

THE ROLE OF SMES IN THE TRANSITION TO A CIRCULAR FOOD SYSTEM

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ABSTRACT

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The role of SMEs in the transition to a circular food system

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Abstract

The main aim of this master's thesis is to study the role of small and medium-sized enterprises (SMEs) in the transition to a circular economy. In particular, the aim is to understand the views of SMEs operating in the Finnish food system, the views of Finnish experts in the circular economy, and also how SMEs can practically better adopt circular economy practices. In order to do this, ten interviews have been carried out to understand the views of managers of six Finnish SMEs in the food system, as well as four Finnish experts in the circular economy. The results show that SMEs, especially those with the circular economy embedded at the core of the business, can play a significant role in the circular transition as disruptors.

Keywords

Sustainability transitions, circular economy, circular food systems, SMEs

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1 INTRODUCTION

In the first chapter of the master's thesis, the background of the topic as well as its importance will be discussed. Moreover, the three research questions will be introduced and the research structure will be summarised.

1.1 Background

Food production and consumption present different types of challenges that comprise social, environmental and economic aspects. These challenges are only expected to get bigger in the future due to a projected increase of the global population (United Nations Department of Economic and Social Affairs UN DESA, 2017), so solutions have to be found as soon as possible. Circular economy, which is a system with the purpose of closing material loops, can bring many benefits throughout the whole food system: from food production to food consumption and waste management (Jurgilevich et al., 2016).

In addition to this, recent global events such as the covid-19 pandemic, consequences of climate change and geopolitical conflicts such as the war in Ukraine are increasingly putting pressure on food systems. In fact, during the covid-19 pandemic, many of the challenges of food systems such as avoidable food waste have even grown in some areas (Gravis, 2020). The war in Ukraine is also said to be fuelling a global food crisis by provoking very significant price increases of basic foods such as cereals, oils, dairy, meat and sugar (Bankova et al., 2022).

Small and medium-sized enterprises (SMEs) have always been and still are the backbone of the European economy (Eurostat, n.d.) and an increasing number of them are adopting circular economy practices. In particular, Finland, which was one of the first countries to adopt a circular economy roadmap (Sitra, 2016), counts with multiple companies that hold best practices of circularity (Kulmala & Lehtinen, 2021). However, the circular economy is still recently new and a significant share of SMEs are not familiar with it yet (Russel, 2014).

A transition to a circular economy is therefore needed and this, as all sustainable transitions, needs to take place at three different levels: the regime, landscape and niche (Schot & Geels, 2008).

1.2 Importance of my research topic

The scientific motivation behind this thesis is that since the circular economy is quite a new topic, there is not a lot of research about it in the Finnish food system. In particular, there is not much research about the role of SMEs in the transition to a circular food system. As argued by Heshmati (2017) and Bozkurt et al. (2022),

the role of small businesses and entrepreneurs who act as “key change actors” has largely been overlooked. Therefore, this thesis could be meaningful for the existing research gap.

Regarding my personal motivation for this research, I am personally very interested in the concept of circular economy as I think that it is a necessary shift our societies have to make if we want to solve many of the global sustainability challenges we are currently facing. Additionally, the food industry is also interesting to me as it implies a lot of environmental issues, but it is also one that we all (at least should) consume every day, and it also involves social issues such as hunger or food insecurity. Therefore, this is a topic that affects all worldwide population and although issues are different everywhere, we all have in common that food is essential to us, and it is a natural resource that we all need to protect.

The geographical context of this study is Finland because that is the country in which I studied my master’s programme for two years, and I saw some of the problems that it has in terms of food. For instance, I noticed that most of food you can find in a grocery store is cultivated and produced in other countries, either European countries or from other continents. This makes prices be higher than in other countries which are more self-sufficient such as Spain, but still a lot of food is being wasted in homes and restaurants, as I could see first-hand. However, Finland is a country where there are a lot of innovative ideas and during my master’s programme I got to know a lot of companies that are working to make the food system more sustainable, and this is why I decided to write my master’s thesis in this topic.

1.3 Research questions

For this study, three research questions have been developed:

1. How is the role of SMEs understood in perspectives of SMEs’ managers in the transition to a circular food system in Finland?
2. How is the role of SMEs understood in perspectives of circular economy experts in the transition to a circular food system in Finland?
3. How can circular economy practices in SMEs be more effectively implemented?

Therefore, on the one hand, the first two research questions have a theoretical lens and are related to transition theory which will be discussed in the following chapters. On the other hand, the third question seeks to find practical answers such as what the challenges faced by Finnish SMEs are, and what opportunities or best practices of circularity can work best for SMEs.

1.4 Research structure

The main aim of this research is therefore to find out what is the role of SMEs in the transition to a circular economy. In particular, the aim is to understand the views of SMEs operating in the food system in Finland, the views of Finnish experts in the circular economy, and also how SMEs can practically better adopt circular economy practices. For this reason, this thesis is going to analyse what are the perceptions of managers of Finnish SMEs about the role of SMEs in the transition to a circular food system in Finland. Additionally, the views of other experts in the field are going to be considered with the aim to understand what SMEs can do in that direction.

This study is comprised of six more chapters. In order to give context to the topic, the second section will discuss food systems and their sustainability impacts (social, environmental and economic), and will also provide a discussion about the specificities of the Finnish food system. In addition, a first introduction to Finnish SMEs will be provided. In the third chapter, the theoretical framework of the study will be presented. First of all, the concept of circular economy will be discussed, followed by the explanation about the theory used in this study which is transition theory, and how this has been applied to circular economy studies previously. Afterwards, the role of SMEs in a circular economy will be discussed, and finally, a short literature review of how SMEs' role in the circular economy transition has been studied in food system before will be presented.

In the fourth chapter, the methodological choices of this research will be argued, including the choice of following a qualitative research approach and the type of data collection and analysis selected. In the fifth chapter, the results of the analysis will be presented, and every subsection will provide an answer to each of the three research questions. Finally, the sixth chapter will provide a practical and theoretical discussion of the results, including study limitations and ideas for future research, and final conclusions will be presented in the eighth chapter.

2 RESEARCH CONTEXT

In this section, the context of the study will be discussed. Since this paper focuses on the food system, different definitions and implications of the concept will be analysed. Additionally, the multiple economic, social and mainly environmental impacts of food systems will be exposed. Finally, there will be a subchapter for the specific geographical context of the study, which is Finland. The Finnish system will be analysed, including how the concept of sustainable food system has been discussed in the Nordic country. Taking into consideration the aim of the study, the composition of businesses in Finland will be evaluated.

2.1 Food systems and their sustainability impacts

The Food and Agriculture Organization of the United Nations defines food systems as the different actors and their activities in the production, aggregation, processing, distribution, consumption, and disposal of food products (FAO, 2018). These can come from agriculture, forestry or fisheries, and parts of other environments in which they are found. Sustainable food systems, in particular, are defined by FAO as those that provide food security and nutrition for all in a manner that does not compromise food security for future generations, i.e., in an economic, social and environmentally sustainable way. This is translated to them being profitable, bringing various benefits for society and having a positive or neutral impact on the natural environment.

Nonetheless, food systems nowadays face multiple challenges globally associated with food production and consumption, comprising environmental, social and economic aspects. Currently, between 720 and 811 million people around the world are undernourished, which represents 10% of the global population (FAO, 2021). Moreover, more than 2.3 billion people have no food or are unable to eat a healthy balanced diet on a regular basis (UN DESA, 2020). Recently, the covid-19 pandemic has worsened the situation, as between 70 to 161 million additional people worldwide have suffered hunger as a result of this. In the future, these numbers are expected to increase even more due to, for instance, an expected increase of global population to 10 billion people, climate change or biodiversity loss. In fact, the Food and Agriculture organization of the United Nations states that by 2050, the only possible way to feed everyone will require a “radical transformation” of the food system (2022).

Apart from food insecurity and malnutrition, global challenges related to food also include diverse environmental issues. For instance, greenhouse gas (GHG) emissions, eutrophication, food loss and waste as well as wastage of other resources utilised in food production such as energy and water are critical problems that need to be addressed (Gustavsson et al., 2011). Environmental impacts of food also include soil health, animal and plant health, biodiversity and toxicity

(FAO, 2018). According to the United Nations Environmental Programme, food systems are responsible for 70% of the water extracted from nature, they account for up to one third of human-made GHG emissions, and agriculture represents a threat to over 86% of species at risk of extinction (2021). Moreover, food production also has a significant impact on land use. In fact, 51 million km², i.e., over 34% of the Earth's land, is agricultural land (FAO, 2019). From this, 77% of the area is used for livestock and the other 23% are crops. Finally, food loss and waste present an important problem as one billion tonnes of food meant for humans is wasted at different stages of the food system each year, and this represents one third of all food produced globally. This means a high share of the previously mentioned environmental impacts are unnecessary and avoidable. Food waste needs to be tackled at different levels of the food system, from food production, to food processing, transportation, trade and food consumption in food service and households (FAO, 2022).

According to Project Drawdown, reducing food waste is the number one solution on the scenario to maintain the global average temperature under 2°C and the third one on the scenario to keep it below 1.5°C (2022). Globally, food waste makes up 10% of greenhouse gas emissions (FAO, 2021). In fact, if food waste was a country, it would have the third highest emissions only after the US and China (FAO, 2013). By reducing food waste, greenhouse gas emissions decrease, the amount of waste entering landfills is limited, food production efficiency increases, and there is a better utilisation of other resources used for food production such as water and energy. Methane is an especially important greenhouse gas to pay attention to when it comes to food waste because when food goes to landfill and decomposes, methane is produced (FAO, 2013). Methane is a greenhouse that accounts for 20% of global warming and is 25 times more potent than CO₂ trapping heat in the atmosphere (United States Environmental Protection Agency, 2021). Therefore, by throwing away food, we not only contribute to greenhouse gas emissions, but also waste a large fraction of the emissions that were used to produce the food in the first place.

Furthermore, some food products are more impactful than others, therefore, it is especially important to put attention on these. For instance, meat accounts for nearly 60% of all greenhouse gases caused by food production, which is twice that of plant-based foods (Xu, et al., 2021). Meanwhile, all activities in global food production such as the use of machinery and fertilisers, or transportation generate 17.3 metric tons of greenhouse gases annually. The research by Xu et al. also revealed that this number is more than double the entire emissions of the United States and represents 35% of all global emissions. Furthermore, some types of meat have even a higher impact such as beef, while the impact of chicken is not as high. Nonetheless, meat products are generally more impactful than plant-based food products, and a shift to seasonal and local plant-based diets has been proved to have minor impacts on the environment and to slow down climate change (EAT, 2019; Xu, et al., 2021).

2.2 Food system in Finland

The Prime Minister's Office of Finland (2019) defines a sustainable food system as one in which food is produced using just the necessary natural resources, ensuring their optimal use and recycling them as much as possible, all in an economically feasible manner. In Finland, the food system is thought of being composed of nine stages, from primary production and traceability of food to bio-waste recycling. In this direction, the Ministry of Agriculture and Forestry of Finland released their strategy for the year 2030 in 2019. In the report, it is stated the goal is to build a renewable and sustainable food system and natural resources economy by 2030 (Ministry of Agriculture and Forestry, 2019).

In 2020, Finland was ranked under the first position on The Global Food Security Index by The Economist Intelligence Unit (2020), which considers the issues of food affordability, availability, quality and safety, and natural resources and resilience across 113 countries. In 2021, Finland was on the 4th position of the rank, however, one challenge was identified under the area of food availability: volatile agricultural production (The Economist Intelligence Unit, 2021). In particular, this indicator looks at the standard deviation in the growth rates of cereal and vegetable production over the last five years, and in this issue, Finland is 40.6% below the mean average of all countries.

Although the Nordic country is in a very good position when it comes to access to quality food compared to most countries, there are still various sustainability challenges in the Finnish food system that need to be addressed. For instance, there has been an overuse of fertilisers over time as well as oil spills and releases of other hazardous substances that have polluted the Baltic Sea to alarming levels (Lehtonen & Schiedeknecht, 2006; Granstedt et al., 2008). There is also a loss of agricultural biodiversity and of genetic biodiversity of traditional breeds (Herzon, et al., 2014), greenhouse gas emission and reduced capacity of carbon capturing of fields (Heikkinen et al., 2013), as well as uneven distribution of value added among stakeholders in the Finnish food chain (Karjalainen, 2011). In addition, food waste is a very significant problem in Finland as well, where Katajajuuri et al. estimated that 335 to 460 million kilograms of food are unnecessarily wasted annually (excluding primary production), or, in other words, 62 to 86 kilograms per year and per capita (2014). According to the authors, an estimated 35% of total food waste is generated by households, which represents an annual economic loss of approximately 70€ per person. The rest is lost either in the food service sector (20%), the retail sector (17.6%) or the food industry (27%). At the same time, however, Finns are among the world population who spend more money on food annually. In fact, the expenditure of food consumed at home was about 2,757 US dollars per person in 2016 (United States Department for Agriculture, 2016).

To tackle these challenges, Finland has prioritised a sustainable food system as one of the main sectors in the national circular economy roadmap published in 2016 by Sitra. The objective is to extend the life cycle of food for as long as

possible and the focus is put on eight main areas of the food system: use of recycled fertilisers and wise use of natural resources by the primary sector, optimised material processing, energy-efficient packaging solutions by the manufacturing industry, lower environmental footprint of distributors, sustainable food offerings by the food industry and retail sector, sustainable consumption of seasonal and vegetarian food, and a just use of food (Sitra, 2016).

Key policy actions suggested on the roadmap for a sustainable food system include creating a market for organic recycled nutrients, minimising food waste by eliminating obstacles and creating incentives, and supporting biogas systems and other renewable energy solutions in agriculture in order to replace the use of fossil fuels. Furthermore, the key project of this focus area is a regional sustainable food system, with the aim to make both consumers and producers aware of the impacts of food and that they all have a holistic understanding of the system.

Thus, Finland strongly believes that the country's food system has to be sustainable on the three levels (social, economic and environmental) and seen as such by all stakeholders involved. On this note, it is important to remark that the Finnish food industry is mainly composed of small and medium-sized enterprises (SMEs), i.e., companies with less than 250 employees and with a turnover or balance-sheet total not exceeding 50 or 43 million euros, respectively (Tilastokeskus, 2020). In Finland, according to Eurostat data (2018), there were nearly 229 thousand SMEs in 2018, which constitutes 99.7% of the total number of companies in the country and these employ 971,000 people. From these, 10,114 SMEs belong to the accommodation and food service sector, representing around 5% of the total of Finnish SMEs (Statista, 2020). Moreover, data shows that there are around 35,000 employees in the Finnish food and beverage industry, 66,000 in agriculture, and 78,000 employees in the accommodation and food service activities (Finnish Food Information Association, 2021). Therefore, SMEs represent a large share of the economic activity in the Finnish food system.

3 THEORETICAL FRAMEWORK

The theoretical framework section is divided in four subchapters. Firstly, the concept of circular economy will be discussed broadly, including the origin of the term and the most commonly used definitions. Secondly, transition theory will be introduced as well as how it has been applied in research on the circular economy. Thirdly, the perspective of small and medium-sized enterprises (SMEs) will be introduced, and previous literature on the role of SMEs in circular economy will be reviewed. Finally, a review of prior research on the topic will be presented, including how the role of SMEs in circular economy transition has been studied in food systems previously.

3.1 Circular economy

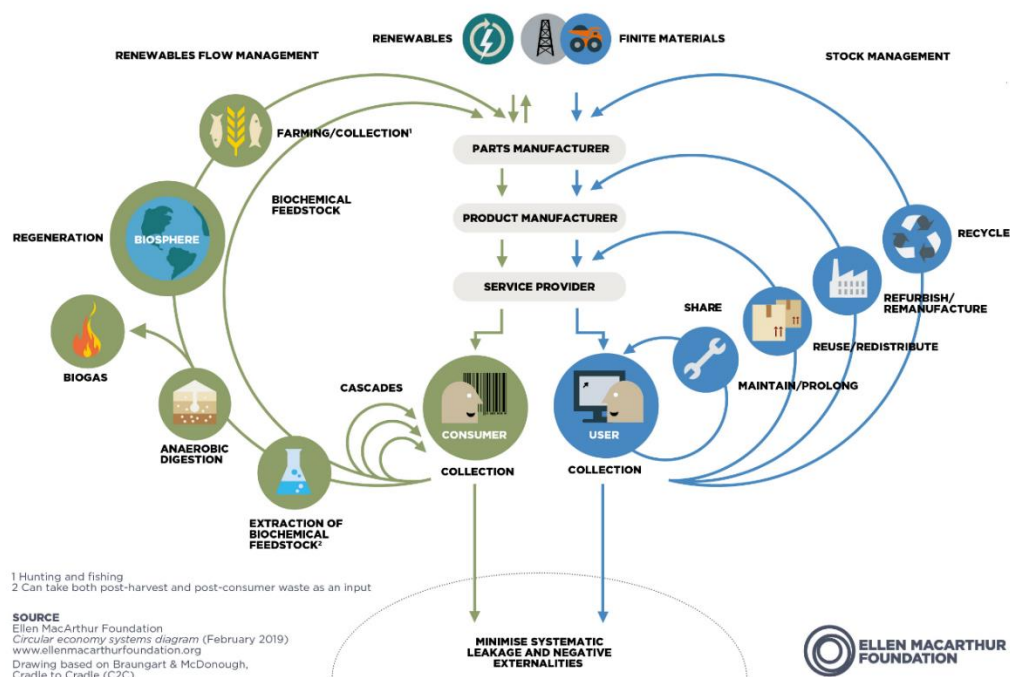
The origin of the term circular economy is debated, whereas it was first conceptualised in China or in western literature, the idea behind the term has existed for a few decades now (Murray et al., 2017). However, the common point of all sources reviewed by Murray et al. (2017) is the concept of cyclical closed-loop system. The concept of circular economy has gained relevance over the recent years and it is now used in different areas such as governmental policy and businesses worldwide. As the authors argue, China first adopted the concept in 1973, in the first National Environmental Protection Conference where they set environmental protection policies and guidelines. Afterwards, in 2002, the country established a development plan with the name 'circular economy', in order to reduce, reuse, and recycle activities in production, circulation and consumption. Since then, the concept has also been applied by businesses and further studied by researchers in China (Murray et al., 2017). In western countries, including European states, the concept has also been adopted over the last years. In fact, the European Union published a circular economy action plan in March 2020 as one of the main building blocks of the European Green Deal (European Commission, 2022).

There are diverse definitions for the term circular economy, but one of the most widely used definitions is the one from the Ellen MacArthur Foundation. They define the circular economy as "a systems solution framework that tackles global challenges like climate change, biodiversity loss, waste, and pollution. It is based on three principles, driven by design: eliminate waste and pollution, circulate products and materials (at their highest value), and regenerate nature" (2021). Cattelan and Tavares (2021) concluded from their research that circular economy can be defined as an economic system instead, which targets zero waste and pollution throughout the lifecycles of materials, from extraction to final consumption, cycling back materials as much as possible and creating value at all levels. The European Parliament instead defines the circular economy as the

“model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible” (2021). In this way, it is stated that the life cycle of products is extended, therefore, reducing waste to a minimum and creating further value. Therefore, although the term circular economy is defined in many ways, there is a common idea that the life span of materials, but also energy and water, are extended for as long as possible, so as to close loops (Geissdoerfer et al., 2017) and reduce waste.

The Ellen MacArthur Foundation created a so-called butterfly diagram (Figure 1), which has been widely referenced and shows the various material flows, systems and loops of the circular economy for both renewable and finite materials. In the case of renewable flows, which include for instance food, forestry products and other biologic materials, the diagram visualises the different processes that can avoid these materials to leakage and provoke negative externalities. Therefore, after final consumption, these materials can be collected and have biochemical feedstock extracted, be processed by anaerobic digestion and be transformed into biogas, or be regenerated by the biosphere (Ellen MacArthur Foundation, 2019).

Figure 1. Circular economy systems diagram



The circular economy, however, is not only a solution to reduce waste. As the European Parliament states, other types of benefits arise from this model such as money saving, GHG emissions reduction, reduction of pressure on the environment, improvement of the security of the supply of raw materials, competitiveness increase, innovation stimulation, economic growth boost (an additional 0.5% of GDP), job creation (a potential of 700 thousand jobs created in the EU by 2030), as well as more durable and innovative products for consumers (European

Parliament, 2021). Therefore, benefits are not only environmental, but also social and economic. Furthermore, circular economy can be linked somehow to all seventeen of the UN Sustainable Development Goals, from gender equality to no hunger or sustainable cities and communities, as Birliga Sutherland and Kouloumpi discuss (2022).

Circular economy, therefore, does not only offer solutions to reduce the extraction of natural resources, but it can also have a direct and significant impact on the reduction of greenhouse gas emissions and thus, fight climate change. According to the *Circularity Gap Report* by Circle Economy (2021), the circular economy can cut 39% of total global emissions and 28% of virgin resource use. The report claims that our world is only 8.6% circular currently, and by doubling this number, we can reduce global emissions by 39% by 2032 and reduce total material footprint by 28% by the same year. Furthermore, reaching 17% of world circularity can bring the amount of net GHG emissions down to 0 billion tonnes by 2050. In the societal needs categories, nutrition is argued to be responsible for 21.3 Gt of material mass and 10 Gt of GHG emissions. The report also suggests pathways for three different categories of countries in the world. Shift countries, including Finland and other EU countries, produce the majority of emissions (43%) and account for 31% of all global resource extraction, even though they represent the lowest population percentage.

Finland's first steps toward a circular economy were taken some years ago when the first roadmap to a circular economy was published in 2016. Even according to conservative estimates, the circular economy offers an opportunity to increase Finland's economy by 2 to 3 billion euros in added value potential by 2030 (Sitra, 2014). Areas where there is a potential for added value include making the forest industry more efficient, reducing food waste, increasing the trade of second-hand purchases, and recycling nutrients, among others. Furthermore, estimates also indicate that a circular economy would significantly increase employment in Finland. According to a report by the Club of Rome, more than 75,000 new jobs could be created in the country by 2030, especially in the areas of remanufacturing and recycling and in small and medium-sized technology and service sector companies (Wijkman & Skånberg, 2015).

The aim of the roadmap is the implementation of a circular economy by 2025 to strengthen Finland's competitiveness, and to create new jobs and sustainable growth (Sitra, 2016). Apart from the addition of value to the national economy, it would also contribute to decoupling well-being of citizens and economic growth from greenhouse gas emissions and increasing natural resource consumption. In this direction, Finland decided to focus on five main areas on the circular economy roadmap: a sustainable food system, forest-based loops, technical loops, transport and logistics, and joint national actions. The first four areas selected have synergies among them, and therefore, actions implemented can bring benefits to more than one of the areas. The fifth focus area, joint actions, was chosen to emphasise the importance of collaboration to achieve the desired systemic and transformational change, covering the entire society. Therefore, the Finnish roadmap states it is crucial that different actors become involved, from

legislators to companies, knowledge institutions, subnational governments and associations, and citizens.

In conclusion, the circular economy is a concept that can be adopted by different actors: from particulars to cities, regions, nations (such as Finland), supra-national institutions (like the European Union), or companies; from small to large organisations. The circular economy is therefore seen as a mean to transform the socioeconomic system and develop a resilient scenario to tackle climate change and achieve other environmental, economic and social objectives.

3.2 Transition theory perspective to the circular economy

Transitions are defined as gradual, continuous processes of change where the structural character of a society (or a complex sub-system of society) transforms (Rotmans et al., 2001). In 2010, Grin et al. defined them similarly as major, non-linear changes in societal cultures, structures and practices that arise from the coevolution between economy, society and ecology, as cited in Loorbach and Wijsman (2013). The authors also added that a radical transformation towards a sustainable society comes as a response to the wide variety of problems that modern societies face nowadays.

In the field of sustainability, socio-technical transition theory has been widely applied (Smoleniec et al., 2017; Osunmuyiwa et al., 2018; Quinteros-Condorett et al., 2020). Under this concept, Schot and Geels (2008) introduced the multi-level perspective (MLP) approach, which defends that transitions take place when there are interactions on three different levels: niche, regime, and landscape. In the first one, innovations build up internal momentum, and then changes at the second one put pressure on the third one, which destabilises and creates windows of opportunity for niche innovations again.

When it comes to the circular economy, transition theory has also started to be applied. For instance, Jurgilevich et al. (2016) considered transition theory to study the transition to a circular food system. In their study, the authors acknowledge that circular innovations have to be scaled up from the niche level so that they become established practices, but they also remark that change needs to occur on the mainstream level as well. Similarly, Ntsonde and Aggeri, adopted the MLP to study the role of circular public procurement in the transition to a circular economy (2019). In the paper, the authors visualise the transition pathway towards circular public procurement by mapping all the changes and actors needed for each of the levels: macro, meso and micro.

Jedelhauser and Binder (2018) studied phosphorus recycling to perform a spatial analysis. The results of the study emphasised the inter-sectoral and multi-regime nature of socio-technical transitions, by showing that innovations on water systems also affect the agri-food system. In addition, the authors proved that circular economy transitions do not only need to take technology into account, but also changes on social system structures.

In the case of Jackson et al. (2014), they adopted two subfields of transition theory (transition management and the multi-level perspective) in order to study the management of metals in Australia under a circular economy. The first one was found to serve to identify leverage points in, for instance, processes of governance, and the second one helped to analyse, for instance, patterns of change at the macro level and their interaction with emergent components of other systems.

In conclusion, different frameworks related to transition theories have been applied on research papers over the last few years when studying the circular economy. Multi-level perspective in particular has been mainly applied, and this research will also be based on this framework. This will allow to analyse the current regime, landscape and niche levels of the Finnish food system, what needs to happen as to move towards a circular food system, the interactions that need to take place, and what role can SMEs have in this transition.

3.3 The perspective of SMEs

As seen previously, transitioning to a circular economy requires collaboration and involvement of a wide variety of actors (Palafox-Alcantar et al., 2020; Cole et al., 2017; Ziegler, 2019). Companies are among these actors and in the last years, new types of business models have appeared that are closely linked to a circular economy. Circular business models are defined as those that not only create sustainable value and protect natural resources, but also consider multi-stakeholder management with a long-term perspective to close, dematerialize, and narrow resource loops (Geissdoerfer et al., 2016), so using materials for as long as possible. They are thought in three different ways according to organisational processes: design, use and recovery of resources (Guglielmo & Nitesh, 2017). The idea of circular business models is to offer solutions instead of only products. According to Sitra (2019), there are five new business models that place the circular economy on the core of the business: renewability; sharing platforms; product as a service; product-life extension; and resource efficiency and recycling.

Small and medium-sized enterprises (SMEs) have also started to adopt circular business models or, at least, circular economy practices in the last years. In addition, research on circular economy and SMEs is growing and there is more and more data and analyses on the topic. In fact, in the Eurobarometer of 2016, the implementation, i.e., behaviour and intentions of circular economy activities by EU SMEs was analysed (Bassi & Dias, 2019). The respondents were asked to report on the adoption of five circular activities: 1) re-planning the way in which water is used to minimize usage and maximize re-usage, 2) using renewable energy, 3) re-planning energy usage to minimize consumption, 4) minimizing waste by recycling or reusing waste or selling it to another firm, and 5), redesigning products and services to minimize the use of materials or using recycled ma-

terials. In the survey, Finland was among the group with the above average percentage who undertook some circular economy related activity (78.64%) with the EU average being 67.77%.

Some of the findings of the research also show that the firm's size and the percentage of total turnover devoted to R&D have a statistically significant effect in all models, indicating that these two elements may become crucial factors in the development of green actions. Enterprises with few resources may be able to afford practices such as reduction of waste but not more demanding redesigning practices. This evidence brings some doubts on the different meanings of the circular economy and efficiency, since whereas efficiency simply means to produce more value with less input, circular economy practices imply a new way of thinking, that is, not only reducing inputs or waste but, as C2C suggests, returning raw materials to the environment (Bassi & Dias, 2019).

Researchers have also studied challenges faced by SMEs related to the circular economy. On one side, Ormazabal et al. (2018) studied challenges and opportunities of circular economy in Spanish SMEs in different sectors. They found that the SMEs in their sample did not perceive the circular economy could help them be more profitable. In addition, SMEs faced barriers such as limited financial, technology and IT resources, short-term vision and lack of time. Another main barrier identified by the authors was lack of public institutional support and also human-based barriers such as company leadership or lack of customer interest in the environment. On the other side, another study by Rizos et al. (2016) analysed barriers and enablers of implementing circular economy business models by SMEs. The authors found that although various policy instruments are available to help SMEs incorporate circular economy principles into their business models, several barriers remain. They recommend European and national policies to strengthen their focus on greening consumer preferences, market value chains and company cultures, and support the recognition of SMEs' green business models. This can be achieved through the creation of dedicated marketplaces and communities of practice, for example.

Another paper (Zamfir, et al., 2017) explored decision models by entrepreneurs to adopt circular economy practices for European SMEs. The results show that the key drivers for adopting circular economy practices are particularly the geographical area, followed by the sector activity and total turnover. In specific, SMEs in Eastern European countries such as Poland, Bulgaria, Romania or Slovakia are less likely to follow circular economy activities, companies in industry, manufacturing and retail are more likely, and companies with higher turnover are more propense to be more circular. The authors highlight that their results emphasise previous research in this area that showed that the national context, i.e., national programs and initiatives, investment ecosystem or economic performance, plays an important role for SMEs to adopt circular economy practices.

Mura et al. (2020) decided to go further and aimed at understanding what actions SMEs are taking to meet the challenges and opportunities of the circular economy. Twenty different circular economy practices related to waste management, packaging, supply chain and product or process design were explored and the results show that several circular practices are simultaneously implemented

by SMEs. This supports the idea that the circular economy has a systemic approach to company's value creation. In particular, waste management was widely applied (separated waste collection was carried out by 84% of the companies surveyed), while resource saving practices were implemented by only 14% of the sample. The authors found that higher costs are the main barrier to circularity for early adopters. However, companies implementing circular practices as a way of doing business perceive them as a business opportunity rather than a cost, which shows how the circular economy can be an important source of value creation for companies, particularly for SMEs.

3.4 Review of prior research on the topic

The role of SMEs in the transition to a circular economy has barely been studied in the food system in specific. However, its importance is more and more recognised, especially in Europe. For instance, the Farm to Fork Strategy of the European Commission published in 2020 as part of the European Green Deal mentions the importance of a circular economy and SMEs in it. The report states that the Commission will take action to scale up and promote sustainable food production methods and also circular business models in food processing and retail, with a special focus on SMEs. A circular economy and bioeconomy are seen as an opportunity for businesses in the food chain to reduce costs and increase revenue, by, for example, finding new value on food waste.

There are some authors who have studied related topics in recent years, but none of them has specifically studied the topic of this research. For instance, Närvänen et al. (2021) studied the role of start-ups in the reduction of food waste by analysing case studies of European and US start-ups in the food system and interviewing some of their managers. The authors concluded that start-ups might have an "influential role" in this transition, both by directly tackling food waste along the food supply chain, as well as by facilitating and driving social and institutional changes towards a circular economy. The authors argued that start-ups empower other actors in the food chain to reduce food waste, by for instance giving agency to actors who did not have it before, such as customers or store employees. Additionally, they argue that start-ups provide a new communication tone about food waste, not evoking guilt, but a positive and creative tone through their branding. Finally, start-ups were also found to engage in collective effort, so they see value in how they can cooperate rather than compete with fellow actors.

Other researchers have studied circular economy in food systems by studying the case of one specific SME, but there is no research yet with the aim of understanding the role that SMEs play in the transition to a circular food system applying transition theory. For instance, Colley et al. (2020) assessed what are the circular economy opportunities for SMEs in the meat processing sector to reduce their environmental impacts, using a Life cycle assessment analytical method.

However, this research does not reflect on the specificity of SMEs in the circular economy or food industry. In the case of the study by Hussain et al., the aim is to study how biological waste materials can be used for generating energy and obtaining nutrient-rich compost for agriculture through anaerobic digestion (2020). Furthermore, the researchers analyse the case of an English SME which uses anaerobic digestion (AD) for converting waste to energy (WTE) and the findings show that technological innovation in SMEs is key to capture value leakage in a circular model, and also that SMEs can gain competitive advantage and generate value while generating multiple environmental benefits.

In conclusion, although there are some previous studies that have analysed the circular economy from a perspective of one or more SMEs in the food industry, there is still a significant research gap in the study of what role SMEs play in the transition to a circular economy in food systems and how they can accelerate this transition. Therefore, this section show how this paper is necessary and will bring new insights to this field.

4 METHODOLOGICAL CHOICES

This chapter describes the methodology followed for this research, firstly justifying the research approach, which is qualitative research, secondly, describing the dataset and, thirdly, explaining the method chosen for the data analysis.

4.1 Qualitative research

As discussed in the previous section, this specific research topic is still quite unexplored, however, concepts studied as the circular economy, sustainability transitions, sustainability in the food system, or SMEs, have previously been studied independently. This means that this specific topic requires an in-depth study of a small number of individuals or settings, while looking at the whole of the situation. According to Lichtman (2017), qualitative research is the best approach to use in this kind of societal problem.

Qualitative research is a type of research that has been widely and increasingly used in social sciences since the 1980s (Lichtman, 2017). It can be defined in different ways, but one concise definition is that of Berg and Lune (2011), who stated that qualitative research “properly seeks answers to questions by examining various social settings and the individuals who inhabit these settings”. Creswell widened the definition by saying that qualitative research is moved by assumptions, a global perspective, and social problems among human individuals or groups (2007). Moreover, SAGE’s definition adds that qualitative research aims to understand human behaviour and the meaning they provide to phenomena (Denzin & Lincoln, 2011). Lichtman (2017) compiled many other definitions of the term and she arrived to the conclusion that what they all had in common was the study of human, cultural, or social interactions or behaviours in a naturally-occurring setting, and where the researcher’s role is to generate and interpret meaning from the data.

Qualitative research is discovery oriented and is based on inductive reasoning (Hair & Page, 2016). As the authors state, when this type of reasoning is used instead of deductive reasoning (mostly used in quantitative research), the objective is to build or develop a theory or a conceptual framework from the collected data. In the case of this research, the aim is to discover what role SMEs play in the transition to a circular food system as well as to contribute to further develop transition theory, especially applied to circular economy.

Therefore, qualitative research has been chosen for this study and, specifically, semi-structured interviews are the selected method for data collection. Semi-structured interviews allow for a number of questions to be directed to all interviewees equally, while allowing for flexibility at the same time (Hair et al., 2015). The interviewees for this research were the managers of Finnish SMEs operating in the food system, as well as experts in the circular economy and the

Finnish food system. The aim is to analyse the individual responses and study the viewpoints they share and those in which they have different opinions.

There are several and varied advantages and disadvantages related to these different methods. In the first place, an advantage of interviews is that they are an “effective and practical” tool of obtaining data that otherwise could not be found in a published form (Eriksson & Kovalainen, 2008). Additionally, this type of data collection will make it possible to have updated and personalised information from specific companies in the Finnish food system as well as from circular economy experts. Therefore, it will be a great opportunity to study their perceptions closely and understand how their opinions are formed in the matter.

In the case of a semi-structured depth or in-depth interview, the advantages are that participants are usually more comfortable than in group discussions. According to Hair et al., depth interviews are “important discovery-oriented exploratory research tools”, as they provide detailed insights into a particular topic from people who have experience and knowledge on the field (2015). Additionally, the semi-structured aspect of this type of interviews enables the interviewer to have flexibility to ask spontaneous questions depending on the interviewee’s answers, while also having an outline and fixed questions to follow.

4.2 Empirical dataset

For the empirical dataset, two main groups of actors were interviewed. The first one was managers of Finnish SMEs in the food system that were already following some type of circular economy practice. There were six interviewees in this group and most of them were the CEO and/or (co-)founders of the company. Additionally, most of the companies were start-ups which had been founded less than ten years ago and counted with less than ten people employed.

In order to find these companies, I first researched Sitra’s lists of examples of circular economy innovations in Finland (Kulmala & Lehtinen, 2021). Secondly, I asked for recommendations from the experts and I also searched different on Internet browsers by typing key words such as *Finland*, *SME*, *company*, *startup*, *circular*, or *circular economy*. Additionally, I searched for companies that operated in different phases of the food system. For example, the companies worked on fertilisers, food production, food packaging, food service, vertical farming and fish products processing.

Table 1. Description of interviewees (group 1)

Company	Company activity	Interviewee	Duration (minutes)	Number of employees	Year founded
Company A	Food reprocessing: Its mission is to cultivate mushrooms from waste (used coffee grounds, agro-industrial byproducts, or other un-utilized nutrient streams) in a low-tech solution.	Co-founder	25'	4	2016
Company B	Food service: zero-waste and local-sourced restaurant and bar.	Co-founder and restaurant manager	22'	8	2017
Company C	Food packaging: a food packaging innovation company who specialises in developing and testing licensed, ready-for-sale food packaging solutions.	CEO and co-founder	41'	5	2015
Company D	Fertilisers production: the company refines nutrient, fibre, lime and carbon-based side streams into high-quality fertilizers and soil improvers.	Quality manager	32'	28	2015
Company E	Vertical farming solutions: The company offers consultation and technology services, and maintenance for vertical farming businesses.	CEO	39'	17	2018
Company F	Fish feed solution: it develops efficient mycoprotein process to feed farmed fish.	CEO, co-founder & CTO	27'	8	2020

The second group of interviewees were experts on the circular economy and/or the food system. To search for experts, I looked for people working in topics related to food or SMEs in Sitra, and the ones I got in contact with recommended me to reach other experts in the field. The four experts interviewed as part of the second group work in research institutions or in the public administration.

Table 2. Description of interviewees (group 2)

Expert	Organisation activity	Interviewee	Duration of the interview (minutes)
A	Public administration	Ministerial adviser	21'
B	Public administration	Senior specialist	46'
C	Research institution	Co-creation manager	24'
D	Public administration	Project manager	30'

All of them were contacted by email and were informed about the privacy guidelines followed, i.e., General Data Protection Regulation (GDPR). The interviews were all conducted in Zoom and were recorded for the later transcription. They were conducted from May to October 2021 and all of them were done in English.

As discussed in the previous chapter, the interviews were semi-structured and the questions were divided in three themes. In the case of managers of SMEs, the first theme was about the background of the company, the second one about their understanding of circular economy concepts, and the third, about the circular economy practices followed in their company. In the case of experts, the first theme was about their background and current job, the second one about their understanding of circular economy concepts, and the third one, about their perspectives on the role of SMEs and their circular economy practices. The actual questions for the two groups can be found in the Annexes at the end of this paper.

4.3 Data analysis

Once all the interviews were carried out, the audio recordings of the interviews were used to obtain the transcriptions, which was done manually in the computer and compiled in one Word file altogether.

According to Hair and Page (2016), the objective of qualitative data analysis is to identify, examine, compare, and interpret patterns and themes. The data collected from the interviews is abundant and diverse, and therefore needed to be ordered and categorised, and this is what thematic analysis provides (Hair & Page, 2016). As the authors argue, coding is the process of assigning meaningful names that reduce data from a large amount of undifferentiated text to a much smaller number of relevant and representative chunks, and it can be performed digitally with software such as Atlas, or instead, hand coding. The process for this thematic analysis was a first reading of the text to be analysed in order to completely understand the data collected, followed by an identification of codes and themes, many more iterations to understand patterns and themes (Thompson, 1997), recoding and adding more themes (Hair & Page, 2016).

To do this, the interviews of the first group, that is, the managers of Finnish SMEs, were analysed by identifying codes and colouring each of these codes

differently. This process was followed multiple times always taking the corresponding research questions into consideration. As a following step, the same process was carried out for the second group of interviews, i.e., those from experts. Finally, the codes were grouped into themes, therefore, reducing the amount of classifications and thus, colours.

The themes were therefore obtained by manually colouring the transcribed text. In addition to this, all answers of each question were compiled together in a different document, so that the analysis and comparison could be more easily done. The themes are presented in the following section as they were obtained, meaning divided by each of the three research questions.

On the first round of obtaining themes, eleven themes were identified and each one of them was marked with a different colour in the transcribed text of the interviews, both for the managers of SMEs and the experts. In order to reduce and make more concise the themes found, an analysis exercise was performed by rereading the interviews and finding things in common between themes. This is how the five themes presented in the results section for SMEs were obtained.

5 RESULTS

In this section, the results of the study are presented in the form of the themes found in the analysis. First of all, the results from the interviews of SMEs' managers are described, followed by the results of the experts' interviews, and then the themes found for these two groups are compared. Finally, practical implications are presented, including the challenges faced by SMEs and the key aspects they see as important for an effective implementation of circular economy practices in the Finnish food system.

5.1 Findings from SMEs

As seen in the previous section, the business activities differ for each of the companies interviewed. All of them follow some kind of circular economy practice, in fact, most of them follow more than one, however, some companies understand the concepts of a circular economy and a circular food system in different ways. It is important to understand how the companies understand the theoretical concepts before analysing how they put it in practice in their operations.

When asked about the circular economy, all interviewees answered they view the circular economy as making the most possible use out of materials, so the consideration of material flows and their cycle was mentioned by most of them. Most of them (Companies A, D, E and F) also put a special focus on minimising waste but also finding new value to it, so that they consume as few raw materials as possible, and Company B mentioned the same about energy. Company C also emphasised the innovation side such as eco-design and solutions creation, and also the overall perspective of taking other actors into consideration. Company E also mentioned that the circular economy should be viewed as the baseline for business operations rather than the future goal for companies. This company also perceives intercompany communication, that is, the exchange of information, materials and waste between companies, as a key element of the circular economy.

Regarding the question about their understanding of the concept of circular food systems and their perception of the importance of a circular economy in a food system, the answers also varied. Company A mentioned this is not a new concept, as it has been practiced in agriculture throughout human history and put biodynamic farming as an example. This manager sees that concept from a simplicity point of view and with significant benefits to all. Company B views it as a natural process as it is the nature of food and biomass in general, and adds the issue about artificial fertilisers compared to the natural process of composting. In views of this company, food miles are also a key issue in a food system, where to maximise the use of resources, food supply chains should be shortened, which would also minimise greenhouse gas emissions.

Company C's answer had a different approach, as the base for the company are innovation and technology. The company sees technology as a key tool to bring efficiency to the industry as well as to eliminate waste. However, Company C also mentioned the environmental impacts of logistics in long food value chains, and that technology is something that can address this issue, for instance, through hydroponics or vertical farming. Finally, circular business models are also mentioned to be a key element in circular food systems as businesses need to change their way of doing business so not to only have profit as an objective but circularity on their core. Therefore, Company C sees technology and circular business models as key enablers of a circular transition in the food system.

Company D sees a circular food system from the fertilisers perspective, which is at the beginning of the food chain, but uses biowaste, including food waste, as raw materials for their fertilisers, so the company builds a bridge between the end and the beginning of the food system to contribute to its circularity, to tackle, for instance, finite sources of phosphorus in the world. Company E sees a circular food system as the recycling of nutrients and closed loops of food production to eliminate food waste, and technology is presented as a solution for this. In views of this company, circular economy is a key solution to food systems, for instance, in greenhouses and vertical farming as well, where nutrient recycling as well as energy and water recycling are maximized, which also tackles financial loss and improves farmers' margins.

Finally, Company F sees the avoidance of food waste along the whole food value chain as key in a circular food system, as well as using side streams and revalorise them. This company views the food system as quite circular already compared with other manufacturing industries due to the natural renewability factor of food, but all other materials needed in the food chain such as water or fossil fuels for food production and distribution, as well as packaging are also mentioned to be significant issues in food systems.

Therefore, whereas for the concept of a circular economy the answers are clear and similar, except for some specific different emphasises, in the case of a circular food system, the interviewees do not have such a clear understanding of the concept. Some of them see circularity to be applicable to the whole food system as a whole, however, some of them view it only for one or two specific stages of the food chain.

Regarding the third theme of the interviews, which is related to the specific practices carried out by each of the small and medium-sized companies, the results are presented in the form of themes. These themes provide an answer to the first research question "How is the role of SMEs understood in perspectives of SMEs' managers in the transition to a circular food system in Finland?", and, therefore, each theme represents one role that SMEs play in the transition to a circular economy. Five themes have been identified from the interviews of the first group of managers of SMEs, which are described in the following paragraphs, and quotes from the interviews are provided for each of them.

5.1.1 To rethink

The first theme identified is “to rethink”. SMEs provide a new perspective to traditional food systems and business as usual (BAU). SMEs rethink the traditional way of doing things and aim to find innovative solutions and tackle unseen challenges. This also includes redefining the role and purpose of businesses. Instead of only having the purpose of generating economic value and benefits, SMEs in the circular economy are now born with the purpose of reducing environmental impact of food that traditional companies in the system have had during the last decades.

For instance, in the case of Company A (the zero-waste restaurant), they developed a machine that enables them to generate no food waste and, instead, transform it into fertilisers for agriculture, therefore, rethinking the way that bio-waste is treated and having an overall perspective of the food system. In addition, the company plans the menu with what it is available in each season and takes action to prepare for the next months:

“Within the food and food waste, we don’t use any outsourced waste systems, so we turn it in-house and kind of send it as a product of value back to the farms, back to where it came from, basically, back to the ground to be used there.”

“During the winter period, we preserve a lot of stuff, so a lot of greens, a lot of tomatoes, cucumbers, and stuff like that. We can as much as possible because on the other side, the long year of ten months is very root based orientated and we use products that preserve well in cellars. That’s what agriculture methods are used here.”

In the case of Company C (the sustainable food packaging provider), they have rethought the logistics in the whole food value chain to make it more efficient and sustainable. In addition, they take their customers’ opinions into consideration so that they really understand the overall issue and make sure their solutions are as good as possible:

“Like then at the food factories and also looking at the logistics between them. So with our solutions, we can reduce the amount of logistics by eliminating the space and the weight during logistics, and then with food factories we can enable them to invest in new packaging solutions and then use their current products and facilities and machines more effectively and also without the need for investing in new machines or such. So we also enable that type of approach. Kind of lowering the bar of adapting more sustainable packaging overall on the value chain, so packaging but also on food industry side.”

“So I think in a way it’s kind of an ecosystem that we are building up to understand the whole system and doing it better to get the feedback early to see whether our solutions are actually solving the problem.”

Company D, which produces recycled fertilisers, has rethought the agricultural methods that are currently used, by developing an alternative solution to non-renewable fertilisers, but also by considering farmers and their economic power:

“The company was founded for the need for more sustainable agriculture. Also we want to produce inputs for the farmers that they like, money-wise can use. So we want to be ecologic but economic as well. So for the need to have like sustainable methods that farmers are able to farm sustainably, with the help of us.”

“Ethanol production is produced CO₂, which is collected in tanks by gas suppliers. And then that gas is transported to our vertical farm and released to the plants. Meaning it’s a waste stream that we are applying. That’s probably the only, let’s say waste stream that is coming from outside of our company.”

Finally, Company E is rethinking the way in which farmed fish are fed, which usually is with imported soy from deforested areas such as Brazil, and they now develop locally-sourced protein for fish feeding that is developed thanks to side streams of other industries:

“We would like to have a locally-sourced more sustainable alternative in that sector, so our fermentation process takes side streams from current industry that are renewable and we convert it into sustainable alternative protein.”

5.1.2 To fill gaps

The second theme identified is “to fill gaps”. SMEs fill gaps in the food system and thus, in the market to enable circularity. Many of the companies interviewed mentioned they were founded because they saw how inefficient and unsustainable the food system is. For instance, a lot of waste from the food industry currently goes to waste, so SMEs enter the market to give a new value to this waste.

In the case of Company B, which developed a solution to grow mushrooms out of coffee waste, the co-founder mentioned that SMEs have found a niche market because of their specific operations:

“I think the thing with SMEs is that if we are small companies, we’re usually doing something quite specific and they have found a niche market that they can operate there. And an individual SME can never do big things, but altogether they are very important in the urban system.”

Company C mentioned that the innovative packaging company was founded because of the persisting need to find alternative solutions for sustainable packaging:

“The other [reason why we founded the company] was the need from the food industry and still there is a huge need for these alternative solutions. Which they shouldn’t be the alternative, they should be the mainstream solutions. But there is still the need.”

Company E expressed that when the company was first founded, the greenhouse was placed next to an industrial facility which they noticed was producing big amounts of waste heat, and that is something they could use for free, so there was an opportunity in the market:

“[The industrial facility that supplied us with waste heat] got greedy with the waste heat, so didn’t really understand that it’s waste for them, and if nobody’s using that, it’s just waste. Nobody is paying anything for it.”

The interviewee from Company F explained that their circular solution had already been developed previously, but it was not exploited, so they found the right market for it:

“In fact, the process that we’re commercialising was not developed by us, it was developed in Finland a long time ago back in the 1970s. [...] So we wanted to find a good application. So I would rather say that there was already a CE solution, and we just have sort of found a relevant market for it in the modern world, where, in the end the process needs to be economically viable, for it to be adopted and for it to have impact. And that’s what we’ve essentially done.”

5.1.3 To connect

The third theme identified is “to connect”. SMEs carry out collaboration in practice among actors within the food industry and also create bridges with actors in other industries. Collaboration is viewed as a key means of circularity, but sometimes it is also carried out due to a lack of monetary resources, which makes SMEs have to find alternative manners to obtain raw materials. The interviewees mentioned collaborations with actors in the same industry or other industries, but also with universities and research institutes, especially for research purposes or to collaborate to find new solutions. All the interviewed managers of SMEs mentioned that collaboration is a key aspect for them to achieve a circular economy, which results into them building a strong network of actors working together towards circularity.

Company A, for instance, cooperated with academic institutions such as universities to perform studies, but they also collaborate with companies such as hotels and other companies in the food system:

“We are cooperating with a school to develop these systems and with Aalto University as well with a master’s thesis project. [...] We did a collaboration with a school to execute the LCA assessment, but before that as well we have different schools, different universities, and different people in finding those glass solutions, soap solutions, so I hope that what’s actually happening with our food waste when it’s assessed, so we know what it is and it’s a lot of information, so basically what we need and to have a background and a base to make decisions.”

In the case of Company B, they connect with other companies such as hotels, restaurants and stores to obtain their waste and use it as raw materials:

“Our growkit is made out of repurposed dairy buckets so from different restaurants that provide us with dairy containers which are single-use plastic normally, but we give them a second use.”

“So we have an ice cream manufacturer that makes batches of coffee or certain flavour of ice cream they make and so they make a batch or two, then we collect the coffee waste that comes from there. [...] And with a hotel that serves mushrooms for breakfast, they also collect coffee waste for us, so then we deliver mushrooms ever since the hotel opened the concept of breakfast, so that’s kind of a long-term partnership that we have with them.”

Company C also has collaboration embedded in their business model, as they always have other actors’ opinions and ideas into account:

“Collaboration is our model of working; we work in a network model that we work with the technology companies and we find out how to use the technology in new more sustainable ways. [...] We work with different stages of innovation and packaging development we work with different organisations [...]. We work with end users like obviously the food industry, restaurants, industry and such to validate our assumptions and our concepts.”

The business of Company D makes it essential for them to collaborate with other actors in the food system or other industries:

“The business that [the company] is doing is we take side streams or in some cases waste or anything that can be used in agriculture as fertilizer and that comes out of industry. So, for example, the forest industry, food industry, energy industry, just to say a few. And yes, from those different fractions, we manufacture different kinds of fertilisers and sediment products for agriculture.”

Finally, Company E also mentions that they collaborate with multiple actors in different manners:

“Of course we are collaborating with a lot of companies and I think the CO₂ is the most clear thing that we’re sourcing as a waste stream. We’re also working with substrate producers [...], which supply substrates and we are working together with them to develop better and higher quality substrates food or more feeding in vertical farming field.”

5.1.4 To innovate

The fourth theme identified is “to innovate”. SMEs play a crucial role to bring circular innovations to the market to solve problems. These are translated into either innovative products, services, processes, technologies, but also the development of new circular business models, in which building stronger and more meaningful relationships with, for instance, customers and suppliers is an important side of them. This brings SMEs to possess a competitive advantage, as many of the interviewees mentioned.

As a tool to rethink the food system, Company A developed their own composting system:

“We incorporated our modern composting system in house to break down this biowaste that we create and turn it into a valuable product within in-house composting system.”

Company B developed an innovative kit where customers can find a new use to their coffee waste and grow new food. Their innovative business model also relies on having strong and long-lasting relationships with their partners and customers to make sure they have a solid customer base:

“We collect coffee waste from some of our customers or donors and we use it as a substrate for growing mushrooms. So rather than the coffee grounds being put to biowaste or landfill or incineration, we make a higher value use of it by using it to cultivate mushrooms.”

“In the end of course, we have built up a customer base both in the individuals and the chefs, so we try to serve them better and better with what they expect from us. [...] so that we stay relevant to our existing customers, and they will come back to us and buy different products from us.”

“We’ve achieved a more direct to relationship with the customer.”

Company C is an innovation company itself in sustainable food packaging, and they always strive to develop more creative and sustainable solutions:

“We call ourselves as a food packaging innovation company. So basically, we develop, test and commercialise new packaging with a sustainable agenda and focus. And then we license this innovation to packaging manufacturers and food brands. And that’s kind of the straightforward model.”

“We are working on constantly improving what we do. And in our case, we believe that define and the creativity is in the core of everything that we do. So basically, we use that to combine different materials, different machine technologies and such to enable more sustainable and circular solutions.”

In the case of Company D, they are developing a new type of fertilisers which are renewable made with side streams of other actors. These solutions are more sustainable than traditional fertilisers:

“The business that [the company] is doing is we take side streams or in some cases waste or anything that comes out of industry. Then we process those side streams, they can be for example limes, they can be soil amendment products, they can be nutrient-rich liquids, and they come from different kinds of industries. [...] And yes, from those different fractions, we manufacture different kinds of fertilisers and soil amendment products to agriculture.”

“If the farmers use our products, the CO₂ footprint will be much smaller that if they use these conventional fertilisers.”

As for Company E, they have developed an innovative process to maximise the use of nutrients, water and energy in their vertical farming solutions:

“We’re recycling the nutrients back to plants. The second thing is the water, so we are processing the air with technology so that we are condensing the evaporation of plants. We’re condensing that back to liquid form and then

we recycle that water back to the irrigation and then we just enrich that water with nutrients again [...]. This process is actually saving 95-96% of water consumption. [...] The third thing is energy consumption, so when we are condensating this water from the air, we are pulling the energy in energy out from this air mass that we are processing. And when we are pulling this heat energy out, we are cooling the place as well as dehumidifying the place, the space where the plants are grown and we're recycling this back to the process. [...] We're using the same energy that we're pulling out from the space by putting back into the space and that's where we're saving a huge amount of energy."

"We reduce wastage by forecasting production more accurately."

"We have to collaborate, just because of our business model, so we need to take side streams of these biorefineries, that's really key for us."

Company F have developed their own fermentation process to produce protein to feed fish. Their innovative solution is also more sustainable than the protein which is currently being used generally, which is soy being sourced from deforested areas such as the Amazon:

"Essentially what we do is we have our proprietary fermentation process where we grow a type of fungus to produce microprotein. Our primary focus is on using our product as an aquafeed component, so in fish feed formulations."

5.1.5 To catalyse

The fifth theme identified is "to catalyse". SMEs catalyse and accelerate the transition to a circular economy by making use of momentum. Some of the global trends that companies mention affect them positively are the awareness of local and organic food benefits for the environment but also in terms of food security and accessibility, as well as awareness about global warming, microplastics, the impacts of meat. SMEs also accelerate the transition by pushing for change. Therefore, SMEs act as catalysers of the transition, by accelerating the shift to a circular economy.

For example, Company A pushes for change by not accepting any plastic from their suppliers:

"We don't accept anything that is packed in a single use plastics, so we don't create any packaging waste."

"I think Finland is a great country to be sustainable in the last few years, especially because the whole set up of the country and the values of the citizens are such that they tend to support more natural activities so being definitely a sustainable restaurant is positive definitely."

Company B make use of global trends such as local food, gardening, and do-it-yourself trends, which they use to promote their solution as much as possible:

“We have other via selling food locally, and I think there is a global increasing interest in local food and stories behind where your food comes from and awareness of the long supply chain that are fragile, so we have been feeding from that. [...] there is also the interest in gardening and food production for yourself as a kind of a hobby, [...], and is also part of the DIY products that we sell, so we saw the big spike last year when the lockdown was there in our sales and the webstore. So I think at least for Finland, where we operate, there’s been positive trends that are helping our business.”

Company C pushes for change and catalyses the transition by offering alternative sustainable packaging solutions to food companies, so they can reduce their environmental impact:

“How we make the impact, it’s basically we allow our clients, the packaging manufacturers, to turn their business into sustainable and circular business by helping them to adapt sustainable solutions with low-cost initial investments, by enabling them to adapt new sustainable materials, by reducing the amount of materials used in the packaging and so forth.”

“I think there’s the interest and like globally, companies reach to a small company like ourselves for help and solutions, so I think the circularity and sustainability is becoming the mainstream. And then this type of special skills is kind of the way of reaching the global market, at least business wise.”

“[The global trends affecting the company] are packaging legislation and the plastic-free movement. And then also the rise of the environmental consciousness around the world. [...] And then it goes back to actually sustainability and this type of solutions start to become mainstream businesses. I think that’s the main driver. Obviously, we focus on areas where the legislation is the driver for change and then we can expand our business accordingly.”

Regarding Company D, they rely on the current success of their business to expand their operations and contribute to the circular transition of other countries as well:

“How we want to improve and have more circular economy is that when we expand and get bigger, that always, when [the company] grows, we will always increase the amount of circular economy happening.”

Company E is also bringing their innovative solutions to other countries and continents around the world, and to more and more companies. In addition, they try to push suppliers and legislators to be more circular or enable circularity, respectively:

“We’re a technology company so we’re developing the technology for our clients to benefit from this circular economy aspects. And this is, so we’re selling technology globally. We have clients mostly in Europe, middle east, north America, Japan, we have clients already. So yes, we’re working pretty much all over the place.”

“I think it might be possible to actually push harder our suppliers to use recycled materials like used aluminium or recycled components or whatever, so that might be something.”

“The trend of local food is one of the biggest [affecting the company]. So people are tired of worrying about food safety issues and when you have vegetables or whatever food supplies, and the supply chains can be outstandingly long, it can be 10 or 15 companies, before the food supply reaches your plate. And nobody knows, nobody even in that supply chain knows the other operators in that chain, so the risk for food safety issues that somebody is using something illegal, or toxic or whatever in the process is hugely increasing.”

“For example, in 2015 we lobbied through a change in legislation, not legislation but... anyway, a law that said earlier that you have to use... ooh okay. You can get 40% investment subsidy if you use old school luminaires that are consuming 3 times more energy than LEDs. But you can't get any subsidy for LEDs in Finland. And this was until 2015b when we collected all the LED manufacturers and walked into the Ministry of Agriculture and said that this is crazy, you have to change it. And they did change it.”

Company F is also planning to expand their business around the world and take big steps to make their solutions reach big markets:

“Now everything associated with sustainability is a huge driver because consumers are more aware [...] and they demand more sustainable food products.”

“We want to build our first factory in Europe, and we just think that it's so much easier to expand after that one, once we have that one factory here and we can bring people to see [it] [...] We do have very active conversations already with American companies and actually with South American as well. And a few in Asia.”

As a summary, the five themes identified which correspond to the roles that SMEs play in the transition to a circular economy, as understood by them, are to rethink the whole system and the way of doing business, to fill gaps in the market where solutions are still needed, to connect actors in the industry and other industries and practicing collaboration, to develop the needed innovations in form of new products, services and also business models, and, finally, to catalyse and accelerate the transition, by making use of momentum and pushing for change.

5.2 Findings from circular economy experts

Regarding the second theme of questions asked to experts in the circular economy and/or the food system, the answers were also quite general and clear. Many saw the circular economy as a solution that converts someone's waste into someone else's raw materials, and using the available resources efficiently. Two

of the experts also mentioned the use of resources has to be well thought within the planetary boundaries and wise, so that the planet can regenerate its systems. One expert also added that, to him, it is not only this, but also a vision for the economy, so a system-level vision that we will not achieve unless multiple solutions and cases bring together a systemic change.

When asked about circular food systems, some experts understand them as closed loops of nutrient recycling in order to eliminate waste, but others also look at it from a more detailed perspective. In specific, they mention soil management, use of fertilisers, food production, water use, sources of nutrients, recyclability of nutrients, renewability of energy use, land use management, food packaging, food waste management, side streams management and logistics. In addition, some experts also express that in the food system, waste can be used to produce energy sources such as biogas or chemical cycling, and that is also part of the circular economy.

From the third set of questions, which was about the experts' opinions about Finnish SMEs in the food system, the answers were analysed in forms of themes as well. In this case, two main themes were identified.

5.2.1 To innovate

The first theme identified was "to innovate". SMEs, but, in particular, start-ups, are seen by experts as creators of solutions and problem solvers to tackle the issues in the Finnish food system. The innovations that start-ups develop include products and services, but especially circular business models as a whole, in which circularity is at the core of the business. They are viewed by experts as actors that provide a new way of doing business, which is exactly what the food system needs.

For instance, expert B sees established SMEs as actors who can play a role in the transition to a circular economy, but who have to incorporate circularity in their business plan and rethink their business. However, SMEs, and specially start-ups that are born with the circular economy embedded in their business model, are seen as the expert as key innovators:

"I think [the circular economy] is a business opportunity for some SMEs, but it's not always the case, it has to be part of your business plan. For example if you are an SME, but you're not start-up, you're a small business that think about probably, 20-200 people working for you, it has to be part of your business plan. You have to think about how the circularity is working in your business. But when you are inside, when the circularity is really your business idea, then it's a different story. Then you can actually make a circular business. That's what I see all the time, with start-ups now creating super innovative ways, using these side streams in a better way."

Expert C explains that the circular economy, and specially, new and innovative circular business models can bring several benefits to SMEs in the food system, for instance, business models that offer services. Innovative businesses are seen as key to save costs, but also to have a better image, to improve their

communication, thus building stronger relationships with customers, as well as to attract new generations of customers and employees:

I would say cost savings [can be benefits of the circular economy for SMEs], hopefully, not automatically but at its best being cost savings. Perhaps some new business servitisation. [...] Yes, cost savings, better image and brand of course when implementing these business models that take the company to the circular economy, that can be well used in communication as well, that tells the customer that they are actually about this topic and doing something on that. [...] And of course, that links that young people, young talent are more likely interested about those businesses that are taking steps towards circular models, so they might attract, be more attractive for employees and customers."

Expert D clearly expresses that he perceives SMES, especially start-ups, as the actors that bring new innovations and focus on problem solving when they find an unaddressed problem in the market:

"I see that basically SMEs, especially start-ups, they are the smaller companies, they are the ones that are working more on new innovations and really depending on problem-solving. [...] I believe that SMEs are kind of the holders of new innovations, where I believe in the field that SMEs and start-ups innovations are created. They are, to be able to grow, they need to fit into this new time and world or bringing in new solutions that the others didn't think of."

"I think the whole field of circular economy is basically creating new business models."

5.2.2 To connect

The second theme identified was "to connect". Experts perceive SMEs as key players that use the innovative solutions to collaborate with small and large companies. However, two of the experts interviewed also see this collaboration in the sense that SMEs support large companies in food production or logistics, for instance, to obtain solutions to the problems they face.

The first expert interviewed mentions that collaboration is essential in a circular economy and that SMEs can benefit significantly from creating partnerships:

"Circular economy isn't done only within one company I would say, you always need good partners or at least at the beginning. So maybe for small companies [...] can engage in partnerships, it's an advantage for them. They can be with bigger companies or other smaller companies."

Expert B mentions as well that collaboration can be very advantageous for SMEs and that creating a network of partners is key:

"I think that collaboration is very important when you talk about the food system in this area. Because to get the side streams together is super important, so you have to figure out how to, small companies having side

streams usually too small to use for anything when you talk about circularity concept. You have to figure out how to combine those side streams. So you can actually have some financial benefit out of it and that's where the collaboration is needed. And it's also about the bigger companies to working together with the smaller companies and it's about the network."

In addition, collaboration is seen as a key aspect of circular business models by expert C:

"Of course, the servitisation is an important aspect that perhaps these circular innovators can make strong cooperation with for example logistic companies. That might make the circular models easier."

Expert D feels that the circular economy might be an opportunity for SMEs to create more meaningful and partnerships with other small companies and to create a new type of relationships, so that instead of competing, SMEs cooperate as a team. In addition, this expert mentions that SMEs that count with fresh and innovative ideas can be seen as a key partner by large companies that have any type of problem and are looking for solutions:

"We need to change the way businesses work, so circular economy gives also maybe to SMEs the chance of getting stronger collaboration with each other and opening up a new type of dialogue and communication [...]. So I think the circular economy is also at the same time, it's a team effort and nobody can really do circular economy all alone, by themselves. It's more teamwork."

"I think the bigger corporations should basically have a person or team who is looking for how to adapt circular economy in their business, what the circular economy means to them, a team that figures out these things, and actively start looking for partners. [...] And once they find these connections, bigger corporations who maybe have already seen that they have some kind of problem or they could do something better, they can find the ones with better new fresher ideas that could solve these things. So yes, team effort."

Experts have been found to have less specific knowledge about SMEs in the Finnish food system, but they all agree that they are key actors that bring innovation and that can create strong partnerships that find a new use for side stream materials, in a collaborative effort.

5.3 Common findings

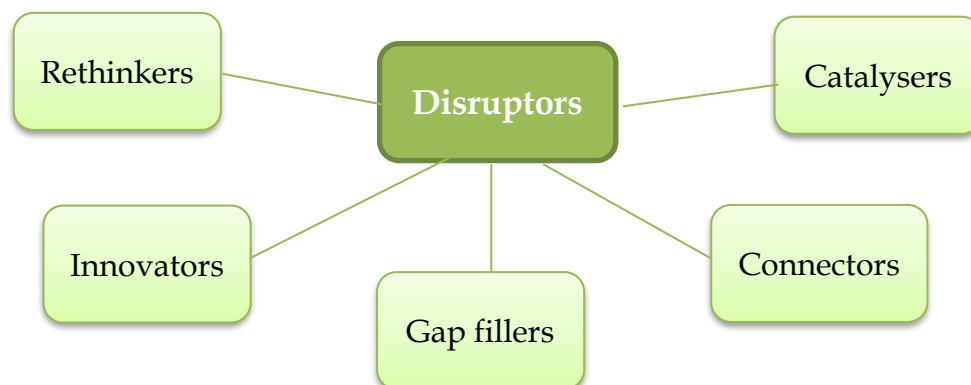
After analysing the views from managers of SMEs and experts in the circular economy, it is clear that some of the separate findings are very similar. From both the interviews with SMEs and with experts, two main themes were obtained, which are that the role of SMEs in the transition to a circular food system is to

innovate and to connect. Both groups of interviewees have been found to specially emphasise that SMEs and start-ups in particular play a key role to bring innovations to the market, in the form of circular business models. The other role they all agree to possess is to connect or carry out collaboration to create a strong network of actors. In this case, all interviewees that collaboration is key in a circular economy, however, experts also add that this can be also beneficial to larger companies, as they can build partnerships with the holders of the circular solutions.

In addition, from the interviews with managers of SMEs where more data was collected, it was found that they also rethink the whole food system in a holistic way, they fill gaps in the market to tackle challenges that no one else is addressing, and they also act as catalysers or accelerators of the transition, sometimes even by pushing other actors for change. Therefore, it has been found that small and medium-sized enterprises, including start-ups, are actors that are play an important role in the transition.

Overall, it can be said that an overarching theme that groups these five different subthemes is that SMEs, and specially start-ups, act as disruptors. Either by rethinking, innovating, connecting, filling gaps, or catalysing, SMEs have been found to have a role to disrupt the current food system, as they work on different types of meaningful solutions to achieve a sustainable and circular food system in Finland.

Figure 2. The roles of SMEs in the transition to a circular food system.



5.4 Challenges and effective implementation

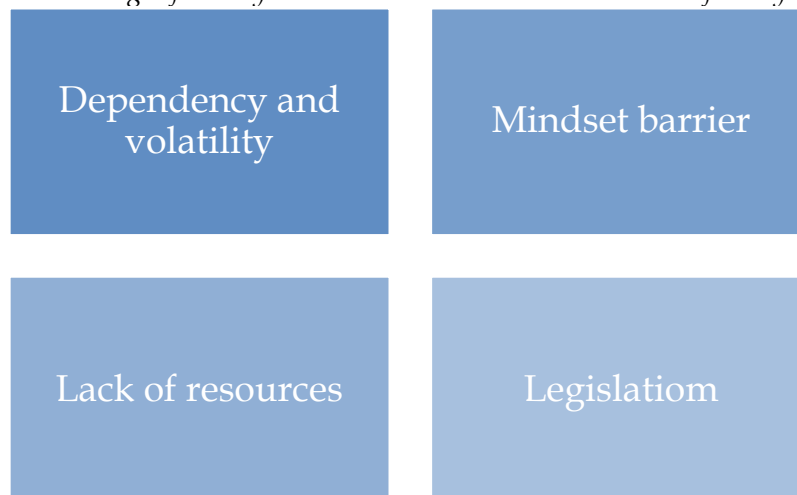
As a result of the interviews, other information about SMEs in the food industry that follow circular economy practices can be obtained. On the one hand, challenges faced by these companies in relation to the circular economy have been identified. On the other hand, overarching elements that explain how these SMEs effectively implement the circular economy have been analysed. These two topics

aim to provide an answer to the third research question, which is: “How can circular economy practices in SMEs be more effectively implemented?”

In terms of the challenges, four have been identified to be common among the SMEs. First of all, one challenge is the dependency of imported food, as some of the companies state that relying only on national and seasonal food is very complicated, so normally Finns consume food with long (international) supply chains. This also exacerbates when there is a rise in prices of food due to global problems such as an economic or political crises. The second challenge is the persisting mindset or cultural barriers from other actors in the industry as well as consumers. Although there is a rise of awareness when it comes to sustainability and environmental problems, some customers and organisations still do not feel the urge to make a change and continue to have unsustainable businesses or consumer habits.

The third challenge faced by SMEs identified is the lack of resources, either in terms of money specially, but also time, labour force, knowledge, technology, tools or bargaining power. Many mentioned that although sustainability and circularity is always at the centre of what they do and they constantly aim to improve even more, they are still for-profit businesses, which means that having profitable solutions is always the first priority in order to survive. In addition, several interviewees expressed that they sometimes lack knowledge or guidelines on how to run a sustainable business. The fourth and final challenge that several SMEs also mentioned is that legislation is not yet prepared to follow many circular economy practices, both at the Finnish and European Union levels.

Figure 3. Challenges faced by SMEs in the transition to a circular food system.



In terms of the key elements that have been found to obtain an effective implementation of circular economy practices, five have been identified. These elements have been identified for most of the SMEs interviewed and they all mentioned that each of the elements are of great importance to them. First of all, as mentioned previously, all companies interviewed follow circular economy practices, but most of them also mentioned that circular economy is at the core of

their business. Therefore, these SMEs or, in most cases, start-ups, have built a business model that is based on circular economy principles.

Company A: *“Circular economy is the backbone of what we do.”*

Company B: *“Since we founded the company, [the circular economy] was one of our core values to kind of have a low environmental footprint with these things.”*

Company C: *“So basically, we use creativity to combine different materials, different machine technologies and such to enable more sustainable and circular solutions. So definitely that’s what we do, and we use the design to enable that in our case.”*

Company D: *“[Circular economy] is in the heart of [the business]. The company wouldn’t be here without the circular economy.”*

Secondly, these companies make sure to make the most out of all available resources, both their products or those of other companies. They use what usually would be considered as waste as their raw materials and maximise and preserve its value for as long as possible. Furthermore, this also includes maximising all resources that can be found as nearby as possible, so that the global volatility of prices and uncertainty of access to raw materials does not affect the companies.

Company A: *“We don’t demand the products, we use what is available at the time. [...] When we have a product that we try to use in full within our dishes and our menus, we maximize the use of all ingredients there that in the end there is some kind of end product there, say some scrapes, onions skins or fish bones or such like that. We use them again, we cook stocks, we use them for syrups, we use them for different practices and even after that use of the ingredient, we end up with used bones that we have on our hands.”*

Company B: *“We collect coffee waste from some of our customers or donors and we use it as a substrate for growing mushrooms.”*

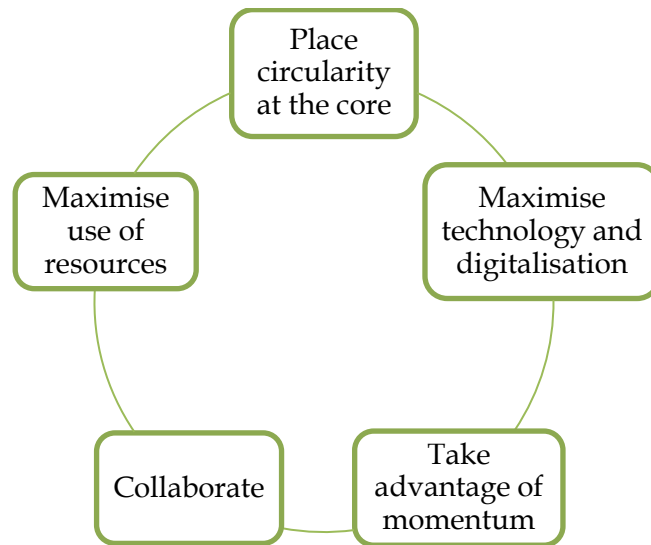
Thirdly, all companies interviewed mention that technology and digitalisation is key in their business, as seen in the quote examples provided in the fourth role by SMEs, i.e., to innovate. Some of the companies interviewed are technology providers themselves, so it is the essence of what they do. Nonetheless, others also rely on technology to carry out circular economy practices, for instance, the composting machine of Company A, or they rely on digitalisation to make their processes more efficient, to monitor their resources and processes, or even to make forecasts.

Fourthly, as seen in the second theme identified from SMEs, i.e., to connect, collaboration is an essential element to implement circular economy practices. As discussed previously, collaboration can take place between SMEs and other small companies, but also with larger companies from the same or other industries, universities and research institutes.

Fifthly, taking advantage of momentum is a key aspect that SMEs benefit from. Many of the interviewed companies mention that various global trends such as awareness raising of sustainability issues affect their business positively,

since final consumers demand for more sustainable food and this pushes companies to look for more innovative solutions as well. However, the interviewed SMEs also benefit from being based in Finland specifically, as there is a substantially beneficial context: above the average customers' awareness and sustainable consumer habits, legislation or investment of governments in circular economy projects.

Figure 4. Elements for an effective implementation of circularity for SMEs in the transition to a circular food system.



6 DISCUSSION

In this section, the results found in the previous section will be discussed. Firstly, practical implications for SMEs and other actors in the food system will be discussed, followed by the theoretical implications that this analysis brings to the current literature of SMEs, the circular economy, the food system, and transition theory. Finally, the limitations of this research will be presented.

6.1 Practical implications

As described in the previous chapter, relatively new-born small and medium-sized enterprises, and specially start-ups, are seen as frontrunners in the transition to a circular economy, they are bringing many significant innovations and thus solutions to the market. But not only this, they also develop new ways of doing business, leaving behind the business as usual (BAU) and developing new circular business models, rethinking the whole food system and providing a new holistic perspective of it.

In the case of established SMEs, their role might be different as if their business is not sustainable or circular from the beginning, they might have a lack of resources, especially to invest in research and development, and lack of specialised knowledge to incorporate circularity in their operations. However, as one of the interviewed experts expressed, established SMEs can start by making their processes more efficient so that they optimise resource use and save resources.

Regarding newer SMEs, including start-ups, the conclusion of the interviews is that they can have an important role in reshaping the current state of the system and use their innovations to make the industry more efficient and thus, accelerate the transition. However, one important role that SMEs could play and that one of the experts mentioned but it was only observed in one of the companies, is to educate. In fact, education of customers and suppliers in sustainable consumption habits is still one of the main challenges faced by SMEs, as many of the interviewees expressed. Communication and divulgation through social media, for instance, is essential to raise awareness, but also serves as a tool to enable stronger, closer and more meaningful customer relations.

In addition, following the adoption of the five elements identified in the previous chapter could also contribute to tackling the challenges they face. For instance, a better use of resources could help both new and established SMEs to save costs, but also shortening their supply chains and moving towards a local or regional economy could also help them tackle uncertainty of global problems, particularly in the future. In addition, collaborating with other actors to create stronger networks could contribute to break mindset and cultural barriers of suppliers, while educating consumers in sustainability topics could help them attract more consumers and increase their business. Moreover, collaborating could also

be used to partner with other actors in the industry to sum up bargaining power and push for new rules and laws that really benefit innovative practices, as Company E exemplified.

Other opportunities for SMEs with circular activities could be to make use of sharing platforms or marketplaces that enable companies to post there what kind of waste they have and what raw materials they need, so that other companies can buy, donate, sell or obtain for free all kinds of materials. Similarly, to break the knowledge challenge, SMEs can benefit from platforms such as Sustainability Leap (2022) to collaborate and share ideas on how to reduce consumption of water, energy, and reduce all kinds of waste. This specific platform is online and supported by the Finnish Environment Institute and was created with the aim to gather progressive practices into a single service to present the benefits of climate, circular economy and nature solutions and enable their replication.

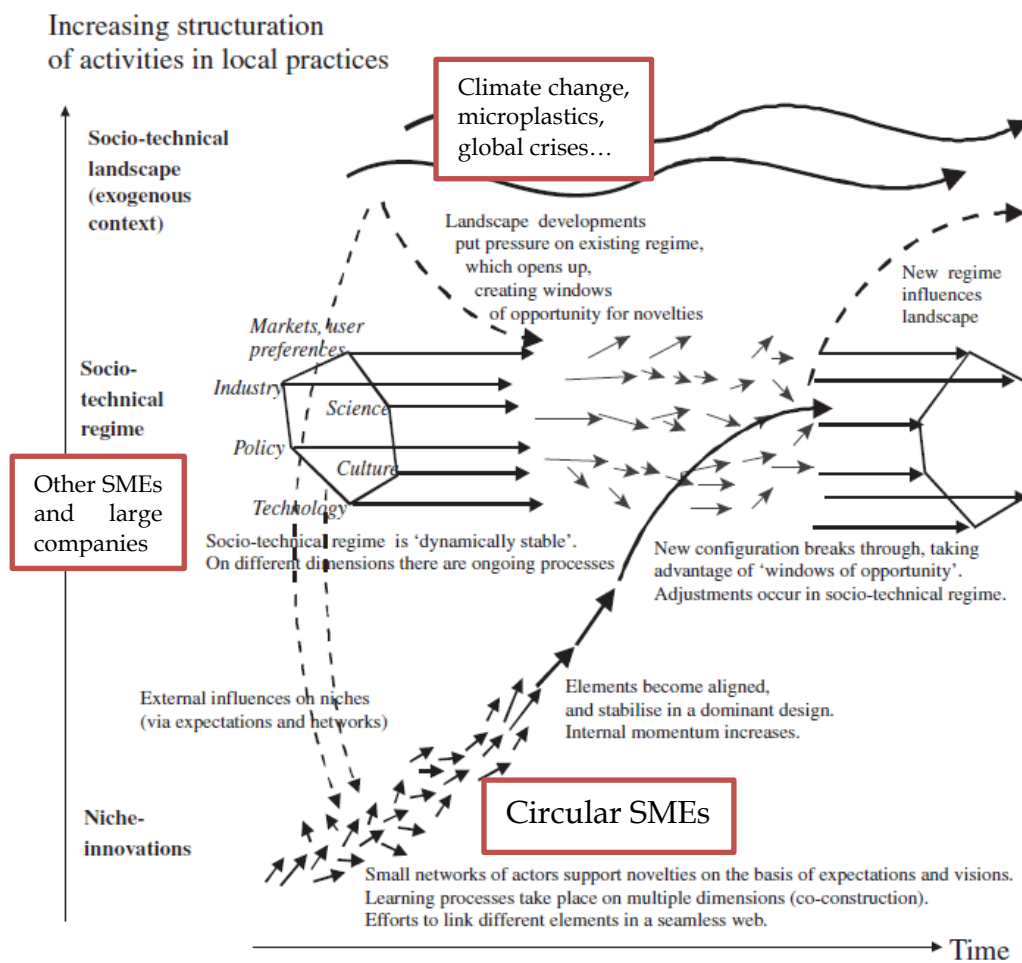
Furthermore, participation in food clusters such as the one in Vantaa that expert D mentioned can also help SMEs to break the knowledge challenge and an opportunity to enhance collaboration. In addition, to strengthen their position in the economy, SMEs can participate in open calls for circular economy projects by public institutions. For instance, the EIT Community has open calls for projects for SMEs, co-financed by the European Union, called Cross-KIC Call on Circular SMEs (2021).

In conclusion, as Zamfir et al. (2017) argue, businesses are one of the key actors in the circular transition, but especially the needs of SMEs must be better met, as stated firstly by the European Commission. Examples of SMEs' needs can be programs supporting important investments, infrastructure, technology and skills (European Commission, 2014).

6.2 Theoretical implications

The results of this study not only provide practical implications for small and medium-sized enterprises, but also provide new insights to the existing literature. As discussed previously, SMEs have been found to have a key role to play in the transition to a circular food system, which is to disrupt. This can be closely linked to transition theory and, in specific, multi-level perspective. Under this framework, SMEs act as actors in the niche level which are building on internal momentum by rethinking the food system and developing innovations, taking advantage of the pressures at the regime level such as climate change or political or economic global crises, and pushing for change at the landscape level to achieve a mainstream circular economy (Schot & Geels, 2008). At the landscape level, we see some governments and companies making changes towards a transition, culture is also slowly shifting towards circularity, and technology is advancing fast. However, to achieve a mainstream transition and see a new configuration at the landscape level, all actors need to work together in the same direction and create a systemic change, and for this, SMEs can play a key role.

Figure 5. Transition pathway to a circular food system.



Source: Adapted from Geels (2012).

Therefore, this study contributes to the existing literature by providing new prove to the fact that SMEs are key actors for the transition to a circular food system and finds five key roles that SMEs can play in this transition. In addition, this study contributes to the literature of transition theory by providing an image of where SMEs that already count with circular economy practices stand. Circular SMEs are developing innovations, thus supporting novelties, to make the circular economy mainstream in the socio-technical regime in the future.

6.3 Research limitations

This study, however, also counts with some research limitations. First of all, there are some limitations related to data collection since the language used in the interviews, i.e., English, is not the native language of any of the interviewees. It is important to remark that this might have led to limited quality of the responses as some interviewees felt they could not fully express their ideas. In addition to

this, interviews brought some limitations as they sometimes do not allow for deep reflection, since interviewees have to answer at the moment, and another method for data collection such as written interviews might have allowed to have more time to reflect on their answers and prepare a better, detailed and clearer response for each of the questions.

Regarding future research, a similar study could be performed with the views of established SMEs who are just beginning to think about the circular economy as well as with the views of large companies, in order to get a broader understanding of the additional challenges they face and what complementing roles these actors can play in the transition. In addition to this, future research could focus on other sectors such as textiles, electronic and electrical devices to analyse what SMEs are doing and their potential, but also the potential of other actors.

7 CONCLUSION

This study aimed to answer the three research questions about the role of small and medium-sized enterprises (SMEs) in the transition to a circular food system, as well as practical implications for SMEs such as challenges and effective implementation. The results of the analysis show that SMEs, especially fresh SMEs and start-ups, can play five important roles in the transition: to rethink, to fill gaps in the market, to connect, to innovate and to catalyse the transition. To connect and to innovate are specially highlighted by experts in the circular economy. In addition, four challenges faced by SMEs have been identified, which are the dependence of the Finnish food system on imported food which is frequently volatile, the mindset barrier of consumers and other actors that are not aware enough of sustainability issues, the lack of resources of which money was particularly emphasised and, finally, lack of supporting enough legislation in Finland and in Europe. Furthermore, five aspects for an effective implementation were identified and some of them have been found to tackle several of the challenges.

Circular SMEs have therefore been found to play an important role in the transition, which is to disrupt, but as the collected data shows, collaboration is key in this pathway, so it is essential that all other actors also get involved. Only when all actors work together in the same direction by collaborating instead of competing, the transition to a circular food system will be possible. Although the companies analysed in this study are Finnish and Finland has been studied as a concrete case, many of the findings can also apply to other European countries with similar circumstances. As global crises such as covid-19, the climate crisis or the Ukraine war unfold, it becomes more and more evident that there is food insecurity in Europe as well and this will only worsen in the future (The World Bank, 2022). Therefore, solutions such as the ones being developed by SMEs, including start-ups, need to be scaled up in order to achieve a mainstream-level sustainable food system. Circular economy, in particular, has been found to be a tool to fight food insecurity as well, as it makes the whole system more efficient. In addition, relying on local and regional economies can also decrease the dependence on long international supply chains and contribute to more resilient food systems.

In conclusion, the circular economy is proving to be an effective tool to combat many sustainability challenges in the food system at the same time, whereas they are environmental, social or economic problems. However, circular economy can also be applied to other sectors such as construction, consumption goods, energy or water, among others. And although it has been already seen to be applied at different levels, from small to large companies, and from municipalities to supranational administrations, there is still a lot to be done if a systemic and fully transformational change which can make a substantial difference is to be achieved.

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ANNEXES

Annex 1. Interview questions to managers of SMEs.

1st theme: Background of the company

- What is your position in your company and what are your responsibilities?
- How long have you been working there? / What year was the company founded?
- How many employees are currently working in the company?

2nd theme: Understanding of the concept of CE in the company

- How do you understand the concept of circular economy?
- How do you understand the concept of a circular food system?
- How do you see the importance of the circular economy for the food system?

3rd theme: Role of this specific SME in the Circular Economy

- Can you briefly explain what your business consists in?
- How does the company approach the circular economy in its operations? / What kind of practices in the circular economy is your company following?
- Why did you start following CE practices / decided to start a circular business?
- What opportunities or benefits do you perceive the circular economy is bringing to your company?
- What are the main challenges the company is facing in implementing these?
- Is your company working to be more circular? (What are your goals?) What are the main challenges for this?
- What global trends do you think are affecting your company and how? (Either or both positively and negatively).
- Is your company collaborating/cooperating with other actors across the industry or even from other industries? If so, how?
- From your company's perspective, what is the role/function of technology and digitalisation in implementing CE practices?
- Would you like to add something else?

Annex 2. Interview questions to circular economy experts.

1st theme: Background

- What is your current position?
- What is your background? Studies, previous positions...
- How did you start working with CE issues?

2nd theme: Understanding of the concept of CE

- How do you understand the concept of CE?
- How do you understand the concept of a circular food system?
- How do you see the importance of the circular economy for the food system?

3rd theme: Understanding of the role of SMEs in the CE

- What do you think are the main opportunities / benefits that the circular economy can bring to SMEs in the food system?
- What do you think are the main challenges for SMEs in the food system to follow CE practices?
- What global trends do you think are affecting Finnish SMEs in the food industry and how? Positively and negatively?
- How can collaboration/cooperation with other actors across the industry or other industries affect SMEs in the food industry?
- How can technology and digitalisation affect Finnish SMEs in the food industry (positively and negatively)?
- Do you know any more experts in the circular food system in Finland? And circular SMEs in the food industry?
- Would you like to add something else?