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**GLOBAL SUSTAINABILITY AND SUSTAINABLE KNOW-HOW IN
THE REGION OF OSTROBOTHNIA**

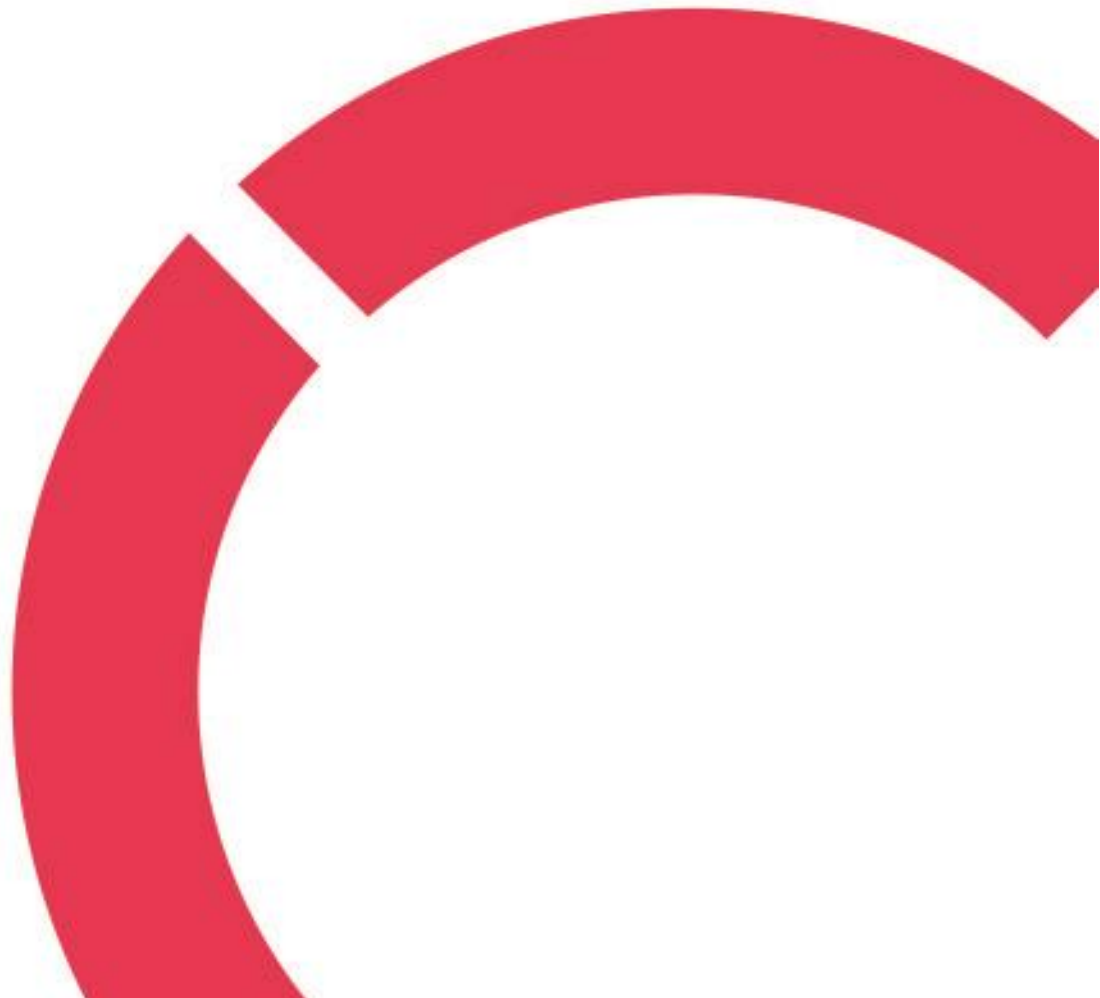
Study and assessment of sustainable practices in Ostrobothnian companies

Thesis

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ABSTRACT

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Name of thesis GLOBAL SUSTAINABILITY AND THE SUSTAINABLE KNOW-HOW IN THE REGION OF OSTROBOTHNIA. Study and assessment of sustainable practices in Ostrobothnian companies		
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<p>Global sustainability, the concepts of sustainability and challenges of growing sustainably were the main topics of this work. Challenges and opportunities of applications of sustainability concepts for businesses in the region of Ostrobothnia were discussed. Further investigation from the regional perspective was chosen to evaluate the know-how of Bothnian businesses in sustainable practices. The topic is valid, thus crucial in the current environmental, social and economic landscape on global arena and requires from all organisation's proactive strategies and fast reactions.</p> <p>The aim of this thesis was to determine and evaluate the current state of the Ostrobothnian organisations regarding their expertise in the subject of sustainability. The thesis' objective was to deliver authentic results within the subject and provide useful guidelines for organisations who want to operate responsibly and sustainably. Additionally, this work sought to inspire all organisations for a comprehensive overview of sustainable practices and their application from the environmental and social perspectives.</p> <p>The theoretical part of the thesis explains the conceptual foundation of sustainability and its principles and addresses the threats and consequences human populations face by not adopting sustainable practices that serve the people and the planet. Finally, challenges and opportunities of applicability of sustainable methods are examined.</p> <p>The qualitative method was chosen for this thesis, and it is exploratory in nature. It consists of seven interviews with local companies and online material available in the subject.</p> <p>Research results led to the conclusion that regional companies and organisations are implementing sustainable practices in their policies, they are actively looking for available, sustainable solutions and are in the process of improvement and development of sustainable know-how in their organisations.</p>		
Key words Circular economy, Sustainability, Sustainable ecosystems, Sustainable development and growth		

CONCEPT DEFINITIONS

SDG Sustainable Development Goals

CEM Circular Economy Model

IPCC International Panel for Climate Change

WMO World Meteorological Organization

UNFCCC The United Nations Framework Convention for Climate Change

UNEP United Nations Environment Programme

LE Linear Economy

CE Circular Economy

GHG Greenhouse Gas Emissions

ABSTRACT
CONCEPT DEFINITIONS
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1 INTRODUCTION

Sustainability and sustainable development have appeared on the global agenda in the last decades as one of the most challenging, broad, and complex subject areas to tackle by companies and organisations worldwide. The sustainability concept involves many crucial aspects of human and natural systems that engage with each other, therefore the creation of sustainable models in the economy are essential to ensure the prosperity of the people and the planet now and in the future. Considering the impact human actions have on the environment and the shape of the economic systems, the ability to create and support sustainable processes and facilitate efficient transition towards a sustainable planet and its inhabitants constitutes a fundamental and global goal for humanity.

The aim of the thesis is to identify the current interest in sustainable practices and their functional knowledge and implementation by the Ostrobothnian companies as well as their level of preparedness to deliver on the market products and services that comply with sustainable principles. Sustainability know-how, circular economic model adoption and its level of implementation on the regional market have been put to study to provide more comprehensive information on regional business opportunities and challenges in the field of sustainability. The foundational knowledge about sustainable principles and development along with the challenges in their applications by the businesses have been addressed and discussed. Moreover, a broad view of ideas and solutions to tackle them have been presented, which may provide insights for sustainability application and practical guidelines for companies who want to become sustainably competitive. Finally, three dimensions of environmental, economic, and social impacts are adopted as the main pillars of the concept of sustainability and used as a measuring tool to compare the current stage in transitioning towards a sustainable business model. Additionally, the thesis cross-examines implementation of the Circular Economy Model across businesses and their progress in the region.

The objective of the study was to conduct fair and informative research exploratory in nature to reveal the extent of progress towards a fully environmentally sustainable and socially equitable transformation of the businesses in the region. The thesis attempts to give ideas and solutions to major challenges in adopting principles of sustainability, and by answering questions posed in this study, the current stage of implementation of sustainable practices by companies is identified and assessed.

The theoretical part of the thesis outlines the concepts of sustainability seen from a general perspective and encompasses the global view and interconnectedness of the pillars of sustainability. It also briefly explores the laws and regulations that lay the foundation of sustainably operating countries, communities, and businesses. Further, the main concepts of circular economy, circular design and circular business models are presented. Finally, the challenges and seizing business opportunities in areas where sustainability and circular economy stimulate competitive value of business offerings delivered to the market.

Qualitative research was chosen for this study and was carried out on companies by means of interviews with specialists in the field of sustainability and sustainable practices. The research is supported by professional data gathered online, and since it is research exploratory in nature, it attempts to identify substantial and efficient solutions supporting the applicability of sustainable practices adopted by businesses. Eventually, the findings and the analysis of the gathered data are intended to contribute to the professional knowledge of sustainable practices and to offer practical guidelines to those companies who seek to achieve a permanent transformation towards fully sustainable models of operation. Finally, the discussion is dedicated to how major challenges and different barriers could be turned into business opportunities. Usefulness and benefits of long-lasting transformation in the field of sustainability count further than one region and ideally can benefit leaders of organisations beyond Ostrobothnia.

2 SUSTAINABILITY

Sustainability is a broad and complex concept which at its foundation encompasses three pillars of the social, economic, and environmental aspects of development. It aims at balancing those three pillars in the way that the people, planet, and environment can co-exist in harmony and cooperation with each other. Transformation towards a more environmentally friendly and socially equitable economy is a global process that poses both challenges and opportunities for most stakeholders involved. The key principle of sustainable development is integrating all stakeholders in the economy in the way that no one stays behind. Nevertheless, full sustainability, which is incorporated by all stakeholders on all levels globally is difficult to achieve because major industries such as energy, manufacture, health, and education, require long-term and fundamental system transformations.

Sustainability was for the first time officially defined in 1987 by the World Commission on Environment and Development (WCED) in the Brundtland Report (BR), in which it stated that sustainable development is the activity that ‘meets the needs of the present without compromising the ability of future generations to meet their own needs’ (WCED 1987:39). The report is a landmark that at its core represents the first institutionally endorsed by the United Nations (UN) concept of sustainability which focuses on the Earth’s biophysical environment and depletion of natural resources with the premise that their infinite exploitation and damage will eventually lead to shortage undermining the ability of life to persist and thrive (Brundtland 1987).

2.1 The three E’s framework of sustainability

To better understand sustainability, a framework of ‘The Three E’s’ was designed which refer to three co-equal pillars: environment, economy, and equity often presented as three overlapping circles (figure 1). As the Brundtland Report states, sustainability is achieved on three levels by simultaneous protection of the environment, preservation of economic growth, and promotion of equity. Essential point in the three E’s framework is equal support and development of the three pillars with no trade-offs nor scarification of any of them (Brundtland 1987.)

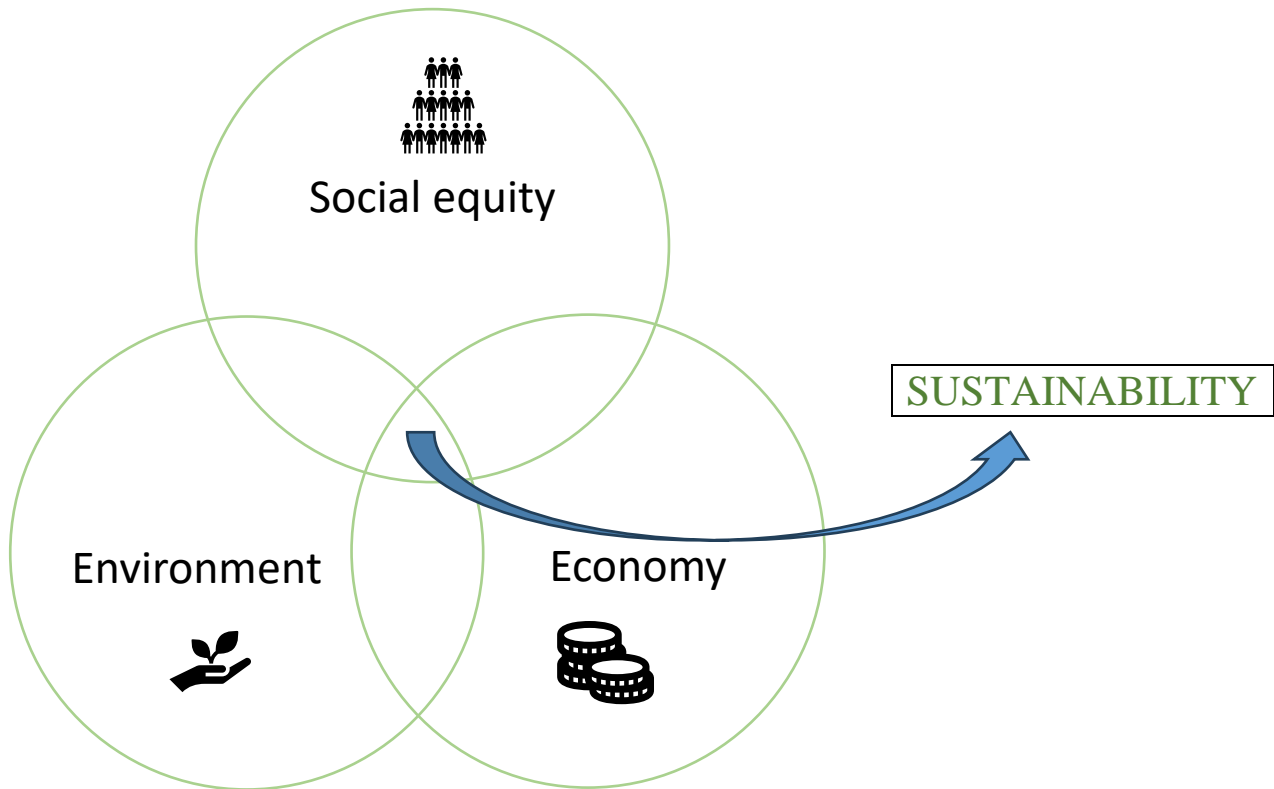


FIGURE 1. The three E's of sustainability (adapted from Bailey 2023)

As seen in figure 1 sustainability takes in simultaneous consideration the three overlapping aspects equally. Sustainability is achieved when economic growth, environment protection, and equity go hand in hand. Among the three sustainability pillars, the environmental aspect is the most discussed because it encompasses all human impacts on the natural world such as interactions with natural ecosystems and habitats, natural resources extraction and creating waste. Environmental sustainability is not only about 'zero impact' but about allowing the environment to regenerate at its own pace. It applies for example in agriculture and fishing industry and indicates practices that allow the soil to regenerate and fish population to renew. (Bailey 2023.)

According to Bailey (2023), a resilient economic pillar in sustainability requires means for everyone to support themselves indefinitely, infrastructure with efficient community public services, affordable housing, enough jobs, stability of income as well as support for small businesses. Sustainable businesses generate profits at present and ensure their continuation in the future, they are resilient to disruptions and unforeseen changes. (Bailey 2023.)

2.2 Importance and reasons for sustainable approach

After over a century of scientific research and evidence, it was established that a sustainable approach ensures balance between environmental, social, and economic needs which in turn contributes to long-term success in business. Sustainable approach means exerting positive impact on environment and society and therefore attempting to address and tackle currently most pressing global issues. Major global problems such as climate change, gender discrimination, income inequality, racial injustice, depletion of natural resources, pollution, human rights issues, and fair working conditions can be improved by adopting sustainable strategies in business. (Chladek 2019.)

Among current and most pressing problems, the climate crisis and global warming have taken over the dominant scene in the subject of human activities that negatively impact the natural environment, of which burning of fossil fuels is the acclaimed prime reason for global warming on the Earth. Despite the fact the Earth's climate has changed throughout history, the current warming on our planet is happening at a rate not seen in the past 10,000 years. From the 1970s, the Intergovernmental Panel on Climate Change (IPCC), has conducted systematic scientific assessments of human activity on the warming of the climate on Earth. The scientific information gathered from natural sources like ice cores, rocks or tree rings provided key findings on the subject. The study can be retrieved from Sixth Assessment Report (AR6), where the signs and patterns of the changing climate and an increasing global temperature has been proven to be a fact. (IPCC 2023.)

The change in global temperature is shown in NASA's long-term study and analysis of temperatures on earth which were compared to the average from 1951 to 1980. The analysis revealed the temperature in 2023 was the warmest on record since 1880 (NASA, 2023). The data shown is annually updated and demonstrates the overall Earth's temperature is about 1,36 degrees Celsius warmer than in preindustrial average.

2.3 Consequences of climate change

Regularly conducted climate change analysis reveals that climate warming affects populations and communities in different ways. Coastal communities for example and communities with livelihoods based on agriculture are at the highest risk. Regions carrying the most exponential risks of climate change include Arctic ecosystems, island nations and the least developed countries. According to Collette Pichon Battle, scientific studies predict that by 2100 climate change will displace more than 180 million people resulting in 'climate migration'. (Pichon Battle 2019.)

Other frontline changes of global warming include natural disasters, ex. fires in California, extreme heat waves, droughts and floods - climate phenomena caused by nature or humans or the combination of both. One of the most affected sectors is agriculture, which in turn could lead to issues with food security, water resources, energy demand and human health. A comprehensive study on biodiversity published in 2022 by WWF reveals that since 1970, we have lost about 69% of species populations on Earth. (Living Planet Index 2023.)

Scientific data shows populations of species in decline between 1970 and 2018. It suggests that natural ecosystems experience continuous degradation at a rate never seen in the history. Depending on geographic region, the extent of declines varies reaching average declines in populations of natural species in Latin America and the Caribbean even 94%. Among the principle drivers of declines land-use change, habitat loss and degradation has been identified, linked mainly to unsustainable agriculture and other unsustainable practices like logging. (Living Planet Index 2022.)

2.4 Sustainable laws and regulations

Climate change is a challenge of our times, but despite that, it may create an opportunity to build a new economic model. The European Parliament (EU) and United Nations (UN) addressed the global crisis and introduced programs to urge countries to take action to mitigate negative effects on the natural environment inflicted by human activity. One of the most important documents issued on the subject was the 2030 Agenda by the UN with 17 Sustainable Development Goals. The 17 goals agenda is a global plan with concrete milestones that take people and the planet towards sustainable life for all. (Sustainable Development Goals, United Nations, 2015.)

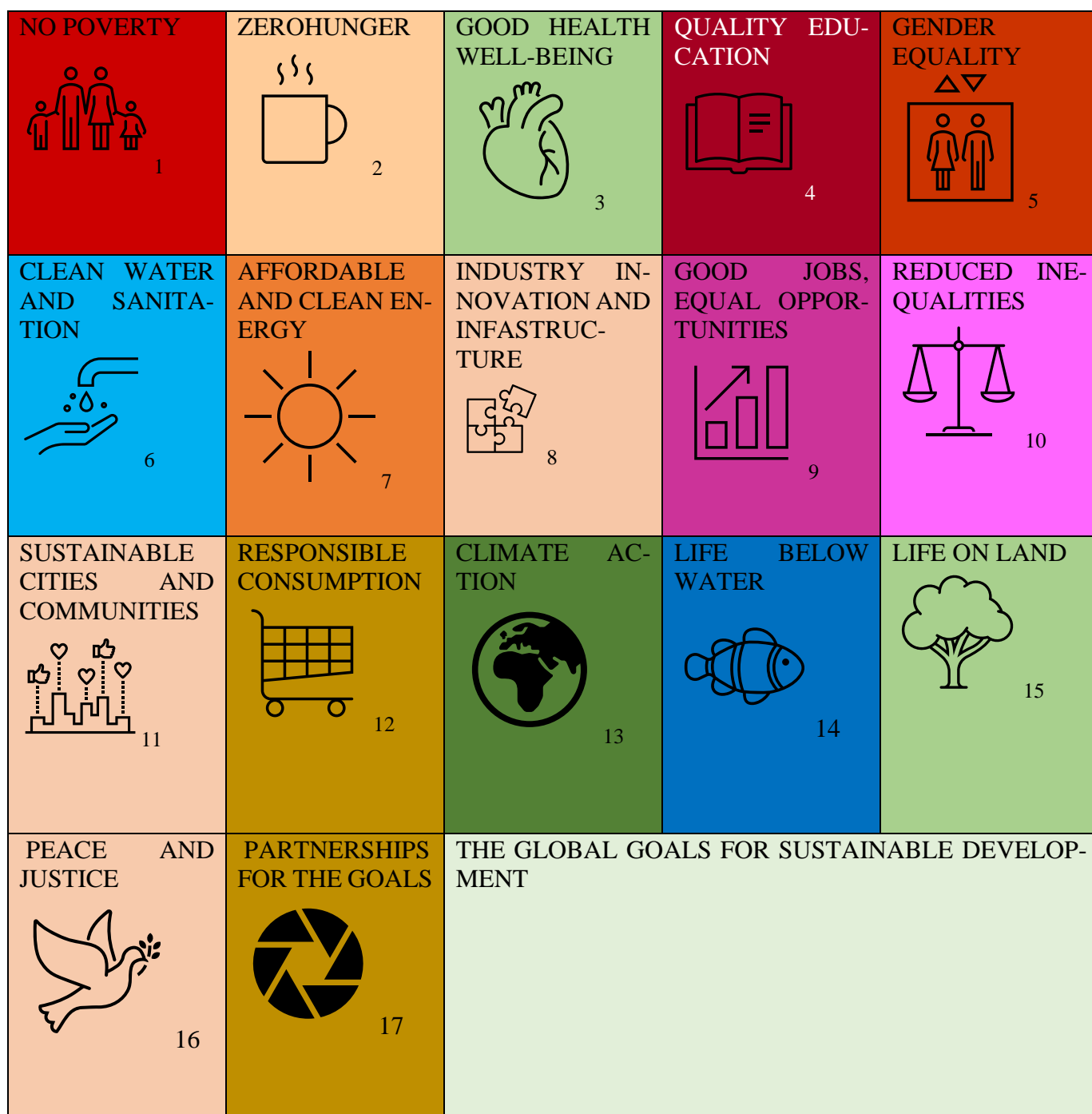


FIGURE 2. Sustainable Development Goals (SDGs). (Adapted from United Nations (UN) 2022.)

To achieve change on a global scale, the UN Agenda involves stakeholders on many levels, including governments, civil society, private sector, and public sector organisations. The agenda is a transformative vision and intends to unite everyone towards a common goal with the scope of improving the situation for millions of people and the planet. The key features of the agenda are based on the principles of human rights, equality, solidarity, and sustainability. (UN 2022.)

Another strategy and remedy to tackle climate change and biodiversity loss has been proposed in The Medium-Term Strategy (MTS) mandated by the United Nations Environmental Program (UNEP). To accelerate the efforts, the European Commission (EU) under the Paris Agreement treaty articulated a legally binding regulation to keep global temperature warming to 1.5°C. The treaty was adopted by 196 Parties at the UN Climate Change Conference in Paris in 2015 and marks a landmark in international agreement of the nations to combat climate change. The Paris Agreement operates on a five-year cycle. Since 2020, countries have been submitting their national climate action plans, known as Nationally Determined Contributions (NDCs). NDCs are climate action plans submitted by individual countries to the United Nations Framework Convention on Climate Change (UNFCCC) . NDCs communicate each member's country's actions taken that contribute to achieving the goals of the Paris Agreement. (United Nations 2015.)

In 2021, The European Green Deal under the EU Climate Law, committed 27 member states of the EU to reduce emissions by at least 55% by the end of 2030. EU Member States are legally bound to turning the EU into a climate neutral continent by 2050. As much as €65 billion from the EU budget is allocated into Social Climate Fund to ensure opportunities for everyone support small businesses and the most vulnerable citizens with the green transition. (European Green Deal 2019.)

2.5 Finland

In the Finnish legislation, The Environmental Protection Act 527/2014 was issued by the decision of the Finnish Parliament. It aims to prevent pollution, reduce emissions, reduce negative impacts caused by pollution, safeguarding ecologically sustainable and biologically diverse environment, supporting sustainable development and combat climate change; promotion of sustainable use of natural resources, reduction of the amount and harmfulness of waste, and prevent adverse impacts caused by waste; improving the opportunities of citizens to affect decision-making concerning the environment. (Environmental Protection Act, Ministry of the Environment, Finland 2015.)

In the UN assessment of the 2030 Agenda in June 2023, the evaluation of implementation of Sustainable Development Goals were shown revealing that at the current pace of changes, any of the 17 SDGs will be achieved and as little as one fifth of the targets are estimated to be globally met by 2030. Despite that, Finland's commitment to sustainability has given the country and its citizens a position of

the frontrunners in the implementation of the 2030 Agenda and in 2023 for the third time in a row Finland ranked first in the UN Sustainable Development Index. (2030 Agenda- Sustainable Development Goals, Ministry for Foreign Affairs of Finland, 2023.)

Finnish cities like Helsinki, Tampere, Turku, Lahti, Espoo, and Lappeenranta strive to be carbon neutral by 2030. To further support green investments, the Finnish government prioritised green transition projects between 2023-2026 by quick processing of permit applications in the field of renewable energy production, carbon capture, industrial electrification, battery production, hydrogen. The Finnish government adopted a new hydrogen strategy that aims by 2030 produce one million tons of pure hydrogen – a tenth of the EU’s target of gas production. Finland’s sustainability actions are supported by EU funding which granted Finnish companies 530 million euro through the Sustainable Growth Program for Finland. (Business Finland 2023.)

As stated by the Government Communications Department National Commission on Sustainable Development, Finland has achieved or is close to achieving the UN Sustainable Development Goals. Finland’s 2030 Agenda Voluntary National Review, published in June 2020 shows success reached in areas of health, education, water, and energy, and minimising inequality among others. Despite Finland’s evident success, there are challenges as well, mostly related to climate change, biodiversity, as well as consumption and production patterns. (Finnish Government, Report on the Implementation of the 2030 Agenda for Sustainable Development, 2020.)

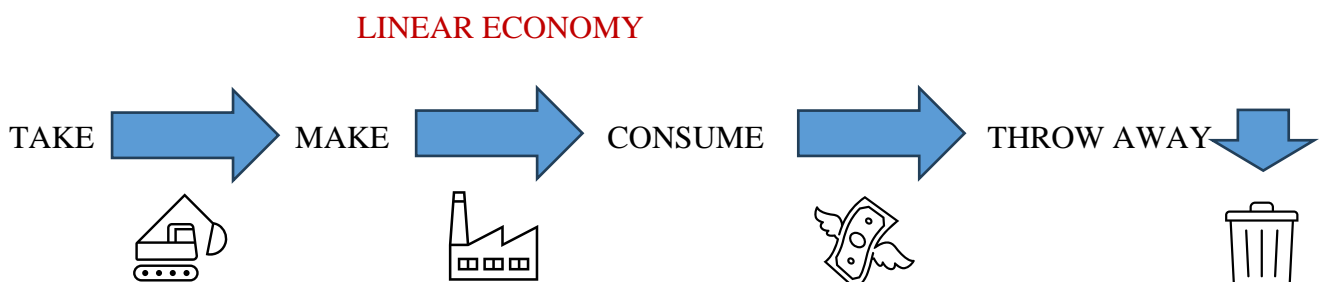
3 CIRCULAR ECONOMY AS A MAJOR CONTRIBUTOR TO SUSTAINABLE GROWTH

After The Industrial Revolution, Linear Economy (LE) framework referred to as the take-make-waste model was adopted. For industrialised countries under fast and continuous development, LE facilitated mass production of goods providing for the growing needs of a global soaring population. Nevertheless, under LE principles, little attention was made to natural capital extraction limitations, creating waste, which was not processed or recycled, LE by definition became a polluting system moving in one direction only from extraction of raw materials to creating waste. In consequence, rapid economic development became an unsustainable process creating negative effects on natural systems and global issues like climate crisis and biodiversity loss. (Ellen MacArthur Foundation, EMF n.d.)

To tackle global development more responsibly, the Circular Economy (CE) framework has been laid as one of principal solutions to global sustainability challenges including climate change and biodiversity loss and reducing or eliminating pollution and waste. In response to inefficient LE, the new CE model gave way to repurposing waste and materials and transitioning them into renewable energy or second-hand materials. As claimed by the supporters of CE, the system is good for the environment, business, and people because it cares for ecological footprint and minimises the consumption of finite resources among others. (Santander, 2023)

3.1 Linear versus Circular Economy

Upon examination of the existing literature of linear and circular economy, it is found that the wasteful take- make- consume- throw away pattern, detrimental to the environment and unsustainable for people must be eliminated and substituted by responsible and reliable economic model CE based on Reduce - Reuse – Recycle.



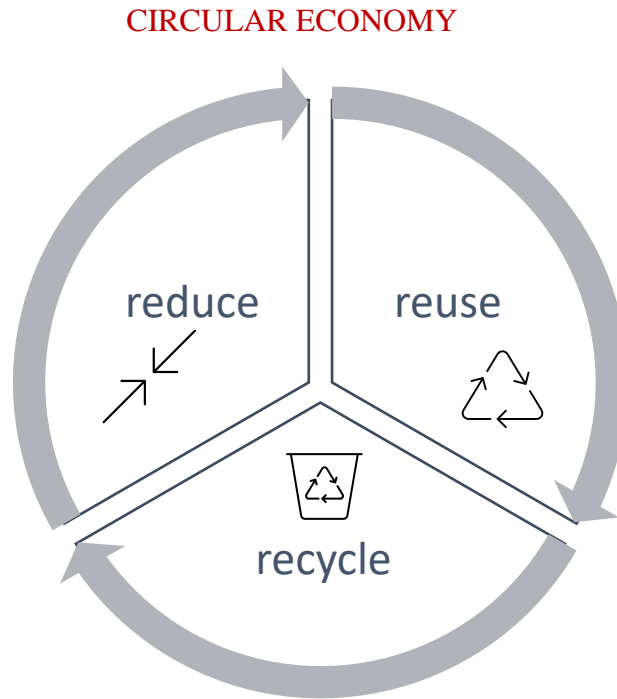


FIGURE 3. Linear vs. Circular Economy (Adapted from Santander, 2024).

Figure 3 shows a simple demonstration of the difference between Linear and Circular models in the economy. In the Linear model the natural capital is extracted to serve the purpose of manufacturing goods which are used and after reaching the end life usually disposed of with no or little material re-purposing or recycling. The Circular model is the opposite with recycling and reusing in focus as well as the minimization of the use of natural capital. According to Santander design, production and consumption are all grounded around sustainability. Energy consumption in manufacturing is aimed to be minimised, and renewable sources must be used as well as non-polluting raw materials. In Circular model products do not have a limited shelf life and are made to be repaired or recycled. (Santander, 2024.)

As opposed to Linear economy that focuses on profitability without considering the product life cycle, the Circular model targets sustainability. The Circular economy may boost competitiveness, encourage innovation, impacts economic growth, as well as create jobs in new areas. It is projected that the circular economy may create 700,000 jobs in the following six years and increase the EU's GDP by an additional 0.5%. (European Commission, n.d.)

3.2 Circulation of products and materials as a key principle of CE

As stated above, the CE economic system aims to minimise waste and maximise efficient use of resources. The key principle under which CE operates is keeping materials and products in continuous circulation to preserve their highest value for as long as possible. Two main cycles in the CE are distinguished, the technical cycle in which processes of reuse, repair, remanufacture and recycle are adopted and the biological cycle in which biodegradable materials are brought back to nature to regenerate it. In the biological cycle biodegradable materials are returned to the earth through previous composting or anaerobic digestion. (EMF, n.d.)

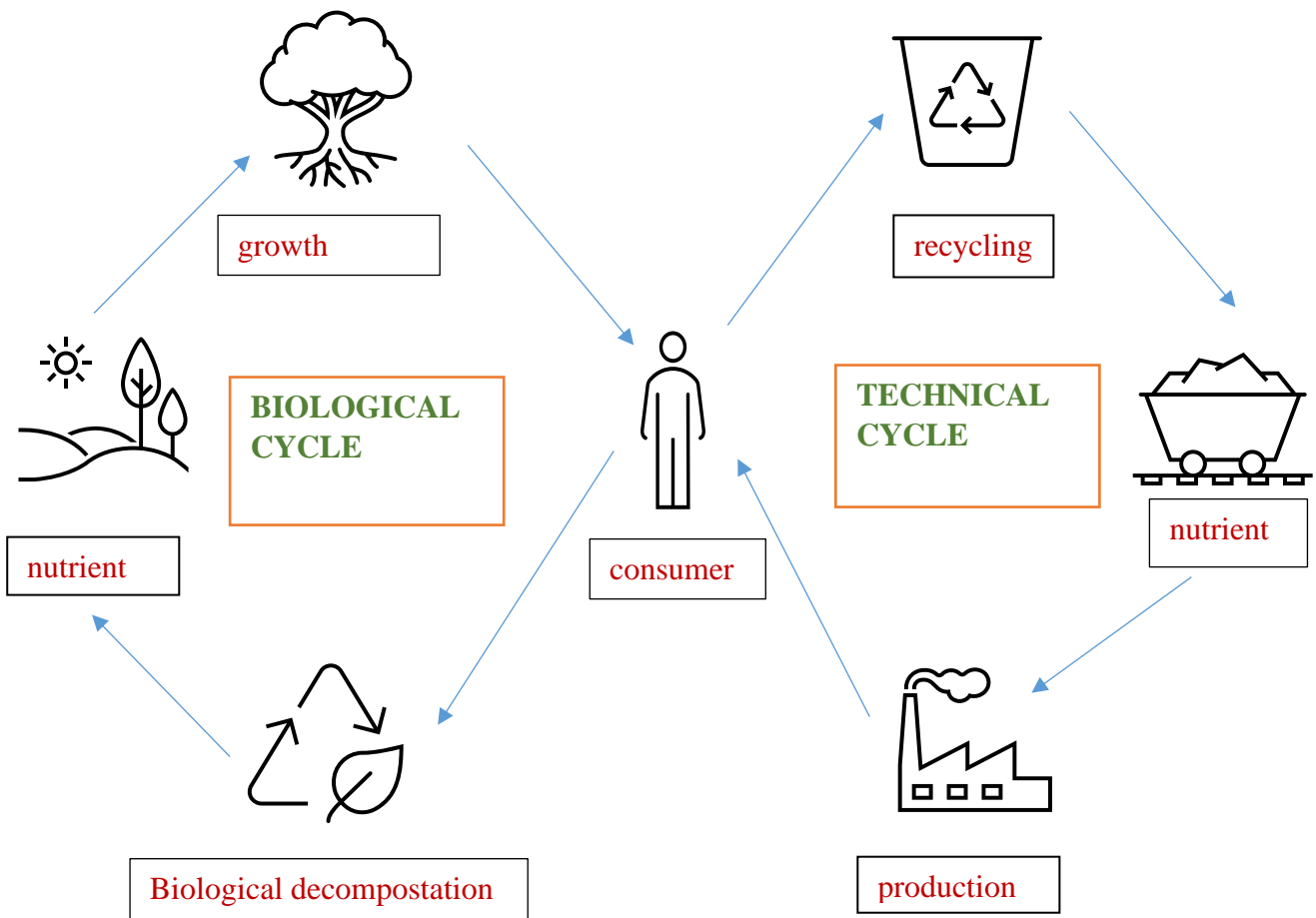


FIGURE 4. Biological and technical cycles. (adopted and available via licence CC BY 4.0).

According to Ellen Macarthur Foundation the most effective way of preserving the value of products is through maintenance and reuse. Technical circle involves a business model of sharing, reuse through

resale or repair and refurbish. When a product reaches the end-of-life cycle, its components can be used in remanufacturing or otherwise recycled.

As seen in figure 4, the biological cycle has biodegradable materials circulated, and since they cannot be reused, they are circulated back to the earth through the process of composting. It is a valuable process for soil because it helps the land to regenerate and nurtures it with valuable nutrients and micronutrients. (EMF, n.d.)

3.3 Waste

In nature there is no such a thing as waste. Everything is naturally recycled. The process is possible because nature knows how to regulate itself within its natural processes. Nature does not need the intervention of people and it is people that often disrupt nature's natural processes. In 2021, industry recycled merely 8,6% of waste, which seems to be a scarily little number if we come to think of that about 90% of what we produce becomes waste. According to the OECD report from 2022 only 9% of plastic waste is successfully recycled, and as many as 22% is mismanaged with the bulk of it ending in a landfill, incinerated, or leaking into the environment. Today in the world plastic waste is twice as big as two decades ago. (OECD 2022.)

To understand better what impact waste may have in sustainability is to look at waste as a new resource. The concept of waste as a resource has major benefits for sustainability. Instead of viewing waste as a problem and burden, it's seen as a valuable resource that can be managed to produce sustainable benefits for various actors. (IME 2023).

According to the European Environment Agency (EEA), Europe is generating too much waste of which not enough is being recycled. Nevertheless, the EU waste recycling has been increasing and for the average of 4,8 tonnes produced by a European citizen yearly, recycled waste in municipalities constitutes for as much as 49%. Despite the fact that the total amount of waste generated in the EU has continued to increase, the share of waste ending in a landfill decreased from 23% to 16% between 2010 and 2020. (EEA 2023.)

3.4 Designing a sustainable product

Sustainability starts with design. The central concept idea behind eco design is to have the minimal impact on the environment while designing a product that offers maximum use. Eco design requires fewer materials and less energy and therefore is also a reason why eco designed products are more attractive to customers. At the same time eco design has a potential to cut up to 50% on product costs and manufacturing if implemented correctly. (Brynton Martel 2023.)

As mentioned above, the creation of a sustainable product starts in the initial phase of its design. According to the European Commission, 80% of climate impact and 90% of manufacturing costs of a product are a result of decisions taken in the design stage. (EU 2022). The design stage impacts manufacturing and material choice. Designing a sustainable product (a circular product) seems to be one of the most important criteria for businesses to consider while planning on the designs of their products and services. Prior to eco-design, industrial design was a manufacturing model for mass production of physical products. It is the most harmful for the environment since there is little or no consideration for circularity at the end of products' life. Eco-design started already in the 70's and as most of the transitions, involved change in system thinking. Circular design is viewed as the future of design because it considers products' positive and negative impacts on the environment in the long term, and in a big picture scope. (European Commission 2022; Circular Product Event 2022)

According to Frans Van Houten, the CEO at Philips: 'If a product is 5% more expensive to manufacture, but in 10 years you get 30% of its value back, then that is a good business case for the company'. (McKinsey 2014). We can conclude that even if a business chose to manufacture a product at a higher cost, in a long-term and big perspective it is a profitable choice for the business to make. For example, opting for bioplastic is more expensive rather than cheap plastic, but looking at the whole system, this choice creates a product life system in long term, and in turn result in creating more value for the company, as well as building its image and brand. (Circular Days 2023.)

3.5 Mission Zero. When 0 becomes something to strive for

According to Our World in Data, addressing CO₂ emissions is fundamental for sustainability and preservation of our planet. Carbon dioxide emissions from fossil fuels are the primary driver of the global

climate crisis, accounting for over 75% of global greenhouse gas emissions and almost 90% of all carbon dioxide emissions. (Our World Data 2022).

Other sources like Global Carbon Project also demonstrates changes in global fossil fuels carbon dioxide emissions in the period between 1900 and 2020 and their charts show that emissions of CO₂ rose to 6 billion tonnes per year by 1950. By 1990, they increased to over 22 billion tonnes yearly. (Greenhouse Gas Emissions, Our World in Data 2022).

3.6 Emission scopes

To measure greenhouse gas emissions, the companies around the world refer to the Greenhouse Gas Protocol as the world's most used greenhouse gas protocol. It is a set of standards and tools developed by the World Resources Institute and the World Business Council for Sustainable Development in 1998. (Greenhouse Gas Protocol 2022). The greenhouse gas protocol measures and assess greenhouse gas emissions within three different sources and scopes. The three scopes are a way of putting into categories different kinds of emissions generated by a company.

Scope 1, sometimes referred to as BURN, covers emissions coming from sources that a company owns and controls directly, those include fuels burned directly, gas in company cars, the heating oil or fuel used to power and operate the company's equipment as well as from assets owned by the company. Scope 2, sometimes referred to as BUY, covers emissions that a company causes indirectly and are associated with things like purchased electricity, steam, heating, cooling. A company consumes them but does not produce them so is not in direct control. Scope 3, sometimes referred to as BEYOND, covers emissions that are the most difficult to measure, they are indirect emissions associated with everything up and down the business value chain of the business, these emissions are not produced by the company itself but instead result from activities needed to support the business operation. There are 15 categories of scope 3 emissions and unless the business does not own physical assets, the majority of emissions are likely to be Scope 3. (Sustain Life 2024.)

3.7 Finland and sustainability

Finland is a Nordic country and together with Denmark, Norway and Sweden have been globally recognized as leaders in achieving the United Nations 17 Sustainable Goals. According to the Sustainable Development Report 2023, Finland has achieved the SDG's indicators and ranks very high in quality of education, health, industry, clean energy, innovative and economic growth, sustainable cities, social care, reducing inequalities and increasing cooperation. (Sustainable Development Report 2023.)

Under the EU climate and energy legislation, the obligations and policy decisions are binding upon Finland too. In July 2022, following the commitment to reduce greenhouse gas emissions by at least 55 per cent by 2030, Finland adopted the Climate Act aiming for considerable reductions in emissions by 2030 and 2050. The emissions reduction is projected to diminish by 60% by 2030, 80% by 2040 and 90 %, aiming at 95 % reduction by 2050, compared to the levels from 1990. According to the new Act, Finland must become carbon neutral by 2035. (Finnish Ministry of the Environment, n.d.).

To additionally support Finnish organisations on their path towards sustainable growth, the Finnish Innovation Fund SITRA operating directly under the supervision of the Finnish Parliament has made its impact promoting CE practices in Finland and beyond. (SITRA 2024). The organisation's focus is on finding ecological sustainable solutions, fair social participation, fair data economy and strengthening democracy and engagement. Only in 2023 100 projects were funded by SITRA within sustainability positively contributing to Finland's economy, innovation, and competitiveness. In summary, Sitra is an organisation that essentially contributes to shaping the country's sustainable economy helping stakeholders in CE growth and development. (SITRA 2024.)

4 RESEARCH METHODS

The research conducted in this thesis poses questions and looks for the answers regarding practices in sustainable development and know-how in Ostrobothnia. It aims to investigate regional companies regarding their level and capability to perform according to the principles of sustainability. Jakobstad regional authorities have shown initiative in promoting sustainability through the organisation of the Circular Design seminar held already for the second time in a row in Jakobstad amplifying the importance of the circular economy that the region supports. Regional organisational leaders underlined the strategy of quality thinking in the region, stepping up for the responsibility with employers who care about their employees, apply long-term thinking with small step taking and organic growth. The regional municipalities stress the importance of cooperation to achieve common sustainable goals. (Circular Design Day 2023.)

Ostrobothnia region comprises five lively communalities that work together to create a place of living for over 50 thousand inhabitants, the region is multilingual and has over years increased integration if compared to other regions of Finland. The bottom-line is that the region has a growing and strong private sector in business with over 6800 companies and of which 80% of them are under 20 employees. It offers 22 thousand places of work and needs more. It is estimated that only in the private sector the region will need about 2.500 new employees in the next 2 years. (Circular Design Days 2023.)

Export value of the region is nearly 2 billion euro per year in the manufacturing industry. The resilience of the region is quite exponential with the share of workplaces in the industry, with a high percentage of manufacturing positions in the region that amount to 23%. The figure is high compared to the rest of Finland, the rest of Scandinavian countries and the rest of Europe. Over the past recessions the region got an upper hand in conquering the negative results of the crisis of 1998 and 2008. The region has officially taken on the path of sustainability and circularity journey about five years ago with its first sustainability project. Since then, there has been a lot done in the subject since that time in both the private and public sector. (Circular Design Days 2023.)

4.1 Valid implications for the research

The study on sustainable practices in the Ostrobothnia region conducted in this thesis, has valid implications for the business development in the region. Sustainable growth and development trends that grew

over past years globally, influence the regional markets as well. Despite many opportunities in the growing sector developing sustainable solutions for businesses, the process of transformation requires fundamental changes in business practices, adopting new regulations, policies and respecting restrictions. To face challenges and step up to new standards, organisations must understand new system principles and successfully implement them into their day-to-day operations. Cooperation among organisations has been identified as one of the most important factors influencing progress is sustainable growth on a regional, national, and global scale.

Ostrobothnia has a considerable number of industries and manufacturing enterprises which makes the region a fit for the research. It gives an opportunity to reveal what the regional businesses know about sustainable practices and what they can share to improve the region's well-being and economy. Among other influential targets in sustainable business is creating opportunities within the green energy sector in Ostrobothnia, which, in consequence impacts Finnish economy, and therefore has potential to become an influential contribution for sustainability in Finland.

4.2 Limitations

To make a significant contribution to questions and challenges in sustainability topics, I aimed at providing robust and ethical evidence to questions posed in this research. Majority of the companies addressed, responded enthusiastically and willingly shared information about aspects and challenges in sustainability in their organisations. Several of the interviewees suggested that I ask difficult and detailed questions, and some of them were not able to respond. They motivated the lack of answer either by lack of existing solution or confidentiality over sharing disclosed information about the company. In addition, some of the inquiries sent to Bothnian firms remained unanswered and information about sustainable practices in those companies remains unknown to me. To extend this study upon sufficient relevant data, I suggest further research and study in Ostrobothnia. At the same time, I consider most companies to have given sufficient information in the subject which positively contribute to the overall knowledge on sustainable economy in the region and in Finland.

Qualitative research is the choice for this thesis, but there are limitations in the chosen method. Qualitative research collects and analyses non-numerical data to understand the social phenomena chosen for the purpose of this subject. It is a time-consuming process which requires extensive data collection and analysis of the findings. Another weakness of this type of research is limitation of the sample size which

may contain representatives which are not relevant to other representatives of the researched population. This type of research can also be influenced by interviewees opinions and biased views of the company and its situation. The interviewee may want to present a good image of the organisation only for example. In case of this research greenwashing comes to mind. Every company wants to have a good image, and operating according to sustainable principles boosts a company's image. Therefore, an interviewee may be prone to expose good practices rather than the bad ones in an organisation.

Finally, a possible shortcoming of qualitative research is that it cannot verify the results or test the validity of the findings. It may also generalise findings to a larger target group so perhaps a quantitative study sample should be considered to provide more accurate data collection.

4.3 Structure of the thesis

The purpose of this explorative research was to obtain information on sustainable practices in the Ostrobothnia region and an insight into the current know-how in the subject. Having this scope in mind, the choice of qualitative research provided an opportunity to discover facts that quantitative data could not do. And since qualitative research enables interviewees to elaborate on their answers and ask additional in-depth questions, it is possible to obtain more information from interviewees. Finally, qualitative research gives more versatile answers and flexibility of adjusting methods and techniques of the data collection.

To answer research questions, different sources to obtain information have been used. First, a comprehensive literature review has been conducted, focusing on the elements of sustainability in the organisations. Secondly, seven interviews with representatives of Ostrobothnian companies were conducted revealing their preparedness and know-how in the sustainability theme. Eventually, the findings were gathered and analysed to evaluate the outcomes of the research. One of the major successes of this thesis has been the ability to define clear goals and targets for companies' sustainable objectives.

The thesis narrows focus on the technological, innovative, and methodological methods implemented by companies in Ostrobothnia, and it has been researched through personal interviews carried out on seven companies and organisations. The information gathered in interviews has been provided by companies and organisations' representatives to serve the purpose of final analysis and assessment in the

subject of sustainability, know-how of solutions at hand, and the ability to resolve challenges in the subject.

5 RESULTS AND FINDINGS

Major concepts and principles underlying sustainability from the global perspective, importance of the circular economy in Finland with a narrowed review of sustainable practices and know-how in the Ostrobothnia region are addressed in the explorative research of this thesis. To thoroughly examine the current stage of preparedness of Ostrobothnian companies to operate sustainably, informative opinions were gathered from companies' representatives and experts. Furthermore, information about sustainable practices and current progress in circularity of the Ostrobothnian organisations were gathered during Circular Economy Week in Jakobstad on the 23rd and 24th May 2023. The research findings largely answered the research questions posed in this paper. Qualitative method was chosen as the most suitable to support this thesis. Explorative nature of the research aims to provide deeper insight into regional business know-how and implementation of sustainable practices by businesses in the region. Challenges and limitations in obtaining full circularity and green ecosystem were addressed. All but one interview was conducted in Jakobstad personally. One interview was conducted via Microsoft Teams. None of the interviewees asked for anonymity, on the contrary, all respondents agreed to disclose their names. All interviewees were asked the same set of questions (APPENDIX 1) and were further supported by additional questions related to individual company business specifics in relation to sustainability themes. All interviews were conducted in 2023 between April and May 2023. All information included in this research was agreed to be included in this paper. The analysis of answers is discussed, and findings are included. At last, further recommendations for future research are included.

5.1 Research questions

In line with the theme of this thesis, questions related to sustainability practices and challenges in the Ostrobothnian region have been asked and responded by six companies' representatives:

RQ 1 what sustainable practices and methods does your organisation use today, how do you integrate them in your sustainability policy?

RQ 2: What are the main outcomes within sustainable development policy your company achieved so far and what are those you aim at achieving in the next decade.

RQ 3 What are the biggest challenges that stand in the way of your organisation to be a carbon neutral organisation in the future.

Detailed analysis of the research answers led to the following findings and answers.

5.2 RQ 1. Sustainable practices and their implementations

For a company that manufactures packaging materials, a product that has been considered one of the least favourable for the environment, the implementation of sustainability starts with circular thinking. According to the manufacturer representative, the critical requirement to be able to operate sustainably comprises the use of renewable materials only. The company uses about 75% of renewable materials in production now. The rest of the raw materials used are mainly fossil based. To operate under the principles of sustainability the use of FSC or PEFC certified papers has been adopted and followed. Another practice is prioritising “green” suppliers when buying raw materials, i.e. suppliers with high environmental profiles. Finally is the choice to engage and communicate with sustainability professionals for guidance and support. This is a new and latest practice we engaged in.

The second interviewee explains that implementation of sustainability in their company takes place on the management level and is part of the business strategy. As part of sustainability policy in the company, 50% of recycled polypropylene, the material used in manufacturing of their products, was introduced, but 50% in the production process of our products is still a virgin raw material.

The third interviewee described their company’s transition towards sustainable practices took place in 2017 and was principally a transition to 100% renewable energy sources. Some other examples of practices include: the Life-Cycle Assessment process, the active implementation and search for new recyclable materials, as well as the increased use of energy-efficient technologies. Another practice was to incorporate recycled ABS plastic in the production of their spoke protectors, which allows for up to 90 percent reduction in greenhouse gas emissions compared to similar virgin raw material. They have also completed their first Life-Cycle Assessments which measure the environmental impact of the life cycle of three of their products. The Life-Cycle Assessment (LCA) is meant to analyse every stage of a product’s life cycle, including the extraction of raw materials, the manufacturing of a product, the use stage, as well as the end-of-life phase and what happens to it after it is no longer in use. In addition to this, the company started using two new, more sustainable raw materials in production, while at the same time researching and testing other recyclable and biodegradable solutions, as well as installed three energy-efficient injection moulding machines. In terms of social responsibility, the company has been actively and regularly monitoring their staff well-being as part of the Healthy-at-work

Project, promoting cycling culture through their Bike. More initiative, as well as enabling a hybrid model of remote work. In addition to this, the company has rebuilt their offices with the aim of inspiring collaboration among employees.

The fourth interviewee nominated digitalization of a company's activities as the first thing among sustainable practices that their company implemented. Secondly, implementation of the shared economy principles: renting instead of buying. The workers contracted at that company get working clothes and consequently give them back. This enables circulation processes of the used clothes which after being used are returned to the organisation and reused till the end of their utility or end of their life cycle. The next practice adopted by the company is the choice of leasing manpower instead of permanent employment, which caters for customers' needs and is based on customers' needs. The company relieves the employment obligation from customers, and therefore this model also has critics depending on who is judging. The company itself claims that from the perspective of human resources' sustainable distribution, it is a very sustainable model for organisations. It also is for the workers who can get seasonal work, execute it, and move on to the next project. The company representative informs about a smart way of managing tools which are purchased only if needed. The purchase with an efficient thinking mindset and focus on the efficient solutions is a regular practice.

Finally, the approach towards well-being of the workers contracted by this company is the final practice that the organisation engages in. It is caring for people's well-being and care to keep a good relationship with them that matters. Well-being getaways are organised hoping to create a sense of unity and belonging for the people.

Importance of the shared economy is crucial within the next interviewed organisation. The company implements it in the way that instead of selling their trailers, they rent them. This practice is aimed to satisfy short-term needs of the customers, in this way a customer not interested in buying and using the trailer long term, may have use of it too. Another practice that the company holds on to is providing 10 years guarantee for the spare-parts, the interviewee suggested that in practice it is 20 years of guarantee. Giving a long-term guarantee for parts is a very important practice according to the company's representative because it assumes the responsibility by the organisation to keep the vehicle in operation for much longer. Another practice in the company is buying old or used trailers and reselling them in the second-hand market.

The fifth organisation interviewed has highlights in recycling and circular economy in the region of Bothnia as well as big advantages in sustainable movement. This company was interviewed for the purpose of finding out how the recycling processes are handled in the region of Bothnia. The company has a long track record of being a progressive company within recycling and circular economy. It has built an infrastructure for collecting waste. Another thing is that the company's responsibility is to handle the information flow about how to recycle waste at home as well. The process of recyclability of waste is catered for on several levels: the combustible waste is crushed by the company's own means and delivered to the power plant, on the other hand most waste received is delivered to partners for processing. Since the company's competence is mainly in collecting the waste, dealing with the infrastructure of the waste management, and delivering it as clean as possible to the partners, it is implied that the company operates to keep the circularity of waste going. The responsibility is also for the communication around the waste processing and towards the households. According to the interviewee, sorting is done well judged by the experience at the company's premises.

5.3 RQ 2. Outcomes within sustainable development policy

Within the outcomes of the first company interviewed, a considerably improved recyclability of the materials was achieved, new repulpable, water-based coatings with better recyclability were made and is one of the results of sustainable practices introduced in the manufacturing. Other than that, the company uses new types of compostable biopolymers. Main sustainability goals include the use of responsible raw materials, i.e. materials either recycled or renewable materials and 100% recycled or certified fibres. The next goal is GHG emission reduction in line with science-based targets, as well as 50% emission reduction by 2030 from the 2021 baseline. The goal would be a zero-waste future: 100% of the products will be either recyclable or compostable, or both, by 2030.

The second interviewee explained that the company's carbon footprint index has decreased by 23 percent from 0,32 in 2019 to 0,25 CO₂e/€ which indicates a relative reduction of gas emissions and a significant outcome of sustainable practices implemented in the organisation. This implies the Scope 1 emissions – direct emissions from own activities that the company owns or controls directly – amount to just 5 CO₂, which is a relatively small amount compared to the indirect, uncontrolled emissions within Scope 3 (7826 t). Yet the best score in terms of carbon dioxide emissions is in the Scope 2 category (indirect emissions from the production of energy that the organisation purchases or generates) which amount to zero. This organisation's Scope 1 and 2 emissions are minimal and jointly constitute

only 0.06 percent of their total carbon footprint which is a great outcome of sustainable practices. In the future, the company aims to enforce human rights regulations to improve the treatment of workers by documenting ethical requirements in production. One of the accomplishments made by the company in social responsibility was getting ISO 14001 certification; another was choosing to work with renewable energy sources and taking account of capturing their carbon footprints. The company also set itself a goal to become certified with Health & Safety ISO 45001. Finally, they want to support their suppliers in their quest for improved ethical compliance through performing ethical audits.

The following company is a work agency and since it operates mainly with manpower, it focuses on people. The company provides the opportunity of working to people. Employment and the ability to make income is one of the foundations of well-being. Along with employment the company organises physical health days and mental health days for their workers to encourage and promote a healthy living style. The organisation supports a charity and voluntary cause for the purpose of saving ringed seals which is an endangered species. This is also important as we put out there a positive impact on natural life.

The fourth interviewed company uses only renewable sources of energy. In scope 1 and 2 the company is on 0. As a result of sustainable practices implementation, the company started a new project with Business Finland that is to help the company towards full sustainability in the future. The company decided to work with Ecobio in Helsinki to guide them through the practices of measuring the carbon footprint of the organisation. In terms of the 17 sustainable goals issued by the UN, the company has achieved full satisfaction in the 3rd goal: good health and well-being of the employees, and in scope the 4th goal in educating their employees.

The fifth company interviewed reports a good outcome of 3% of all the waste processed in Bothnia ending in landfill. The 3% constitute: isolation materials, glass-fibre materials, asbestos, and ground dust waste. An area in the neighbourhood of Kokkola is proposed for the landfill. It is a completely isolated area from beneath, there is no spill into nature, the rainwater is collected and cleaned before going back to nature, when the landfill is filled up to a certain level, and it is measured every year, it is then covered completely and waterproof from above. The most harmful materials like paints and lubricant oils are recycled and from the point of sustainability are not the worst in managing because they can be used in the chemical industry many times. Non-recyclable materials, like those from boating industry waste in Bothnia, are firstly attempted to be reused, ex. glass fibre in different ways, the final waste that wasn't possible to be reused end in landfill. The results are 47% of all waste is a recycled

waste in Bothnia. 50% is recycled as energy (burned in the powerplant), mostly UPM here is a partner and energy delivered from it is used in heating pumps for the city to deliver heating in the communal buildings. Burning of combustible waste is done in a power plant in Vasa. It is used by us because it is exclusively designed for treating combustible waste (Westenergy powerplant). Alholmens Kraft in Jakobstad doesn't have any cleaning methods or filters for burning. Westenergy specialises in that, so it is used for those purposes.

5.4 RQ3. Challenges in sustainable operations and growth

One of the challenges of the first company that was interviewed is the cost of sustainable raw materials (recycled and virgin) which can be more expensive. One of the main challenging questions in relation to a company's customers is if customers are ready to pay more for the product made of more sustainable, recycled materials. As in the end it is the customer that pays for it, the company that manufactures, has to charge the customer for the additional costs perhaps and the end customer pays more effectively too. Another question that poses a challenge is availability of all new and more sustainable raw materials, and if there is a risk of their shortage. It is an organisational challenge to secure the sourcing of these materials. Yet another big challenge could be reducing the company's carbon footprint. Main part of the company's CFP comes from raw material production and as a raw material producer this responsibility belongs to suppliers. The question that arises is whether the suppliers can reduce the CFP enough and contribute to our targets. Finally, further challenges include the adoption of all new regulations like for example the new coming PPWR (EU packaging and packaging waste regulation) and adoption of the requirements of the investors that own the holding to which our company belongs. As to how the company will develop and what the future company plans are, for example energy supply, ex. green electricity, etc. and information related to that is confidential.

The second interviewed company reports challenges that recycled material poses in manufacturing because recycled material behaves differently from the virgin material. Recycled material also has different specifications than the virgin. Since the interviewed company makes water traps, the risk of a leakage arises that the product may cause in the end use. Another challenge in closing the loop in post-consumer plastic. The company wonders how to follow what happens with it as well as what happens with post industrial scrap.

The third interviewed company considered the most challenging aspect of the transition to complete carbon neutrality the reduction of the environmental impact caused by the materials purchased and used in manufacturing. To combat this challenge, the company sets itself to increase the share of recycled and biodegradable raw materials through close cooperation with both its customers and suppliers in search for more sustainable solutions. It aims to focus on finding new, alternative raw materials, either recycled or biobased. There are many options available, but the challenging part is that not all are suitable for products made by the company. The material of which the products are made must fulfil all safety and quality requirements, meet durability expectations on the final product, and be available in sufficient quantity and for a reasonable price. The raw material's carbon footprint naturally must be lower than virgin material, and suppliers need to have documentation ready to prove carbon emissions of the material. The company has already found some materials and made changes to their products, but it was just a small step considering their broad product portfolio and number of raw materials required. Enough resources to work on this matter is essential, and something that needs to be prioritised even more. Another challenge is to bring their end-of-life products back to life through remanufacturing. Particularly, the company does not have the technology and resources to reuse the material that could be potentially retrieved from parts that are no longer used, nor do they know how to encourage the customers to bring back the parts in the first place. In addition to the lack of technology, there has been some resistance in the company to further research into this area, perhaps because the company does not sell the final product, a bicycle in this case, but a component, hence it is very complex to engage the final vendors to ask the customers to bring their used components or whole bicycles for disassembly. During the interview, it was mentioned that there was one customer who indeed collected all the used parts and components and delivered them to the company for processing, but as it turned out, some of the parts were clearly not produced by their company. In the end it was impossible to sort the parts and decide what to do with them afterwards. One of the solutions to consider would be sending them to a 3rd party facility to regrind and recycle the products for the next life cycle. Well, these and others are a few major problems that the company faces in their struggle for a fully sustainable operating facility. Currently, the company is closely collaborating with Kierrätyskeskus to come up with a recyclable material suitable for future remanufacturing. In the challenge to close the loop, there is a question of how their products could get a second life. Bicycle components could get recycled into something else but how to do it and how to employ this change into a real-life scenario is one of the major questions posed by the company. Another aspect is that they hope to see an infrastructural change within waste sorting in the EU. A bigger plan and a new infrastructure for the European waste management program.

Apart from the above, the company is also facing a challenge of deciding on which type of standard they should report their sustainability matters according to. Should they learn more about GRI (Global Reporting Initiative) and is that suitable for the company. Lastly, how can they best implement software for making Life Cycle Assessments. The question posed in the topic was if Simapro or other software be considered. The company will have to assess resources that are needed for this and find a way to appropriately employ them.

The following interviewee reported the challenges in practical aspects, and they were related to working clothes. It sometimes poses mistakes in sizes of clothes that do not correspond to the needs and problems of complaints arriving at them.

The biggest challenge though seems to be a debate with the Unions who protect workers' rights. They have been debated now and questioned as to how serious this challenge is. It is a subject to further discussion and resolution in the future. Depending on if the case is viewed from workers or employers' point of view, the perspective is different and produces different conclusions.

The next interviewee's biggest challenge is reported to be materials used in production e.g.: scope 3 emissions.: steel, aluminium, glass-fibre are. These are not sustainable materials and pose the biggest challenge for the business in reaching sustainability goals.

The sixth's company challenges are many. They are expected to deliver results within aspects of recyclability and sustainability which is a challenge as well as a positive thing. People sometimes think it is difficult to deal with recycling the way it is recommended by the company. Recycling starts at home, so the basis is structured in the way that people sort waste in the place where it is produced (i.e. at home). The challenge is to make people act according to how it is recommended by the organisation. It means that it is a lot up to people how they sort out their waste. If it is not done properly by the people, the waste is viewed as 'dirty waste' and hard to separate forward in the chain. If the waste is sorted correctly where it is produced, it is viewed as clean waste at the station thus easier to recycle and move forward the chain. Another challenge ahead is posed by power companies that are building more windmills of which wings are glass fibre composites. Since the lifespan of windmill wings is 30 years, it means that in 30 years there are going to be a lot of composite materials to sort. It is a big challenge ahead of the company. It is understood that the cost of green energy is quite high, ex. concrete used to build which poses a serious question if there really is a green way to do the green energy. And if there is, then how to do it as there always are downsizing, not only the composites but concrete that takes even more energy to produce than the composite wings. As to types of materials that are absolutely the

most challenging is leather (furniture with leather parts). They pose extremely big difficulties in recycling, so they are burned. Leather is always very difficult to process.

One more challenge, perhaps the biggest challenge is in communication, and how to make sure that the company really is sustainable. The company relies a lot on transportation to and from places with waste so there is the transportation challenge. In recycling in the Ostrobothnia region, the results reflect the GAUZE curve which is the highest in the middle. It means that on one far end, people who represent this part of the curve are doing extremely well when we look at their willingness to recycle and to live a sustainable life. On the other end there is a small part almost equivalent in numbers to the first group on the curve that does not care at all. In the middle of the curve, there is the biggest group that wants to do the right thing, and they mostly know what to do but they don't do it. In this group there is a gap between knowledge possessed and acting according to this knowledge. This gap, perhaps, is the true reason why we are not able to transform to a fully sustainable society. We have the knowledge already for 15 – 20 years and we still are not a fully sustainable society.

The following challenge is communication with the whole society, as it is the whole society that is our customer. Some of them are not willing to adjust to changes, they don't want to change their ways and customs, are afraid of changes or don't have the energy to do the change or do not care. The challenge is to communicate the right way to the group of difficult customers. Another novelty and yet another challenge is for the company to put in operation this summer paper bags for organic waste. The organisation met with a strong opposition especially from men above 60 years old. The main objective of the paper bag for organic waste is to get rid of plastic from biowaste. It has been recommended for the past 5 years but the change has been very slow. The analytics are low and amount to only 10 to 15% of biowaste packed in paper bags. With that comes a risk most afraid of, e.i; that the biowaste will end up in combustible waste. This is being put to analysis and will deliver first results next spring. There is a serious concern that the quality of sorting will go down. Sometimes landlords do not put out the regulations on visible places to read about. They receive free materials from us and sometimes they just give a negative answer that they think won't work.

The biggest negative minds to conquer and try new ways of doing it are men over 60 years old. They did not try if paper bags for biowaste does work, they just say that it won't work. Other challenges and possible solutions are for example posed by the textile industry. When textiles come to our station, we recommend that people first consider giving away for charity purposes, second hand stores, or fixing the clothes. The one instruction about garments from a sustainability point of view: use the textile you

have. Eventually when we have torn textile that can't be reused then bring it to our station. Last alternative is if it is torn and dirty to put it for combustion. HM burns clothes, new ones, if they don't sell them.

Clothes made of plastic are a challenge also because of microplastic problems. Biowaste comes to the plant, it is crushed and they do biogas. Soil gets plastic in the end and plastic is soft, so it goes through, therefore we try to eliminate plastic from biowaste processing. Plastic is a scary thing because we are so dependent on it. We have to change day-to-day habits and it is difficult as people don't have energy for it.

5.5 Interview with an unanimous representative of a public organisation

This interview is meant to share the insight on Bothnia's renewable energy plans that aim to render the region more green sources and bigger capacity. Since there is a plan to build offshore windmills parks in the region and the plan consists of building many of them, it has a serious implication for the region in terms of environmental, social and economic aspects. The OX2 plan- offshore windmill farm is to be about the biggest in the world and is planned to be built about 30 km from Jakobstad, offshore, between Finland and Sweden. Sweden has many of these types of projects, so we observe a hype going on with offshore wind farms. And because they produce a huge amount of energy, different companies could make use of it for making hydrogen (gas) used as a fuel. From hydrogen a synthesised fuel can be made and used ex. for the ships. As it is a gigantic project coming ahead, of which the financial plan could be to invest even 1 billion euro in Kokkola region, it implies serious and many consequences for the entire region. Currently, there are 3 companies competing outside Jakobstad to build those farms.

From a sustainability point of view building an offshore cluster of wind farms entails consequences of different aspects. Depending on how we look at this venture, it is not good for the environment, because windmill structures are enormously high constructions, higher than Eiffel tower. There are about 150 of these constructions to be built in the OX2 windmill farm, therefore there is first and extensive research conducted in the matter. The research encompasses aspects related to building foundations for these structures, ex. which soil and other aspects. The investors are hoping to start building in 5 to 6 years from now if the research and preliminary conditions are fulfilled. If the projects continue, they are estimated to be worth around 7 billion euro only in the Ostrobothnia region. The government, and

the EU has started putting big financial funds into green energy, so it suggests that there is a big financial potential in delivering the green energy projects.

The Finnish government may see it as a good opportunity for the economy, because a lot of cheap energy means interest for a lot of companies to invest. It poses a big opportunity for the region to grow and develop industrially because companies will be attracted to build by means of 'green' steel and green other materials etc, the pressure on export in the energy, most of which is expected to be exported to Germany is another opportunity.

A possible challenge is how to tax the entire operation as OX2 is partly Swedish, and other foreign investors. The farm is far out in the sea, in Finnish jurisdiction area, but not in Finland, ei out of territorial water of Finland. The Finnish government's understanding is that the companies are not to be taxed much, so it will be cheap for companies to come in business operations in Finland. The benefit for the country and the entire region would be huge economically, because creating cheap energy means creating economic opportunities for industries to come and produce in Finland. In historical background, Finland has always had cheap energy, provided by Russia and Sweden and the country still also has nuclear power, five active stations.

Windmills farms pose challenges of other types too. For instance, wind power in windy conditions produces a lot of energy, and the price of energy is low. Nevertheless, no wind means higher prices and less energy produced. Prices will fluctuate from cheap to more expensive depending on the weather conditions. In Finland there is 4000 MegaWatts of wind energy and for a few weeks ago it produced only 30 MegaWatts. So, it is an unstable source of energy.

There are many debates ongoing about fossil free instead of only renewable sources of energy. The EU policy focuses and supports only renewables, and it seems not enough. What is left behind is nuclear power that is not supported because of ideological reasons. But because fossil free is solar, wind and nuclear energy, and wind and solar energy is not able to provide energy backup as there is no storage for the renewables, the EU does not support nuclear of course, we are confronted with the serious challenge to meet the needs of energy demand. The problem with the current energy system is that we will need more nuclear power in the future because the reliance on renewables is not going to be enough.

5.6 Implications for further study and research

Research conducted on Bothnian companies led to the conclusion that there is a need and will to follow the path of sustainable growth and development by organisations. Bothnian companies acknowledge to make effort in implementation of sustainable practices in their organisations. Despite that not all industries are operating only according to sustainable principles and not all organisations know how to solve problems related to sustainability. After having conducted the research and analysis of the findings, based on the information I gathered, I recommend further and deeper study of organisational challenges and possible solutions to them. In individual case studies and through analysis of individual organisations challenges, a more accurately directed action may be suggested to implement across the organisation.

Deeper investigation of sustainability, practical solutions in the subject as well as further research conducted in case studies, may lead to answers and solutions useful for companies. Sustainable practices if efficiently embedded in organisational operations can lead to improvements in running the businesses and in the end benefit the Finnish economy. Circular business models and green energy have become a global trend that keeps on evolving, therefore, the need for further exploration of sustainable technologies, guidance on how to successfully implement policies supporting circular transition and innovation. Moreover, transformation of the economic system and the way we think is the challenge ahead of future generations as well. Closing the loop in the circular model is a challenge that needs further explorative solutions. I recommend based on the accumulated evidence in this paper, that for an important topic like sustainability, further studies are carried out to benefit the Finnish economy, its people, and the environment.

6 CONCLUSIONS

The aim of the thesis research was to examine and evaluate the level of preparedness and know-how of Bothnia companies in sustainability and sustainable practices implemented by their organisations. Circular Economy and Renewables implementation in business operations with regards to Scope 1, 2 and 3 were considered while performing this research. This research also explores the major challenges as well as opportunities that companies face while transitioning to sustainable models of doing business. Major barriers and limitations in operating sustainably were discussed with interviewees. Furthermore, possible solutions and business opportunities were addressed and investigated. The thesis reflects on broad and complex aspects of sustainability, the core principles that drive sustainable growth of the society on our planet with respect to nature and human equity. The interviews answered the research questions to a greater extent.

To summarise the findings of the thesis, organisations in Ostrobothnia acknowledge a consistent interest in sustainable practices and implement to certain degree sustainable solutions and available technology in their operations. Circularity as a valid and inseparable element of sustainable growth and development is widely addressed. Many companies are looking for alternative, more sustainable solutions to improve their results within sustainability performance. Circular Design Days in Jakobstad demonstrates the will of the city council governance to support the quest for sustainable and circular economy in the region of Ostrobothnia. Even though circularity has been a widely acknowledged concept, there are questions as to how much green economy really is green and to how much greenwashing may be taking place. In the broad circular model analysis and its brilliant ideas, it is needed to acknowledge limitations of current systems and that transition to more sustainable models requires change of thinking and adopting a new mindset. At our disposal are already green technologies and enough sustainability know-how especially in the clean energy sector. Unfortunately, the results to create economic and social equity, while preserving the natural environment and limited natural capital, do not meet the standards of a fully sustainable society yet.

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APPENDIX 1

Table 1. Interviewees

<p>Interviewee 1</p> <p>Jan-Anders Fagerhed</p> <p>Position: Technical Service & Development Manager Barrier Lining</p>	<p>Walki Oy.</p> <p>Company manufacturing packaging</p> <p>www.walki.com</p>
<p>Interviewee 2</p> <p>Position: Camilla Wikman</p> <p>Position: Marketing and Communication</p>	<p>Oy Prevox Ab.</p> <p>Company manufacturing water traps</p> <p>www.prevox.com</p>
<p>Interviewee 3</p> <p>Sari Noromies</p> <p>Position: Sustainability & Operational Excellence Developer</p>	<p>6.1 Herrmans Bike Components</p> <p>Company manufacturing bike components</p> <p>www.herrmans.eu</p>
<p>Interviewee 3</p> <p>Daniel Asplund</p> <p>Position: Sustainability and Aftersales Manager</p>	<p>Ekeri Oy</p> <p>Company producing transport equipment, primary trailers and providing other transportation solutions.</p> <p>www.ekeri.com</p>
<p>Interviewee 4</p> <p>Pia Granqvist</p> <p>Position: Publicist, Spokesperson for Ekorosk</p>	<p>Ab Ekorosk Oy</p> <p>Company sorting waste, distributing waste further to contractors that utilise and combust.</p> <p>www.ekorosk.fi</p>
<p>Interviewee 5</p> <p>Inessa Kivikangas</p> <p>Position: HR assistant</p>	<p>Saimaan Työpalvelut Oy</p> <p>Recruiting company, offers jobs in industrial and construction areas in Finland.</p> <p>www.saimaantypalvelu.fi</p>
<p>Interviewee 6</p> <p>Independent representative of a public organization.</p>	