative research are considered to provide a more profound understanding of a certain social phenomena than would be achieved from purely quantitative methods such as questionnaires. Qualitative research is often associated with human perception and both understanding and using non-numeric data. (Saunders, Lewis & Thronhill, 2012) Also, qualitative data collection and analysis allows the researcher to define concepts, categorize different types of motivations and behaviors, map the nature, dynamics and range of a certain phenomenon and develop new ideas and theories. Additionally, qualitative approach is a suitable research method when the purpose of the study is to provide descriptions on how issues are interpreted by people or to gain an understanding of how people experience and make sense of the reality around them. (Merriam, 2009)

Most research include elements of both deductive and inductive approaches and for instance it is not possible to do research without some initial ideas and thus almost all researches have elements of deduction. Likewise, almost all research can be used to advance theories in some ways, meaning that it has inductive qualities. In order to deepen the understanding of the studied aspects, this thesis follows an inductive approach, meaning that the coding is not limited to the predefined themes. Thus, in inductive approach the collected data has a key role in the research. (Hirsjärvi & Hurme, 2008) However, as existing literature is used for creating a theoretical framework of this study, purely inductive approach is not possible.

The drawbacks associated with qualitative research include for instance that the quality of the research is surely dependent on the researcher's individual skills. Also, the personal biased of the researcher and the presence during the data col-

lection may distort the results. (Anderson, 2010) Furthermore, as the data is collected in an open-ended way (see part 4.2), the frequency of an answer does not have the same meaning as for example the frequency of a survey questions.

4.2 Data collection

The data collection for this research was conducted through interviews, more precisely semi-structured thematic interviews. Interviewing is the most commonly used way of gathering data. Semi-structured interviews were chosen over fully structured interviewing as it allows more leeway to the researcher to ask questions that are not specified in the interview guide, but still includes questions that are asked from all participants. In a semi-structured interview, the discussion flows from the beginning to the end by anchoring itself to the specific pre-defined themes while at the same time allowing the interviewees to openly share their views. (Saunders et al., 2012) The interview questions (see Appendix 1) were structured with the help of the theoretical framework and considering the research questions.

4.2.1 Selection of interviewees

The interviewees were selected based on the scope of this study. The most important criteria for the company selection was that the company utilizes forest-based streams in their operations and is developing or involved in development of new products. Secondly, the organizations should preferably be SMEs. However, the author wanted to involve at least one large organization in this study, which has extensive resources. By choosing the organizations from different industries, allowed the author to recognize for instance different business strategies, cultures and products. The core products or services of the interviewed companies included packaging materials, textile fibres, construction and building materials, biocomposites, design products and biomedicines. The companies varied, for instance, in size, growth plans, maturity and whether they dealt with B2B or business-to-consumer (B2C).

It was acknowledged that the founders or top managers are the key persons, with the broadest picture of the company. They also generally have more information and understanding of the company's operation as a whole. Thus, after the selection of preferable companies, the selected interviewees' professional profiles included chief executive officers, founders and development managers.

The potential respondents were invited to participate in the interviews via e-mail. Attached to the e-mail was the questionnaire and the privacy policy of the study, which specified how the data is handled. In case the author did not receive any

respond to the e-mail, the potential respondents were contacted by phone after a few days. Ultimately, ten face-to-face interviews were conducted, which is in line with what was planned in the research plan. In most interviews there was one person representing the company but in two cases, the company wanted to include two people. Nevertheless, the interviews were analysed from a company's perspective and thus the amount of interviewees is marked as ten. All communication was conducted in Finnish language. Having a common language during interviews increased the fact that all meanings were better understood and less likely misconceived because of the language barrier. Also, by conducting the interviews in the native language of the interviewee made the respondents feel more comfortable in the situation and that way improved the quality of interviews.

All the direct identifiers concerning the interviewed companies and interviewees were removed from the final published report so the interviewees were able to express themselves more freely. In this master's thesis, the names of the interviewees are replaced with numbers from 1 to 10 in a random order.

4.2.2 Conducting interviews

All the interviews were carried out in person between February and April 2019. The interviews took place in the workplace of the interviewees, except one case where it was agreed to conduct the interview at a meeting room close by the author's office.

In the beginning of each interview, the author presented the privacy policy of the study and the interviewees signed the forms, where they accept the privacy policy and agree that the interview can be recorded for the purposes of this study. After that the author briefed the objectives of the research and motivation behind it. Prior to the commencement of each interview, the interviewee's background and work position were asked and the author briefly introduced herself so that the mutual trust was created. A prepared questionnaire was used for each interview. In most cases, the main questions lead to a set of follow-up questions, which helped to understand the phenomenon in more detail. Also, the flow of the interview changed according to the answers and interviewee responses (see also Anderson, 2010).

The duration of interviews ranged from 45 minutes to two hours and they were directed by pre-planned questions. During each interview, notes were taken and the discussions were recorded with the voice recorder. As mentioned, each of the interviews were conducted in Finnish and afterwards transcribed in Finnish by the researcher. The length of transcriptions varied between 8 and 15 pages per interview. The audio files were listened more than once, to ensure the understanding and to increase the reliability of the transcript. The list of pre-planned questions is presented in Appendix 1.

4.3 Thematic analysis

Remarkable challenge in qualitative research is how to handle and analyse the large amount of collected data (Bryman & Bell, 2011). In order to identify the barriers, prerequisites, resources and capabilities and showing how they form the whole in this study, a suitable method for this purpose is a thematic analysis. According to Bryman and Bell (2011, p. 571) thematic analysis is rather vague definition as searching themes as an activity can be found in several different qualitative data analysis approaches. Thematic analysis is a rather flexible approach that can be easily modified for the needs of various studies. Additionally, thematic analysis is said to be a suitable method for researchers in their early career as it does not require detailed theoretical knowledge of other qualitative approaches (Braun and Clarke, 2006). However, although the flexibility of thematic analysis can be seen as a strength, it can lead to inconsistency and lack of coherence when developing the themes. Thematic analysis enables that the conclusions can be separated from individuals and transferred to a more general level which also increases the anonymity of the interviewees (Bryman and Bell, 2011). Therefore, thematic analysis, or coding was chosen for the data analysis for this thesis.

The analysis followed the step-by-step guide presented by Braun and Clarke (2006). The figure 6 below illustrates the data analysis process.

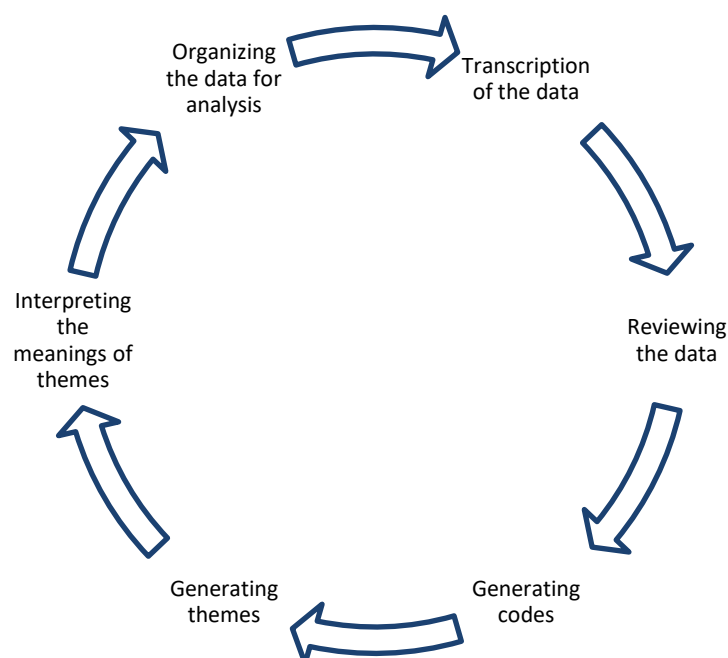


Figure 6. Data analysis process (Braun and Clarke, 2006)

First, the data was transcribed in Finnish and the read multiple times so that the overall understanding of the content was achieved. The next step was to generate the initial codes manually by using bolding. After this, based on the codes, preliminary themes were formed having the focus on research goal and research questions. Each of the interviewees were specified with number (from 1 to 10) and the data was organized with using color codes. Each theme was highlighted with its own color, which enabled to organize the data in a systematic and simple way. Then the data was grouped according to the individual themes. Whereas codes recognize the interesting information in the data, themes are broader (Braun and Clarke, 2006). Next the codes were re-organized refined according to following guidance by Braun and Clarke (2006, p.91) - "Data within themes should cohere together meaningfully, while there should be clear and identifiable distinctions between themes." Then the themes and data were re-evaluated if there was some complementary information to add. In the end, research findings were presented and the most important and interesting comments were quoted. Each of the quotations were translated from Finnish to English as accurately as possible so that the actual meaning of quotations was maintained.

5 RESULTS

This part will present the findings and highlight the key discoveries made throughout gathering and analysing the primary data. As mentioned earlier in Chapter 2.4 the same factor can be considered as a barrier and a driver. Therefore, the results chapter in this study discourses the drivers and barriers interchangeably. The data have been divided into internal and external factors keeping in mind the research aims. Themes, based on the interview data, are presented below in Table 3. To support the findings of the study, quotes extracted from the interviews are disclosed.

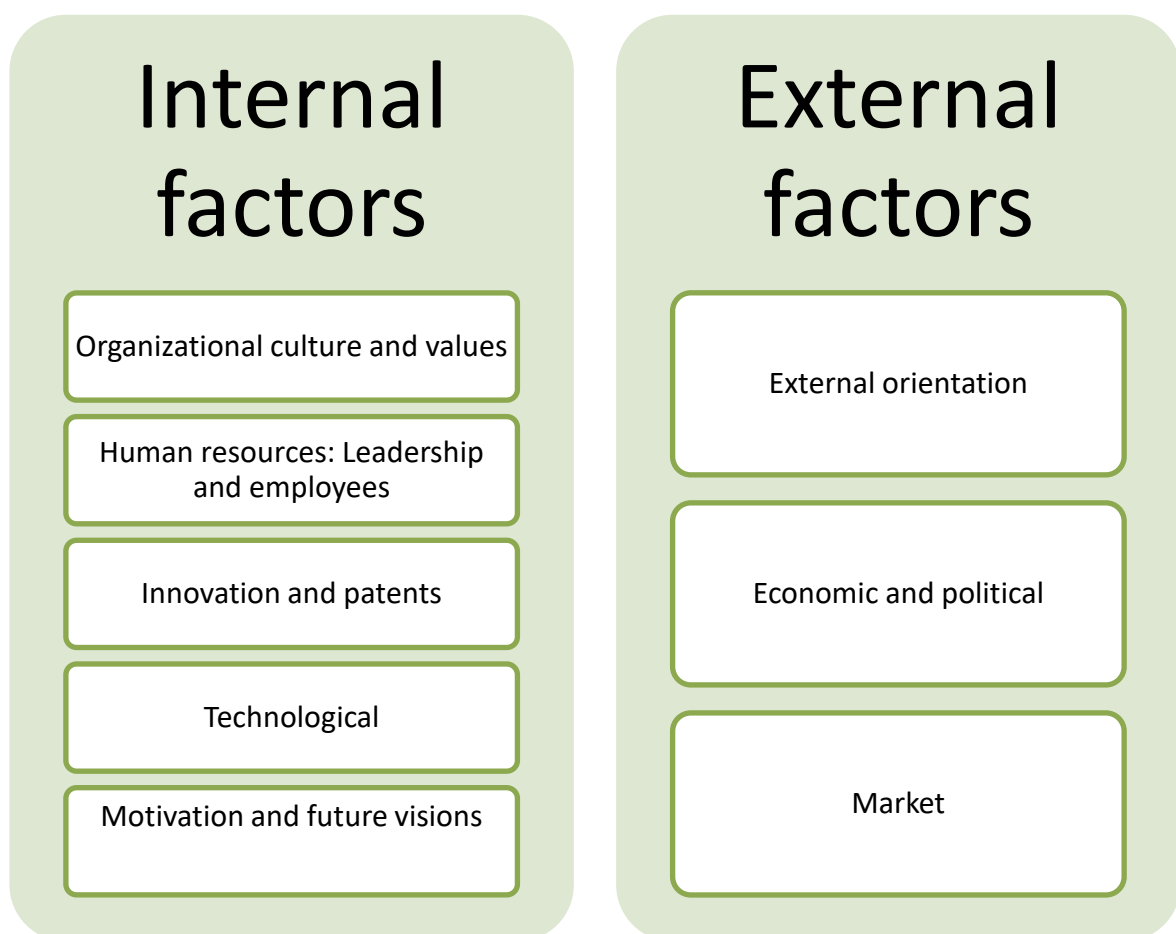


Table 3. Themes for data analysis

5.1 Internal factors

The internal factors identified from the interviews were categorized under organizational culture and values, human resources: employees and leadership, motivation and future visions, innovation and patents as well as technological factors.

5.1.1 Organizational culture and values

There was a clear agreement among the interviewed companies that in order to be competitive and successful in the market, the company's culture must be open, trusting and flexible. Themes such as mutual confidence as well as respecting and supporting each other build the base for open culture. Additionally, the most frequently mentioned attributes in the culture of the interviewed companies were agility, innovativeness and diversity. Accordingly, the larger companies in this study were pondering how to maintain their start-up kind of agility and dynamic and be able to react fast enough as the market is changing rapidly.

"When starting to build these things, we need to be flexible and agile"
– Interviewee 3

Many respondents highlighted companies' roles as SMEs to bring plenty of new innovations and speed up the development in the field. Majority of the participating companies in this study are recently founded and thus the culture has not been formulated to be too strict which was seen as a cultural strength. Moreover, it was mentioned that production of new innovative products may be very different and challenging for the mature forest industry, which traditionally focus on bulk production. Additionally, the rigid culture of forest companies was mentioned by several respondents. All in all, it was agreed that continued research and cooperation in the area of utilizing streams will help to create a right climate for success in SMEs.

During the interviews it was discussed whether the strict processes are required when being a start-up. The processes in this context referred to organizational processes that are collection of tasks that bring value to the customers. The questions of processes divided the interviewees into two camps. Naturally, the companies who have been existing for a longer time, highlighted the importance of processes. Arguments in the favor of the processes included that processes improve the homogeneous of the production, which was, in fact, seen as a challenge for majority of the interviewed companies (see Chapter 5.1.5). Also, processes were seen as necessity for being able to discover the drawbacks and improve the processes.

“We must have processes and tie certain things as we need to improve in homogeneous production”- Interviewee 6

“The most value comes from when creating and updating the processes you need to build the internal value chain around the process and follow it” – Interviewee 7

Arguments against hierarchical processes, in turn, related to the fear of losing the agility and wasting time with paper works. Additionally, it was revealed from the interviews that the inherent flexibility of start-up cultures may suffer when processes need to be defined too precisely. Some companies highlighted the importance of hierarchy, which was said to be needed when the company grows. The need for hierarchy was explained by arising from the processes. However, related to culture’s openness, majority of the interviewees felt they have a low organizational hierarchy.

“We have very thin processes and decision making is fast. Essentially with our own risk we are able, with a light testing, to modify things in production” Interviewee 9

Commonly agreed strength related to organizational culture was people that support the same values and believe in same things. Additionally, the work community believes they are doing the “right thing” strengthens the culture. However, when starting a company from a scratch several companies mentioned that forming the values for the company was difficult. Some of the companies shared their values and those included for instance quality, care, braveness, honesty, empathy and being ecological. From the discussions it was noted that the culture can easily disappear if the company has not been able to strengthen and articulate and ensure that everyone agrees the values. Related to company’s values, it was mentioned that when recruiting a new employee the company wants to match the values of potential employees versus the values of the company. This can be interpreted from the comment of an interviewee who stated that all the recruitments are conducted value-based.

“I have always said that if there is a difficult situation, decide based on the values then it will go right” – Interviewee 5

It also emerged from the study that there are challenges related to the company’s culture. Some of the interviewees mentioned that their companies are quite thin, and the expertise is in the hands of few people. Thus, the risk of key persons leaving the company is quite high. Furthermore, even though none of the interviewed companies felt that their company is siloed, it was acknowledged that

with the growth of company that can happen. Silo means that people in the organization are concentrating on working only with their own groups and not cooperating with other departments.

“It is dangerous when our team grows, the doing spreads and somehow the structure starts to evolve. Our current strength is that we are very close community, who shares a lot of information and acts together”-Interviewee 6

5.1.2 Human resources: employees and leadership

The importance of employees was pointed out by each of the interviewees. During the interviews appeared that the companies that have had their operations running for under two years, found it difficult that the employees do not yet really know each other and thus the culture is not fully established, as can be seen from the quote below.

“During early stages in start-up companies when there are many new employees working together for the first time it is typical for a honeymoon period” – Interviewee 9

The respondents of this study highlighted the importance of having the whole work community involved when forming a strategy. By integrating the employees to decision making increases the sense of community and the employees consider themselves as an important part of the workplace. Walking the talk kind of ideology was presented, which relates to the employees speak out and keep their word. Also the previous mentioned open culture (see Chapter 5.1.1) advance employees' willingness to challenge certain ways of acting. If there are shortcoming in confidence, people do not dare to disagree. Additionally, the employees' courage to admit the mistakes and learn from them was seen as important factor in a culture.

“We are aiming to find the best agenda for us and people must dare to disagree and not just look for a nice compromise.” Interviewee 6

The participants of this study strongly indicated that their most valuable resources are motivated people with a diverse backgrounds. Diverse backgrounds can be seen more valuable than competence when solving issues. The companies mentioned the required know-how should be especially from the fields of technology, chemistry, marketing and sales. Also it was acknowledged that the company should be well aware of the customer needs as the customer demands are rapidly changing. On the other hand, it was noted that in some cases the require-

ments that the customers believe the product has, corresponds to what they currently use. Thus, the company should have capabilities to convince the customer of the functionality of the new product or material. Additionally, related to CBE, several interviewees considered as an important capability to understand the circularity of materials and products.

“You cannot have people that have very specify know-how from one field, as then you would have a situation that you have very many people working for you of which everyone is expert of their own field”
– Interviewee 1

“What happens to materials when you recycle them and how they should be treated in downstream process so that they can be reutilized is important to understand” – Interviewee 3

Due to the innovative and novel markets, the respondents highlighted the role of business leaders. It was mentioned that the requirements for leadership are changing – open, innovative and opportunist leadership style is required. One interviewee also questioned whether he is the best possible leader when the company grows. In addition, it was mentioned that the leader must understand that people react differently, to change for instance, and a good leader is able to recognize and manage that fact and perceive different needs.

5.1.3 Innovation and patents

When considering the scope and the field of this study, innovation plays a key role. According to the interviews, forest industry has been viewed as a very traditional industry where new impetus is needed. Thus, it was not surprising that all of the interviewees highlighted the importance of innovation. Additionally, they all agreed that innovation has many forms and can happen either top-down or bottom-up. Majority were pondering what does “innovation” actually mean and found it difficult to define due to its pervasive nature. One interviewee categorized the innovations to product, process and business system innovations. Even though that kind of clear categorization were not found in other interviews, it was clearly noted that the interviewees acknowledged the many forms of innovation. For instance one interviewee mentioned product innovations and thought that these kind of innovations often arise from people who work closely with product development and production. Other interviewee, in turn, brought up that business system innovations often originate from top-down as those people who are in the management often are able to see the bigger picture of the business. When going into more details, often the innovations come from bottom-up. Also, it was mentioned that everyday improvements are always considered as innovation.

When asked of where the innovations arise, various views were presented. Majority of the interviewees stated that their product or service itself is already an innovation and that enables innovativeness around it. In addition, however, it was pointed out that the product itself as an innovation is not enough, it requires continuous innovation and ongoing improvements. As mentioned earlier, often especially start-ups have limited resources and that was seen as an enabler for innovations.

"In our case the innovations have arisen from combining complete different industries together. We have investigated very traditional issues in a very traditional methods but by doing cross-bordering industry research, everything that we discover is new."- Interviewee 1

"It is a good thing if you are forced to do things with small amount of resources as then you really need to think in which way to find solutions" Interviewee 3

It was also noted by majority of the companies that not all the innovations happen inside the company. Several interviewees highlighted that by creating an open relationship with partners enables different kinds of innovativeness. Often when thinking outside of the box with external partners, new ideas and opportunities arise.

"I see Finland as a huge innovation factory where not all the machines are on the same floor. And you are not part of one company but instead you combine technological things. These are different machines, one is company X and the other one is something else. If these are able to communicate together, we would have an enormous power to innovate." - Interviewee 4

Many respondents highlighted that the key to innovativeness is the company's culture. The encouraging culture towards innovation was seen as a lifestyle within a company by many interviewees. Also, innovation was seen as a part of daily routines by several companies. However, it was mentioned that creative actions and innovations do not originate from working from eight to four and by sitting in the same room all day. In order to increase employee involvement in innovation, some companies mentioned that they have developed "innovation boxes" where each employee can present their new ideas or improvements and these will be handled in management team meetings regularly. Also, it was mentioned that the company has rewarded its employees of innovations. Additionally, one interviewee pointed out that they have utilized the help of external consultant to improve the best practices and also organized an innovation day for the whole work community.

A commonly identified challenge of continuous innovation among companies was a lack of time. When considering the companies in this study, majority are

start-ups and thus in many cases resources are limited. Especially problematic seemed to be that the management team uses lot of time to continuous development, process improvements and increasing digitalization. The interviewees found out that the issue is that people get stressed and if people are stressed, they do not come up with new innovations. Innovation requires time and in some way relaxation that the mind has time to think and ponder more openly.

When discussing about the company's required intangible resources, most of the respondents pointed out the importance of intellectual property rights (IPR), particularly patents. Most of the companies interviewed have applied patents for either their product, equipment, material or production method. In many cases, the patents were multinational. However, there was some companies that felt they do not have reason for patents and found other ways to compete in the market and protect their business as can be seen from the quotes below.

"The patent protects for X years and many patents can be easily disturbed. If you are a small start-up company, what prevents a large company from flattening you?" – Interviewee 5

"It is essential to ensure that your client is so happy with your work that you won't be replaced by someone. Another thing is that you run faster than your competitors. You can get a patent or you can do something else. I do not think we have anything to get a patent for, therefore we have to use the other two options." – Interviewee 5

5.1.4 Technological

The technological factors presented in this study can be classified both internal and external. When asked of the barriers that hinder the transition to CBE, majority of the interviewees mentioned technological barriers. Thus, it was agreed that more co-operation with research centers, universities, customers and other businesses is required to tackle these barriers.

"Perhaps the greatest challenge with CE is to get the recycled fractions stabilized. We must guarantee our customers with a stable product quality." – Interviewee 6

"It is extremely difficult to bring the recycled material to our production. It just does not work on this scale." – Interviewee 8

As the citations above indicates, the variation between different residues was seen as a challenge for majority of the interviewed companies. It was acknowledged during the interviews that the companies must be able to maintain the

same quality of the product from one batch to another. Also, the questions how to provide evidence to verify the recyclability was seen as a challenge. It also emerged that renewing technologies is rather slow because of investment-intensive nature.

5.1.5 Motivation and future visions

Based on the interviews the motivation towards building a business around CBE can be roughly divided into four main themes. Those themes are profitable business, innovativeness, corporation imago and concerns of the environment. It was highlighted by majority of the interviewees that CBE must be a business case and profitable in order to survive. On the other hand, it was acknowledged that motivation is the most important factor and as long as motivation is not only based on quick profit, the company then has better prerequisites to success. Also, some of the respondents felt that the traditional forest industry needs renewal. Wood-based streams are ethical and renewable resources and they enable global production in several different sectors. It was also acknowledged during the interviews that the streams are often seen as complicated and costly for the forest industry and thus they want to get rid of them. Additionally, it emerged from the study that the social pressure and taking care of the corporation's imago drives towards CBE. The results of the study indicate that some of the interviewed companies got motivated by acting as forerunners in their industry. Also, most of the respondents felt motivated of the innovativeness of their products and services.

"The fact that the world will never be complete. We are just beginning, even though based on some growth measures, we already are very successful but we see our current business as a drop in the ocean compared to the opportunities" – Interviewee 5

"If we are looking at our environment and what is happening, we must in every means find ways how we can ensure the operations. By only decreasing and decreasing and not using this and that, it is ok, but it does not ensure that we have 10 billion people living on this planet." –Interviewee 10

The interviewees were asked where they see their company in next five to ten years. Most of the interviewees wanted to share their vision in the time scale of five years. In fact, it emerged from the interviews that most of the companies had their vision from three to five years onwards. Majority raised in their vision the aim to grow the business with an exception to one company. Also, there was a clear distinction between companies willingness to grow. Others wanted to grow to a certain point and after that let the larger companies to forward the business as the large companies have more resources and more credibility. While others aimed to grow big and saw themselves as a multinational companies in the future. It was also mentioned that the current forest-based industry is lacking the

medium size businesses and thus it was seen extremely important in one company's vision to become one.

"Small enterprises like us come up with initiatives and take them to a certain point. Then the task of these larger companies is to take them forward. They know industrial operations, they know logistics and most importantly, they have money" – Interviewee 3

"We aim to build an example of how production business works both technically but especially commercially with our product. Then we start to duplicate our business concept to bigger companies, where the scaling is not that capital constrained." –Interviewee 6

Some of the interviewees saw their company as a vanguards in the field of forest-based CBE. The aim of many interviewees was to reform the whole traditional forest-industry and build an ecosystem that enables a new field of industry to be built in Finland. Some of the companies interviewed currently utilizes virgin biomass and the aim for the future was to increasingly utilize side streams and recycled biomass.

"We are producing forest-based high value products and perhaps one day the situation is that there are not any more that many sawmills but instead crushing plants" – Interviewee 1

Internationalization was highlighted among many of the companies. However, one company stated that they do not want to become too international but instead stay in the area where the legislation is the same kind where their current operations are. Also, some of the interviewee stated that their visions include changing the business model. Licensing the technology seemed to be in next five years vision for plenty of companies. Furthermore, some of the interviewees introduced the "Goretex" vision where they wished to include their actual brand visibility in the product. It was mentioned that none of the multinational forest companies have been able to do that but it was seen as an opportunity as the end customers are increasingly demanding transparency and appreciate environmental values.

"... they (end users) want to have a clear label which states that this product is more environmental friendly and everyone can recognize it" – Interviewee 10

5.2 External factors

External factors in this study have been divided into external orientation, political and economic and market factors.

5.2.1 External orientation

In terms of external orientation the respondents' answers were straightforward. The results of the study indicate that in order to success in CBE and enhance the performance, it requires integrated system of various actors that can all be considered as key partners. However, the level of the partnership varied from company to company. While some companies build their whole operations around networks, some companies found it difficult to get partners that would bring additional value to their business. Many respondents highlighted that rather than working with many partners, they aim to have less partners but deeper co-operation with them. The most frequently mentioned partners included suppliers, customers, research institutions and universities. However, some companies pointed out that due to the size of the customer base and the resources the company has, it is not possible to create partnerships with the end users. Additionally, the co-operation with competitors was mentioned in cases where the development is done for the common good.

“External orientation is a vital condition. You need to create the interfaces with your company and the value chain in a way that there are many interfaces” – Interviewee 7

“There are X amount of people working in our company. Then we have a strong ecosystem” – Interviewee 4

What is rather new in the forest-based industry is that not all the resources need to be owned. SME's can have an access to external resources such as employees, equipment and business space, without realizing the full cost of these resources. Several interviewees highlighted the importance of external orientation related to human resources. Some of the companies highlighted that they purchase most of the expertise outside the company while others considered important to have all the knowledge inside the company.

“We have our own technology. We are doing things for the first time so no one else is capable of doing these things” – Interviewee 10

The most identified benefits of partnerships included innovation and development with partners, support from partners and shared resources. It was believed that networks should expand over the whole value chain and incorporate also customers and their needs. Depending on the nature of the company, some companies were able to develop the products and processes together with the customers, which was seen as an enabler for competitive advantage. Additionally, some companies acknowledged that they could utilize the reputation of their partners and hereby strengthen their own brand. The results of the study indicated that it is not anymore the most favourable option to incinerate the production side streams. Instead if forest companies follow the cascading principle and

sell their streams to companies who produce high-value products, their ethicalness and responsibility increases.

"The reason why we are appreciated and not easily replaceable, even though someone would offer lower price, is that we aim to continuously innovate together with our partners to improve our processes but also their as well." – Interviewee 5

Despite the fact that all of the interviewees pointed out the need of partnerships in order to survive, the interviewees had experienced challenges regarding external orientation. Some of the interviewees were unsure whether the co-operation works with large companies as their company is so small. Also, it was mentioned that generally speaking the traditional culture of forest industry companies is stubborn and unwilling to make changes to the traditional operations. Some of the interviewees felt that getting in touch with right people in large organizations is difficult. The fear of losing their own voice was mentioned when co-operating with large companies. Also, some interviewees pointed out that sharing information and developing together with large companies poses risks for instance manipulation on a personal level and stealing the ideas of a SME who may not have the resources to protect its own innovation.

"No one is interested enough of us that we could trust external orientation." – Interviewee 9

During the interviews it was pointed out that not one company's motivation is enough to make a change but instead the whole production, supply and consumption chain should be involved and co-operation with partners is required. It can be found out from the interviews that the type of cooperation that is needed between companies for effective use of wood-based streams is somehow new for the traditional forest industry and it requires plenty of time to build partnerships.

"Our industry is unfamiliar for forest industry. ... Before agreeing what is produced, what is required, what steps and what opportunities here occurs is a long learning path." – Interviewee 1

Majority of the interviewed SMEs were pondering how to increase the credibility of their operations. Especially during the early phases of a company, some interviewees felt that the larger companies did not take them seriously. It can be concluded from the interviews that developing processes or products together with large companies can be difficult due to the lack of credibility of SMEs. Additionally, some of the companies mentioned that in the initial phases of their company, they needed to reassure the larger companies that they will take in all the streams from production that has been agreed. On the other hand, some of the interview-

ees mentioned that they have needed to reassure their customers of the production certainty, i.e. they are able to deliver all that has been promised. Also as a result of lack of credibility, some of the companies felt that the larger companies are not interested in development work with small companies.

“We are operating with a multinational giant companies. They may not be willing use time to profoundly develop with such a small company. We must grow in order to achieve more credibility” – Interviewee 2

The discussion of ecosystems divided opinions among the interviewees. Some of the respondents stressed the benefits of ecosystems such as support from different parties and utilizing different streams. Accordingly, few of the interviewees were already integrated to such ecosystems. However, several respondents addressed that the current ecosystems are not strong enough. Although the existence of operating ecosystems such as Äänekoski was acknowledged and seen as a well-functioning system, some of the interviewees did not see their company could fit in there due to the location or operations in general. The need for new kinds of businesses ecosystems was highlighted and the willingness to integrate to those seemed to be high.

“We partly have a service at the end of the chain but we are missing parts there. There should be new kind of business in order to make it work” – Interviewee 8

5.2.2 Political and Economic

Although most of the interviewees considered governmental actions as a driving forces towards success in CBE, some governmental issues were found that may hinder the transition to CBE. Some interviewees pointed out the fact that most of the new innovative wood-based materials or products are novel in a regulative manner and thus it has been found difficult to define in which category the material belongs. Legislation were wished to support these issues even faster. Also related to the categorization of materials, it was noted that even inside Europe the models differ from each other. That causes issues for instance in how to communicate to customers in which way the material should be recycled in different countries.

One of the interviewees was seemingly frustrated that even though they comply with the legal requirements in CE practices, it was mentioned that they do not believe their competitors do the same. Thus, it was highlighted that especially in the field of public procurements, the activities should be monitored even more carefully. Furthermore, it was pointed out during the interviews that the waste

hierarchy principle should be followed more carefully as indicated in the quotation below.

"As long as it is allowed to utilize a side stream for energy purposes even though it would have a higher value utilization is not good. Energy utilization is not very high in material hierarchy and still regulations in many cases favor it and does not guide the streams to higher value utilization. These kinds of regulations should be dismantled." – Interviewee 5

Related to circular economy and extended producer responsibility, some interviewees were unsure how to organize the collection of the material after its end of life. It was acknowledged among the interviewees that regulations that require producers to organize and pay for the treatment and recycling of waste after their end of life are going to spread to a large number of industries in the future. Some of the interviewed companies felt that the value chain together should pay more attention to extended producer responsibility. Additionally, several interviewees highlighted that the costs of taking back the material are currently too high. Especially problematic was the global operations and how to organize the collection from each parts of the world in a way it does not cost too much and harm the environment.

"How do you collect them deliver them for a new use in a way that it does not cost more than it takes energy to produce the new material" – Interviewee 3

A strong theme that emerged among participants was that CBE needs to be a business case in order to be able to success and even survive. Based on the interviews, many start-ups struggle with financial resources and SMEs are often dependent on external financing. Hence, in order to find funding, it is important to have a strong business model. The lack of track records was mentioned as a main barrier by some of the interviewees. Additionally, the need for more incentives for investors to invest in sustainable businesses would be required.

"Circular economy must be business in order it to actualize. Money must be included." – Interviewee 2

Majority of the interviewees in this study agreed that even though start-ups may have challenges with financial resources, it is relatively easy to receive funding especially in the field of circular economy. Nevertheless, some of the interviewees had dissenting views and they claimed that the initial phase financing is difficult to get and wished to receive more support from the native investors. It was noted that if larger companies want to scale up their production it is not that

capital constrained compared to small companies who generally need to find external financing.

“In the future Business Finland and similar organizations together with ethical investors could support more this kind of activities. Investors should be encouraged to this kind of financing.” – Interviewee 1

“Naturally the issue has been that everyone has been patting on the back but none has given money. Except friends, fools and family” – Interviewee 1

Majority of the interviewees pointed out that their material costs are relatively low when using wood-based streams. However, some of the interviewees indicated a vision where in the future more recycled material will be utilized in their processes. Related to the costs of recycled material, it was acknowledged that if the degree of processing of the recycled streams goes too far, it will eventually be reflected in a high price and naturally it will affect to the business. Moreover, from the forest industry’s perspective, one interviewee had experienced that side streams are not in the center of the large mill and hence the costs of the side streams are not well acknowledged and there are plenty of hidden costs. The hidden costs compose from for example loading, transporting, storing, drying and adding chemicals. That has been causing struggles when negotiating of the prices of side streams.

5.2.3 Market

Public acceptance is crucial to the success of commercializing a new product or service. According to the interviewees, consumer awareness is increasing and the demand for responsible products and solutions were acknowledged. The consumers’ power as a driver to change was mentioned by majority of the interviewees. It emerged from the interviews that the amount of Lifestyles of Health and Sustainability (LOHAS) consumers is rapidly increasing and the consumers in this segment tends to purchase based on value rather than price. However, it can also be interpreted from the study that the knowledge of circular products may be missing and thus it makes difficult for companies to convince what being sustainable or circular adds to the product in terms of value. Some of the interviewees also mentioned a gap between the stated values of customers and actual engagement in CBE practices.

“Enlightened consumers guide our operations.” – Interviewee 4

In some industries, the markets are ruled by a price and the interviewees pointed out that in many cases the “circular product” is more expensive than the average product. The interviewees also pointed out that bio-based products must be at

least as good as the solutions they replace. Additionally, “consumer is the king” kind of philosophy was found from the interviewees answers. It was believed that the whole value chain will comply to the customers’ demands sooner or later. Those who already have their operations in a sustainable base are in a good situation. However, the interviewees pointed out that continuous development is required in order to remain attuned to the times.

“The consumers’ values and the choices they make eventually force all the value chains to comply with those choices” – Interviewee 7

Values of sustainable development have been emphasized lately especially in the field of consumer business. Thus, not surprising that the importance of company’s communicating the sustainability aspects to consumers was highlighted during the interviews. In order to even more engage the consumers to CBE, it needs to be made easy for the consumers for example when considering recycling. In fact, majority of the interviewees brought up that their product or material is easy to recycle as it has been designed according to CE principles. In addition, the interviewees acknowledged that the labelling of products need to consider the circularity and inclusion of end-of-life options. The labels should increase the information sharing and incentivize consumers to cascading.

“If you are able to get your own communication story to support the consumer decision, it has a clear positive trend.” – Interviewee 7

“It is extremely difficult to teach. We cannot change the behaviour of a consumer. Instead, we aim to communicate these things to consumers” – Interviewee 6

In many cases, when talking about forest-based businesses, the markets do not yet exist so the companies are creating new paths. Alternatively, the companies operates in a market, where the demand already exists but they are used to utilize different materials with different processes. The task is to change the attitudes of the value chain that they change their processes and internalize new habits, materials and processes. In other words, the culture of other players in the value chain is also experiencing changes. The interviewees pointed out that it takes time for the market to learn the new materials and products. Also it emerged from the study that large companies protect themselves with a strict definitions for the materials.

“In many fields you are working in markets that do not exist yet. In other words you are creating new paths. Or then the market, that has a huge demand, is used to different materials and processes and your task is to make your clients use their time and money in order to adapt new ways of doing things, new materials and new processes.” – Interviewee 7

6 SUMMARY, DISCUSSION AND CONCLUSIONS

In this chapter the research findings are analysed and discussed in detail and compared with the existing literature. The central question of this thesis was to discover under what prerequisites the SMEs can success in wood-based CBE. The key findings of this study are in many parts in line with the existing literature. However, some fascinating and surprising results have also emerged during this study. The discussion chapter will follow the same structure as it has been in the thesis, first the internal factors that affect to the transition to CBE (either drive or hinder) will be discussed and then the external factors will follow. This chapter will also consider the sub-questions: “What kind of resources and capabilities the companies should have to enable continuous innovation and success?” and “What are the barriers for SMEs in utilizing wood-based biomass, particularly side streams, in CBE?” In addition, in this section the author’s recommendations for SMEs will be presented based on the literature review and the empirical data. Then the considerations of the trustworthiness as well as limitations of the study are presented. Finally, the author will present the recommendations for further research.

6.1 Prerequisites to success and the hindering factors in CBE

Forest industry is experiencing substantial transformation due to major changes in global markets driven by globalization, changes in consumer demands and values, population growth as well as climate change and resource scarcity, to mention few (e.g. Hetemäki, 2014; Hetemäki and Hurmekoski, 2016). According to the principles of RBV, companies must upgrade their business strategies, models and capabilities to meet the changing business environment in order to success (Grant, 2010). Business models and activities that comply with the principles of a more sustainable and efficient economy are spreading among forest industry. The well-being in society cannot be increased through mass production of more and more goods but instead the production of high value and also sustainable products is needed. In line with the existing literature (see e.g. Korhonen et al., 2018; Teuber et al., 2016) the interviewed companies highlighted that the motivation towards CBE are based on the internal and external pressure, concerns of the environment, competitiveness and innovation. Although economic drivers were identified during the study, it was also pointed out that merely seeking for wealth likely leads to short-term focus instead of building sustainable competitive advantage. There needs to be passion included, which is in line with the study by Schoemaker et al. (2018). Additionally the willingness to modify the traditional forest industry was seen as a motivating factor among the respond-

ents. It emerged from the study that CBE requires much more than just implementing new practices and rather the whole economy needs a new way of thinking supported by the quotation by Kirchherr et al. (2018, p.229) “CE must be understood as a fundamental system [innovation] instead of a bit of twisting the status quo”.

As the main principle of OHI states, instead of trying to copy other companies “success recipes”, companies must take the general archetypes as inspiration and create their own recipe of success that best fits their own culture and strategy. The organization’s health and performance will suffer if the day-to-day practices do not support the company’s strategy or are not in line with the direction that the management have communicated. According to OHI, organization’s health relates to the capability to align around a clear vision, strategy and culture, to perform excellently and to renew the focus of the organization by following the market trends and responding to them. (de Smet et al., 2014)

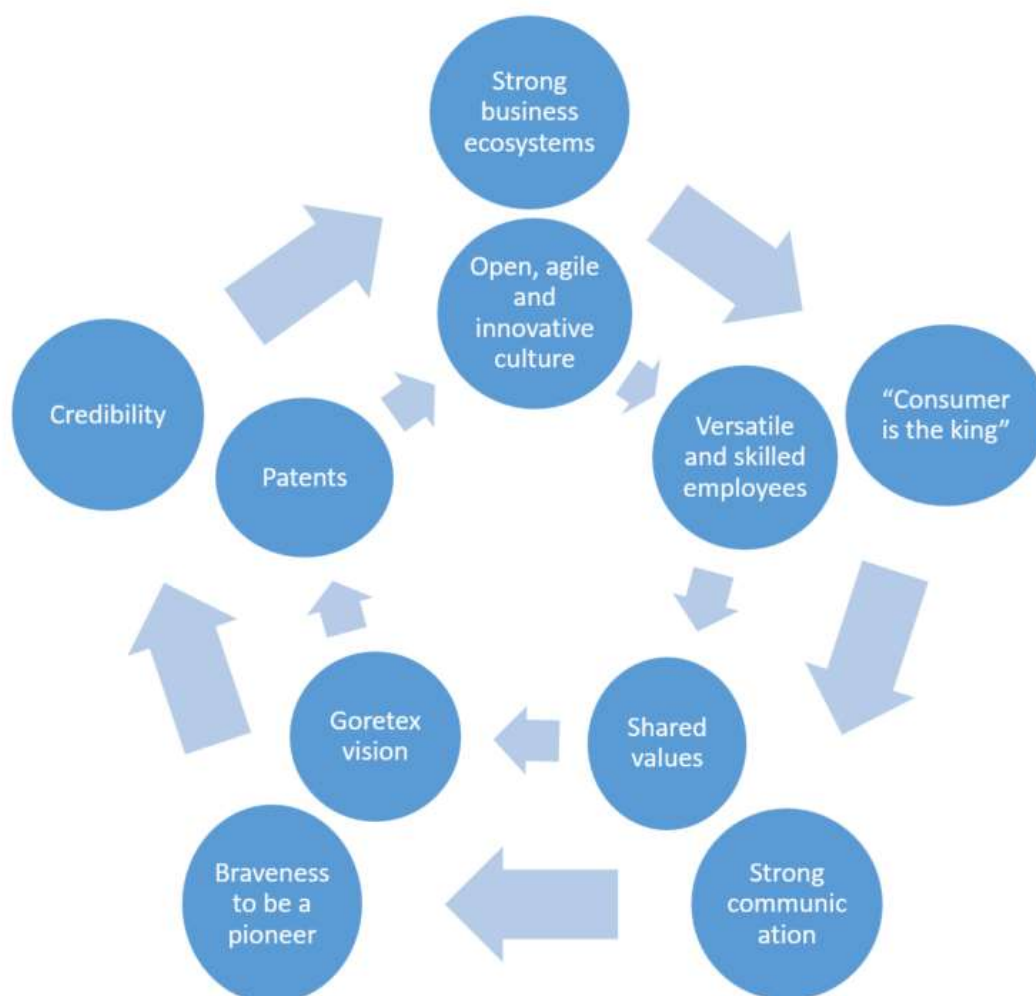


Figure 7: Prerequisites to success in CBE

Figure 7 above presents the prerequisites to success in wood-based CBE based on this study. The inner circle represents the internal factors while the outer illustrates the external ones. The findings of this study are in line with the existing literature, according to which SMEs are seen to play a key role in the transition to CBE as a result of their flexibility, capability to generate innovations and dynamism, which have been seen lacking among the traditional forest companies (Hansen, 2016). According to the interviewees an open, agile and innovative culture enables success in CBE. Accordingly, the transition towards a sustainable business was seen to be easier for new businesses as they are able to start the whole business based on sustainable values instead of trying to change entrenched attitudes and behaviour. The previous mentioned is in line with Schoemaker et al. (2018) who states that if the company has deeply rooted ordinary capabilities, those can in fact be harmful for companies' renewal processes in volatile, uncertain, complex and ambiguous (VUCA) business environments. However, tacit organizational knowledge or trust between employees and management cannot be bought and such company-specific assets develop slowly (Amit and Schoemaker, 1993), which was also identified during the interviews. Accordingly, OHI claims that the competitive advantage nowadays is increasingly achieved from hard-to-copy intangible assets such as company's culture and effective leadership (Price and Keller, 2011).

A major difference between the existing literature (see e.g. Ritzén and Sandström, 2017; Rizos et al., 2016) and the findings of this study is the barrier regarding organizational culture, which in the existing literature is identified as the most pressing ones. However, in this study organizational culture barrier was one of the least mentioned which can be explained from that the companies participating in this study has from the beginning based their values on sustainability. According to the findings of this study, versatile and skilled employees are a prerequisite for companies' successful transition to CBE. Most of the respondents of the study were parts of top management of their companies and perhaps due to that the role of top management in creating innovative culture was not highlighted as much as in previous studies (see e.g. Hansen, 2016; Näyhä, 2019b). A study by Näyhä (2019b) highlights that the capabilities and skills of leaders are of high importance in creating the needed atmosphere for change and encouraging the employees. In particular, this study found out that the required skills and know-how to be able to commercialize wood-based innovations were especially from the fields of technology, chemistry, marketing and sales. Thus it can be concluded that diverse backgrounds are more valuable than competence. Additionally, the importance of matching values with employees and the company was highlighted as a driver towards CBE.

As have been mentioned, all of the interviewed companies had a clear vision of the future. However, it remained unaddressed whether the employees are well aware of the vision, which is in a high importance when considering the success of achieving the vision according to the OHI framework (Keller and Price, 2011).

Based on the interviews, management has the vision of the future and the time perspective is commonly from three to five years. However, a quickly growing and constantly changing economy is a challenge for companies and it may be difficult to predict three years from now where the business should be. If there are major capital investments included in the strategy, the time perspective is even longer. Thus, the main features of the company's culture, which also were highlighted during the interviews, are flexibility and ongoing capability to update the strategy in order to remain attuned to the times. Novel in the field of CBE literature is that many respondents highlighted "Goretex vision" as their way to success. That vision is based on including the actual brand visibility in the product as Goretex has done. The interviews revealed that the end customers are increasingly demanding transparency and appreciating environmental values and thus that kind of vision can be significant opportunity for SMEs. Additionally, the results of this study indicate that more medium sized companies are required in forest industry to be part of new ecosystems, which is very much in line what have been discussed in the literature earlier (see e.g. Arasto et al., 2018)

Innovation is required in the field of CBE in order to be competitive and success in the market. Similar to previous literature (see e.g. Hetemäki and Hurmekoski, 2016) this study shows that the possibilities of what can be made of the forest biomass are enormous and instead of asking what can be made of forest biomass, the critical questions concerns in what scale, where and driven by what the new innovations are produced. The results of this study are similar to earlier studies from the forest products' industry suggesting that there are three main areas of innovation: product, process and business systems (Hansen, 2016). Among most of the respondents innovations was seen as a part of daily routines and deeply rooted to the company's strategy. Additionally the innovation was seen to come both from top-down and bottom-up. The literature on forest products' industry suggest that beyond the traditional "lead by example", the company should build a strategy for innovation and introduce metrics that guide the employees in being innovative and creating novel innovations (Hansen, 2016). Similar metrics were not found in this study, however, some of the interviewees mentioned that employee involvement to innovation have been increased by introducing "innovation boxes" and "innovation days".

The transition to CBE requires arrangements to improve cooperation with the value network and even the creation of a new business ecosystems. The importance of partnerships with suppliers, researchers, regulators, customers and even competitors is highlighted in the CE literature: "circular business model innovations are by nature networked: they require collaboration, communication, and coordination within complex networks of interdependent but independent actors/stakeholders" (Antikainen et al., 2017, p.7). Partnerships help to acquire strategic resources such as product development skills and access to distribution channels, which may be valuable, rare, hard to imitate and non-substitutable (see Chapter 3.2). According to the results of this study, in order to capture the value

of CBE opportunities, the entire network must be involved in CBE activities. In line with the existing literature (Arasto et al., 2018), the results of this study show that SMEs together with forest companies will play a huge role to develop ecosystems which will bring new high-value products to the market. The reasons for the interviewed companies getting involved in strategic alliances were mainly in line with Doz and Hamel (1989). First, it emerged that companies in alliances combine their resources and knowledge to create more value than they would separately. Second, by integrating in alliances, companies can learn new skills and competencies from other companies, which would otherwise require a lot of resources or even be impossible to develop. Third, co-operating with potential competitors may help to neutralize possible threats. Furthermore, collaborating with prestigious partners can help SMEs to achieve credibility in their own value chain. In fact, according to the results of this study, the lack of credibility was the most prominent challenge among SMEs in wood-based business.

Related to extended producer responsibility the interviewed companies brought up their willingness to take back the materials/products but it was acknowledged that the system is not strong enough for that. This study found out that the interviewed companies experienced costs of taking back the materials and collection of materials in a way it is economically feasible and does not harm the environment challenging. Similar was found from the study by Reim et al. (2019) who claimed that products that are manufactured from by-products are not generating value when for instance logistics are too complex. This issue needs to be seriously taken into account as these bio-based products compete in the same market with the existing traditional products.

The market economy follows a simple minded rule: supply and demand. If the pressure from the market and customers is lacking, there are no incentive to develop sustainable products. On the other hand, if there are not any sustainable products and producers, the customers will not learn to demand them. Thus is it extremely important to communicate the benefits of the new products to consumers. "Consumer is the king" kind of philosophy was raised up often during the interviews and customer-centric way of thinking was emphasized. Furthermore, this study found out that in some industries markets are ruled by a price and often the circular product is more expensive than the average ones as also recorded by Reim et al. (2017). Additionally, CBE products are not yet as profitable as their alternatives and SMEs often are dependent on public support for research and development (Reim et al., 2017).

This study discovered technical barriers together with the lack of credibility to be the most significant influencing factors for utilization of CBE. Specifically the lack of homogeneity of recycled streams was seen as a major barrier for utilization of recycled materials in production according to the interviewees. According to Kirchherr et al. (2018) these potential technical barriers seem to be under-appreciated in current political and stakeholder discussions in the field of CE. Some of

the interviewed companies had an experimental pilot production running to speed up the development and reduce market and technology uncertainty. Despite the ability to reduce the aforementioned uncertainties with the piloting operation, D'Amato et al. (2018) presented "Valley of Death" scenario, where resources are found more easily during the R&D phase in comparison to the commercialization. Previous studies have found legislation as a hindering factor to CBE (see e.g. Rizos et al., 2016). However, majority of respondents in this study considered legislation only as a driving force in their industry towards CBE. Nevertheless, it was acknowledged that most of the new innovative wood-based materials or products are new in a regulative manner and thus the categorization of materials have been seen challenging and the support from legislation would be needed. Also the respondents found challenging that different countries have different regulations concerning for instance recycling of waste. Also, it is vital that the legislation is predictable and thus the law making process needs to be as open as possible that companies can take into account new laws when making decisions of large investments.

This study supports the findings of existing studies (see e.g. D'Amato et al., 2018; Reim et al., 2017) that revenues of CBE products have not yet reached the same profitability as their alternatives. Also, naturally, the price of the new innovative products made from renewable sources is higher compared to the ones made of non-renewable materials in mass production. Altogether, the results of the study shows that financial incentives for circular investments would be needed to support the transition to CBE. Novel in the wood-based CBE literature, this study raised the question of whether the costs of side streams are known in the mills as there can occur a plenty of hidden costs. Also, the forest companies must find substitutes for the existing energy needs that the side streams had met in the past. Therefore, the balance in resources is vital to achieve by involving different actors and motivating them to contribute to industry-level transformation.

6.2 Recommendations for SMEs

There is no single secret for success in business but instead different factors that have an effect in SMEs performance. During the study, in an extreme importance was seen that the company's values match with the values of employees and the culture is based on pulling in the same direction. It is extremely important that enterprises discover the internal factors that limit the transit to CBE and integrate the CBE initiatives into company's strategy, vision and key performance indicators, which calls for employees training (Kirchherr et al., 2018). Accordingly, the interviewees emphasized that the employees must be kept aware and constantly informed of the organization's culture and the desirable operating models. Organization's culture should not be considered as a one-time created state but instead it needs to be questioned, maintained and improved. The results of this

study indicated that in most of the interviewed companies the employees were involved in the strategy formulation. However, as the growth of most of the interviewed companies is rapid and with the growth, the companies become more and more complex, it is important to acquire external help. In order to improve the company's culture, the author suggest of using external consultant who could have more "outside the box" improvement ideas. Additionally, in line with Schoemaker et al. (2018), the management could conduct a capability audit where the required competencies would be listed, the gaps between the current and desired levels could be identified and then the needed steps would be determined that are the most critical to support a given strategy.

Innovation was highlighted as the most essential factor for SMEs transition towards CBE and thus the author recommends rewarding employees from being innovative. Additionally, innovation boxes and innovation days could increase the level of innovativeness inside the company. However, as the results of this study show, research and development can take place various different ways beyond the traditional in-house laboratory. Jointly developing with different parties in the value chain is required as many of the barriers the company faces today may have already been overcome by others yesterday. The companies have to constantly monitor what is happening in the research field. Being up to date not only provides insights to new developments but also can be a required source of networking and co-operation. As have been discovered, the company does not need to own each required resource and capability but instead those can be achieved from the business ecosystems. By integrating in business ecosystems, the most identified barrier, namely lack of credibility, can also be tackled.

Based on this study (as well as the existing literature referred to in this study), several recommendations for SMEs success in wood-based CBE are presented below in Table 4.

Constantly develop the culture and strategy and utilize the help of external consultants.

Set sustainability at the core of the strategy and conduct a capability audit.

Inspire employees to innovate by organizing innovation days and innovation boxes and reward the employees for being innovative.

Jointly develop with different parties.

Utilize the resources and capabilities from the business ecosystems.

Table 4. Recommendations for SMEs to success in CBE

According to the Finnish CE roadmap, Finland will become a leading BE and CE country because of the high-class forestry (Sitra, 2016). Transforming an industry, which have been operating for decades, is not an easy task to do but the ones who have the courage to make the first radical moves will earn the rewards. This however, as discussed, requires broad-minded collaboration, novel ecosystems and a completely new way of thinking.

6.3 Trustworthiness and limitations of the study

This chapter discusses the appropriateness of the collected data and its analysis in comparison to the research aims. Qualitative research can be evaluated through several various criteria. Rather than focusing on reliability and validity, which have seen derived from quantitative and scientific research traditions (Eriksson and Kovalainen, 2008), the framework developed by Lincoln and Guba (1985) concentrate on the concept of trustworthiness. Trustworthiness contains four aspects: credibility, transferability, dependability and conformability (Lincoln and Guba, 1985). This study will make use of the previous mentioned aspects to document the accuracy of the qualitative study as according to Eriksson and Kovalainen (2008) they are accepted criteria for evaluating qualitative research.

Credibility of the study refer both to the researcher's familiarity of the studied topic and the data being sufficient to support the claims (Eriksson and Ko-

valainen, 2008). What strengthens the credibility in this study is the logical structure throughout the study from starting with the research plan, followed by going through relevant theories, data collection and analyses. Also, when selecting participants for this thesis, the aim was to involve people with a various backgrounds in order to address the research questions from a different perspectives, as proposed by Patton (2002). In analysing the data, the author aimed to be as transparent as possible. For example, representative quotations from the transcribed text of the interviews were used in the results section.

The main thing with transferability is not to replicate studies but rather to discover some degree of similarity between the research in comparison to other studies (Eriksson and Kovalainen, 2008). The degree of transferability in this study is enhanced by presenting previous studies from the field of CBE and comparing the findings of this study and the former research in discussion chapter. Still, it needs to be noted that the results may differ although the study was replicated as the respondents opinions can be time-specific. However, Lincoln and Guba (1985) advise researchers to provide rich descriptions of the context and research procedures but to leave the evaluation of the transferability to the reader.

Dependability, in turn, relates to the researcher's responsibility to inform the reader of the research process and that it has been logical, traceable and well documented (Eriksson and Kovalainen, 2008). According to Lincoln and Guba (1985), dependability in qualitative study refer to finding ways to consider the changing conditions that appear in the context of research and the study design. In this thesis, the aim has been to make the research process clear and the supervisors of the thesis have checked and commented the research plan and its implementation. Also, the analysis process has been described as much detail as possible.

Whereas conformability refers to linking the findings and interpretations to the data so it can be easily understood by the reader (Eriksson and Kovalainen, 2008). Also, it refers to the neutrality of the researcher so that the findings of the study are only based on the experiences of the respondents rather than the interest of the researcher (Lincoln and Guba, 1985). In this study, the conformability was enhanced by using mainly inductive reasoning in data analysis. By using inductive reasoning enables the data to "speak" rather than it being tested against previously existing theories or concepts. In addition, it is possible to enhance the conformability by using triangulation (Lincoln and Guba, 1985). This thesis applied evidence from various empirical sources to cross-check information as well as different theories to interpret the studied aspects, meaning that both data and theoretical triangulation are present in the thesis. However, triangulation could have been enhanced by utilizing additional data collection methods.

Even though this thesis was designed to match the quality criteria presented above, it has the following limitations. First, all the data is collected from Finland and thus the results should be seen as an outcome of Finnish cultural and socio-economic context. Second, the sample size is rather low so that together with the Finnish cultural context might limit the generalizability of the results in this study. Due to the small size of most of the companies, the author had a chance to interview one person of each company which hampers the possibility to compare the information regarding the same company. Additionally, the personal opinions of the respondents may have been in a big role when answering the questions. Third, due to the different backgrounds of the interviewees, some topics were discussed in depth while others were only mentioned briefly. Fourth, some of the interviewed companies were in early stages of the development in their respective business and thus some of the respondents may not have thought some of the topics in respect to their business.

6.4 Future research

This study has increased the overall understanding of the concept of CBE from the SME sized businesses and the factors that either hinder or drives the use of wood-based streams. The most pressing barriers found from the study were the lack of relevant business ecosystems and the lack of credibility. As the results indicate, it is indeed relevant to further research what are the concrete actions the SMEs should take to achieve more credibility? Also, how different stakeholders could support the establishment of new ecosystems and what kind of ecosystems/ take-back models are actually needed? Additionally, as the process from purchasing the resources into commercialization of a product is long and complicated, more detailed research would be needed of the barriers and drivers of each of the steps separately. The primarily perspective in this study is a SMEs perspective, which is a rather wide scale. It would be worthwhile to study whether the same drivers and barriers are relevant when comparing recently founded start-up company versus a medium sized company that have had its operations for a longer period of time. Additionally, when considering the research approach, adding quantitative methods could have proven deeper point of views to the studied topic.

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APPENDICES

Appendix 1: Haastattelurunko

Yleiset asiat

1. Yrityksen perustiedot
 - a. Yrityksen koko (liikevaihto ja työntekijät)
 - b. Yrityksen perustamisvuosi
 - c. Päätoimiala
 - d. Motivaatio yrityksen perustamiselle
2. Haastateltavan perustiedot
 - a. Asema yrityksessä
3. Yrityksen tuotteet ja palvelut
 - a. Raaka-aineet - mistä tulevat ja minne menevät?

Kiertotalous

4. Miten kierto- ja biotalous näkyvät toiminnassanne?
5. Mitä liiketoimintamahdollisuuksia ja -haasteita (ei teknisiä) yrityksenne on kohdannut sivuvirtojen/biomassan hyödyntämiseen ja tuotteiden kaupallistamiseen liittyen?
6. Missä näette yrityksenne 5-10 vuoden päästä?
 - a. Mitkä ovat toimintaympäristön tekijöitä, jotka edistävät kierto-biotoutta?
 - b. Mitkä ovat yrityksenne sisäisiä tekijöitä, jotka näette vahvuuksiksi sivuvirtojen/biomassan hyödyntämiselle?
 - c. Mikä sinua henkilökohtaisesti motivoi kohti tavoitetilaa?
7. Minkälaisia resursseja ja kyvykkyyksiä yrityksellä tulisi olla kiertobiotalouden kehittämiseen?
8. Mitä vahvuuksia/heikkouksia koette yrityksenne toimintakulttuurissa organisaatiomuutoksen kannalta?
9. Minkälaisia kumppanuuksia toimintaanne tarvitaan?
 - a. Miten kumppaninne tukevat/mahdollistavat yrityksenne arvon tuottamisen?
 - b. Mitä esteitä kumppanuuksille on?
10. Millä tavoin innovaatiot syntyvät yrityksessänne?
 - a. Mitkä ovat suurimmat puutteet/esteet jatkuvalla innovaatiolle yrityksessänne?

Appendix 2: Questionnaire

General information

1. Company's information
 - a. Size of the company (turnover and employees)
 - b. Company's foundation year
 - c. Main industry
 - d. Motivation for starting a business
2. General information of the interviewee
 - a. Role in the company
3. Company's products and services
 - a. Raw materials - where do they come from and where do they go?

Circular bioeconomy

4. How circular- and bioeconomy can be seen in your operations?
5. What kind of business opportunities and challenges your company has faced regarding utilizing side streams/biomass and commercialization of products?
6. Where do you see your company in 5-10 years from now?
 - a. What are the external factors that advance circular bioeconomy?
 - b. Which internal factors you consider as a strength for the utilization of side streams/biomass?
 - c. What personally motivates you towards to the goal?
7. What kind of resources and capabilities are required from a company to advance circular bioeconomy?
8. What are the strengths/weaknesses for your company's operations in terms of organizational change?
9. What kind of partnerships are needed in your operations?
 - a. In what way your partners support/enable the value creation of your company?
 - b. What are the barriers for partnerships?
10. How are innovations being born within your company?
 - a. What are the biggest obstacles to continuous innovation to your company?