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ANALYZING FOOD WASTE REDUCTION FROM A STRATEGIC SUSTAINABILITY PERSPECTIVE

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ABSTRACT

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As the Earth is on the verge of a tipping point, food production has significant impacts on climate, biodiversity and human societies. Food waste contributes to the waste of valuable resources that would be needed to support the growing population of the planet. Collective human action is required to shift the current unsustainable practices toward more sustainable development of food systems. Food waste reduction activities generate value by saving edible food that would otherwise go to waste. This thesis takes a strategic sustainability approach to food waste reduction. The study serves as a first attempt to apply the framework for strategic sustainable development (FSSD) to the context of food waste reduction.

The theoretical framework of the study combines the findings of previous studies on food waste, food waste reduction and strategic sustainable development. The thesis addresses the urgency of activities that reduce food waste strategically by linking food waste reduction to achieving more sustainable food systems. The study sheds light on the categorization and the causes of food losses and waste at different levels of the food chain. The theoretical framework examines various strategies for food waste prevention, reduction and management as well as the value and impact of food waste reduction. Synthesis of the theory is constructed in the form of a strategic sustainability perspective on food waste reduction.

The data of this qualitative study consist of seven interviews conducted with professionals from the Finnish food waste sector. Interviewed professionals have gained experience in food waste reduction activities in business, NGOs and the public sector. The data were analyzed by following the inductive method, which includes both data-driven and theory-driven phases of qualitative content analysis. The analytical framework of the study was built on the five-level model of FSSD, focusing on three levels of the model: system, strategic guidelines and tools.

The system-level of the findings introduces the key stakeholders of food waste reduction activities and the basic concepts of the system where food waste is generated. The strategic guidelines -level of the findings identifies the key resources of food waste reduction activities and forms strategic guidelines for food waste reduction activities. The tools-level of the findings identifies six types of value that can be generated in food waste reduction activities: financial, social and nutritional value, biodiversity value, resource value and greenhouse gas reduction value. Findings suggest ways to measure and communicate the types of value to stakeholders. The tools-level also presents factors that affect the decision-making of consumers and other food chain actors on food waste reduction. The study suggests that decision-making could be supported by increasing consciousness about the impacts of food waste, reducing the stigma around food waste and increasing the know-how on how to utilize food waste ingredients.

The study discusses the relationship between food aid and food waste reduction and concludes that a food waste business can generate social value by providing an opportunity for food citizenship for the people in need. The thesis contributes to organizational practice by presenting three propositions. The study emphasizes that there is an existing gap between the perceived value of food waste reduction activities and concrete tools to measure and communicate the types of value to stakeholders. The study identifies people, logistics and financial resources as critical resources for food waste reduction activities. The study concludes that food waste reduction activities should be scaled to have an even more significant positive impact on the environment.

The study suggests that further research should continue developing the framework for strategic food waste reduction activities. The basic sustainability principles of the FSSD should be applied to the context of food waste reduction and define the vision of success for food waste reduction activities. Further research could shed light on how to organize the logistics of food waste reduction activities. The thesis notes that the biodiversity value of food waste reduction activities could be further examined to expand the perceived value of food waste reduction.

Keywords: food waste, food waste reduction, sustainable development, sustainability, food system

TIIVISTELMÄ

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Ruoantuotannolla on merkittäviä vaikutuksia ilmastoon, luonnon monimuotoisuuteen ja yhteiskuntaan. Kolmannes kaikesta tuotetusta ruoasta päätyy lopulta hävikkiin. Maapallon väestön kasvaessa ruoan tuottamiseen käytetyt arvokkaat resurssit pitäisi pystyä hyödyntämään. Ruokahävikin vähentäminen on osa kestävämpien ruokajärjestelmien kehitystä. Erilaiset ruokahävikkiä vähentävät tahot pelastavat ja hyödyntävät syömäkelpoista ruokaa, joka on vaarassa joutua jätteeksi. Tämä tutkimus ottaa strategisen kestävän kehityksen näkökulman ruokahävikin vähentämiseen. Tutkimus liittää strategisen kestävän kehityksen viitekehyksen (FSSD) ruokahävikin vähentämisen kontekstiin.

Tutkimuksen teoreettinen viitekehys yhdistää aiempaa tutkimusta ruokahävikistä, ruokahävikin vähentämisestä ja strategisesta kestävästä kehityksestä. Teoreettinen viitekehys valottaa ruokahävikin vähentämisen merkitystä osana kestävien ruokajärjestelmien kehitystä. Tutkimuksen teoria tuo esille tapoja kategorisoida ruokahävikkiä, hävikin syntymisen syitä eri ruokaketjun osissa sekä ruokahävikin vähentämisen strategioita, arvoa ja vaikutuksia. Teorian synteesi koostaa strategisen kestävän kehityksen näkökulman ruokahävikin vähentämiseen. Näkökulma yhdistyy tuloksissa empiiriseen aineistoon ruokahävikin vähentämisestä.

Tämän laadullisen tutkimuksen aineisto on koottu seitsemästä haastattelusta suomalaisten ruokahävikkiasiantuntijoiden kanssa. Haastatelluilla asiantuntijoilla on kokemusta ruokahävikin vähentämisestä yksityisellä, julkisella ja kolmannella sektorilla. Aineisto on analysoitu laadullisella sisällönanalyysillä. Tutkimuksen analyyttinen viitekehys nojaa FSSD-mallin kolmeen tasoon: systeemitasoon, strategisten ohjeiden tasoon ja työkalujen tasoon.

Tutkimuksen tulokset muodostavat strategisen ruokahävikin vähentämisen viitekehyksen. Tulosten systeemitaso esittelee ruokahävikin vähentämisen sidosryhmät sekä systeemin peruselementit. Tulosten strategisten ohjeiden taso tunnistaa ruokahävikin vähentämisen keskeiset resurssit ja muodostaa strategiset ohjeet resurssien kestävälle käytölle. Tulosten työkalujen taso tarkastelee ruokahävikin vähentämisen arvoa ja tunnistaa kuusi arvon osa-aluetta: taloudellisen, sosiaalisen ja ravitsemuksellisen arvon, resurssiarvon, biodiversiteettiarvon ja kasvihuonekaasupäästöjä vähentävän arvon. Tulokset esittävät konkreettisia keinoja arvon osa-alueiden mittaamiseen ja viestimiseen sidosryhmille. Tulokset käsittelevät myös kuluttajien ja muiden ruokaketjun toimijoiden päätöksentekoa, johon liittyen tutkimus esittää kolme päätöksentekoon vaikuttavaa tekijää: tietoisuus ruokahävikin vaikutuksista, ruokahävikkiin liittyvä stigma ja hävikkiainesten hyödyntämisen tietotaito.

Tutkimus osallistuu keskusteluun ruoka-avun ja ruokahävikin vähentämisen välisestä yhteydestä. Johtopäätökset nostavat esille, miten ruokahävikkiin keskittynyt liiketoiminta voi tuottaa sosiaalista arvoa, vastata ruoka-avun ennakoimattomuuteen liittyviin haasteisiin ja edesauttaa ruokakansalaisuuden saavuttamista. Tutkimuksen käytännön merkitys voidaan tiivistää seuraaviin kolmeen väitteeseen. Ruokahävikin vähentämisessä tunnistettu arvo ei vastaa mitattua ja viestittyä arvoa, vaan osa arvon osa-alueista jää mittaamatta ja viestimättä. Ihmiset, taloudelliset resurssit ja logistiikka ovat ruokahävikin vähentämisessä keskeisimmät resurssit. Ruokahävikin vähentämisen tapoja tulisi pyrkiä skaalaamaan, jotta toiminnalla olisi entistä merkittävämpi, positiivinen ympäristövaikutus.

Ruokahävikkiin keskittyvän tutkimuksen kannattaa jatkaa strategisen ruokahävikin vähentämisen viitekehyksen rakentamista. Jatkotutkimusaiheeksi ehdotetaan FSSD:n esittämien vastuullisuuden perusperiaatteiden tarkastelua ruokahävikin vähentämisen kontekstissa. Tutkimus voisi myös selvittää, miten ruokahävikkiä vähentävät tahot määrittelevät toiminnan vision ja miten ruokahävikin vähentämisen logistiikka voidaan järjestää tehokkaasti ruokaketjun eri toimijoiden yhteistyössä. Ruokahävikin vähentämisen biodiversiteettiarvon tarkastelu voi tarjota hedelmällisiä jatkotutkimusaiheita.

Avainsanat: ruokahävikki, ruokahävikin vähentäminen, kestävä ruokajärjestelmä, kestävä kehitys

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1 INTRODUCTION

1.1 Food surplus, losses and waste

The amount of food waste generated in the European Union each year is around 90 million tons (BIO Intelligence Service, 2010, 12–13). Food losses and waste contribute to waste of valuable resources and cause millions of tons of greenhouse gas emissions (Food and Agriculture Organization of the United Nations, 2017, 112). Furthermore, resources that are used to cultivate, produce, store and distribute food have also other environmental impacts such as increased water eutrophication (Katajajuuri, Silvennoinen, Hartikainen, Heikkilä & Reinikainen, 2014, 327). Food losses and waste stand in the way of transitioning towards environmentally sustainable food systems (FAO, 2017, 112). Moreover, food losses and waste negatively impact nutrition and go against food security (High Level Panel of Experts on Food Security and Nutrition, 2014, 35).

This study uses a definition of food waste presented by Katajajuuri and collegues (2014, 323), stating that food waste includes "all wasted food and raw material, that could have been consumed had it been stored or prepared differently". However, definitions of food loss, food waste and food surplus have varied in the previous literature. Food loss has been defined as "unintentional reductions in food quantity or quality before consumption, including postharvest losses" (International Food Policy Research Institute, 2016, 25). Food loss has also been defined as the loss "accidentally occurring for reasons not under the direct control of the agents concerned", including a lack of knowledge, skills or poor logistics (FAO, 2017, 112). It has been addressed that food loss could also include "the amount of food available for consumption at either retail or consumer levels but is not consumed", as well as loss from mould or natural shrinkage (Buzby, Hyman, Stewart & Wells, 2011, 495).

Food waste has been linked to an element of intended or unintended behaviour, and that it could include food that is removed by choice or negligence, even though it would still be fit for consumption (FAO, 2017, 112). Food waste has been considered a subset of food loss (Buzby et al., 2011, 495). Food losses and waste (FLW) have been defined to include all deliberately discarded food that is still fit for human consumption (IFPRI, 2016, 25). In addition to more traditional definitions of food waste, a new term 'side flow' (SF) has been introduced by

Hartikainen, Mogensen, Svanes and Franke (2018) in the context of primary production, and the term is used as a synonym for food waste. A more expansive definition called 'potential food loss and waste' (PFLW) has also been presented. PFLW consists of food loss and waste generated along all stages of the food value chain, including crops lost before harvest and food that is not produced because of the lack of appropriate agricultural inputs (IFPRI, 2016, 24–25).

Previous research on food waste has focused on e.g. retail level (Cicatiello, Franco, Pancino & Blasi, 2016; Buzby et al., 2011), primary production (Hartikainen et al., 2018), water footprint (Ridoutt, Juliano, Sanguansri & Sellahewa, 2010), food service sector (Silvennoinen, Heikkilä, Katajajuuri & Reinikainen, 2015; Boschini, Falasconi, Cicatiello & Franco, 2020; Martin-Rios, Demen-Meier, Gössling & Cornuz, 2018), consumer-level (Buzby et al., 2011; Borrello, Caracciolo, Lombardi, Pascucci & Cembalo, 2017; Elimelech, Ayalon & Ert, 2018) and hospitals (Williams & Walton, 2011; Dias-Ferreira, Santos & Oliveira, 2015).

Previous research on food waste in the Finnish food chain has examined the volume and composition of avoidable food waste in Finland (Katajajuuri et al., 2014) and food waste generated in the Finnish food service sector (Silvennoinen et al., 2015). It has been estimated that the food waste in the Finnish food chain is around 425–535 million kilos per year, corresponding up to 80–100 kilos of food waste per person per year (Hartikainen, Kuisma, Pinolehto, Räikkönen & Kahiluoto, 2014, 49). The climate impact of Finnish household food waste is approximately 350 million kilos of CO2-equivalent per year, which equals to the annual carbon dioxide emissions of 100 000 cars (Katajajuuri et al., 2014, 326). On the European level, the climate impact of food waste including the food chain and food waste management is around 186 megatons of CO2-equivalent per year (Scherhaufer, Moates, Hartikainen, Waldron & Obersteiner, 2018, 112).

When it comes to the reduction of food waste in Finland, some challenges have been discovered. In the context of Finnish food service sector, one of the main challenges is minimizing buffet service waste (Silvennoinen et al., 2015, 141). Although food waste is carefully weighed and documented by Finnish retail chains, they are not willing to publish exact information on their food waste since it is considered a strategic element (Katajajuuri et al., 2014, 324). To find comprehensive solutions for food waste reduction, various stakeholders of the Finnish food system would focus on the roles of consumers, public food sector services,

production and retail, as well as cooperation between different food system actors (Saarinen et al., 2019, 110). This thesis contributes to this by focusing on food waste reduction activities that collaborate with different food system actors and try to reach consumers.

Food waste reduction is considered important at both micro- and macroeconomic levels (Katajajuuri et al., 2014, 328). To succeed in food waste reduction, previous research has highlighted the role of careful planning, good management, documenting food waste data and regular weighing of food waste (Silvennoinen et al., 2015, 144). In addition to this, better coordination between manufacturers and retailers, campaigns that raise public awareness and voluntary industry agreements have been presented as approaches for food waste reduction (Garnett, 2011, 28). Alternative food sharing models have been categorized from the perspective of sharing economy: "sharing for charity", "sharing for money" and "sharing for the community" (Michelini, Principato & Iasevoli, 2018). Furthermore, it has been addressed that increasing the perceived value of food, including also other than monetary values such as the value of social interaction or quality, could help reduce food waste (Hebrok & Heidenstrøm, 2019, 1443). This study contributes to this by examining additional types of value that could be generated in food waste reduction activities. The thesis also attempts to provide tools to measure and communicate different types of value to stakeholders, to enable strategic food waste reduction.

Consumers' role and responsibility in food waste reduction have been assessed in the previous research. This thesis participates in the discussion since many of the interviewed food waste professionals have gained expertise on food waste reduction activities at the consumer-level. On the one hand, previous research has focused on the role of consumer acceptance and attitudes towards utilizing food waste ingredients (Bhatt, Lee, Deutsch, Ayaz, Fulton & Suri, 2018) as well as consumers' willingness to participate in the food waste reduction practices (Borrello et al., 2017). On the other hand, previous research has stated that consumers' abilities to reduce food waste depend on their resources (Närvänen, Mattila & Mesiranta, 2019). It has been argued that consumer awareness campaigns on food waste may fail to address the everyday practices that influence food waste levels (Hebrok & Heidenstrøm, 2019). Consumer-citizen roles of reducing food waste have been introduced, including the roles of choice-makers, carriers of practices and leaders of change (Närvänen et al., 2019, 270). Social media has created opportunities for consumers to participate in the discussion of food waste reduction and share their approach to it (Närvänen, Mesiranta, Sutinen & Mattila, 2018).

This thesis aims to contribute to the previous research by analyzing food waste reduction from a strategic sustainability perspective. Strategic sustainability is approached by applying the Framework for Strategic Sustainable Development (FSSD) (Broman & Robèrt, 2017). The FSSD, as well as this thesis, uses the Brundtland definition of sustainable development: "sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987).

This thesis serves as a first attempt to apply the FSSD to the context of food waste reduction. The FSSD has previously been concluded to support structuring the analysis in the complex sustainability context (Broman & Robèrt, 2017, 27). The framework can help expand the organization's view on key resources and assess future resource availability (França, Broman, Robèrt, Basile & Trygg, 2017, 164). In the context of this thesis, the framework is used for assessing the resources and tools that are needed for strategic food waste reduction activities. The FSSD helps build an understanding of the system where food waste is generated and form strategic guidelines for food waste reduction activities. The overall goal of the thesis is to construct a framework for strategic food waste reduction activities.

1.2 Research problem and research questions

This thesis analyzes food waste reduction from a strategic sustainability perspective. Strategic sustainability perspective on food waste reduction is constructed in the theoretical framework of the study. The empirical data of the study consist of interviews of Finnish food waste professionals, working in public and private sector and NGOs. The thesis connects the theoretical framework to the empirical data of food waste reduction activities. The overall goal of the study is to construct a framework for strategic food waste reduction activities.

The goal is to be reached by answering the following research question:

How can food waste reduction activities be developed from a strategic sustainability perspective?

The research question will be answered with the help of the following two questions:

1. What are the strategic guidelines for food waste reduction activities?
2. How can the value of food waste reduction activities be measured and communicated?

These two questions examine both the theoretical framework of the thesis as well as the empirical data.

1.3 Research process

The research project often starts with the idea of the research topic that the thesis author finds interesting, which was also the case with this thesis study. The research topic is the broad subject matter area, and research questions define, what issues are studied in the project (Eriksson & Kovalainen, 2008, 27). Food waste was selected as a broad research topic based on the author's interest. At first, the author visited a food waste restaurant and discussed with the CEO to get some inspiration and further knowledge on the topic. This helped to frame the first version of the research question and write a research plan. The research process started with writing a literature review that consisted of articles of food waste reduction and helped to familiarize on the topic more thoroughly. The research process is presented in the following figure (Fig. 1).

The second phase of the process included finding interviewees and conducting the interviews. The first round of interviews was conducted in May 2019. Interviewees were selected based on their knowledge and experience on food waste reduction. The data received from the interviews were then transcribed and read through multiple times. Since framing the research topic and refining research questions is often an iterative process by nature instead of a linear one (Eriksson & Kovalainen, 2008, 27; Hirsjärvi & Hurme, 2008, 15), the second round of interviews was conducted based on knowledge received from the first round.

The second round of interviews was conducted a year later, between May and June in 2020. While conducting the second round of interviews, the Framework for Strategic Sustainable Development was applied to the theoretical framework of the study. The FSSD was visioned to support having a strategic approach to food waste reduction. The FSSD has not been applied previously to the context of food waste reduction, which was an interesting starting point. In

addition to this, previous research on food waste reduction, the impacts of food waste and the value of food waste reduction was added to the theoretical framework along the process.

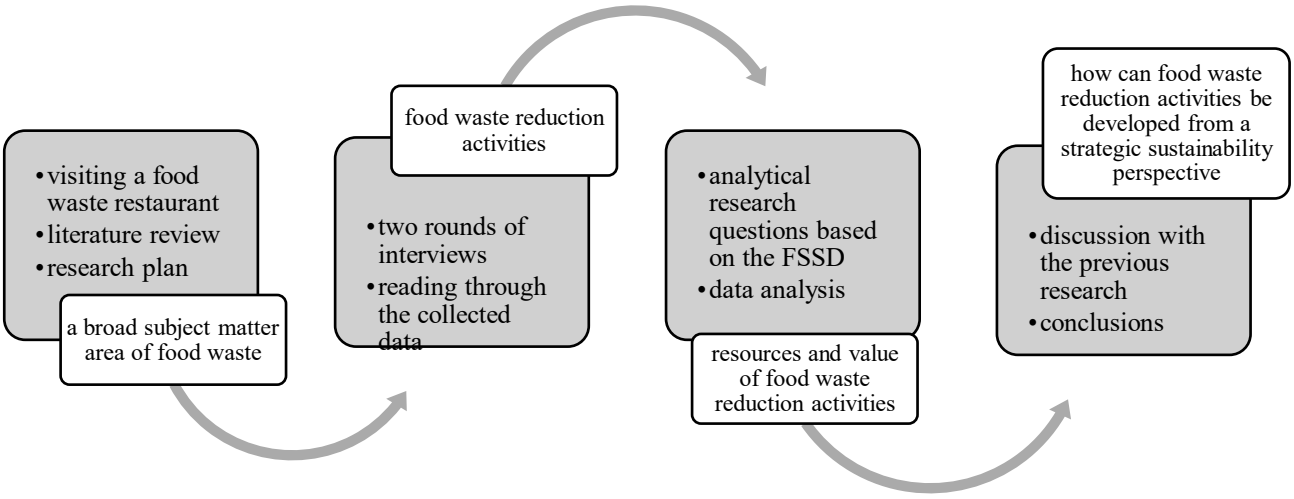

Figure 1. Research process and the development of the main research question

A circular research process offers a more realistic picture than a linear one since it is almost necessary to move back and forth during the research process (Eriksson & Kovalainen, 2008, 31). Research questions were examined and reframed continuously during the research process. The figure above (Fig. 1) presents the development and refinement of the main research question during the process. After the second round of interviews was transcribed and the data were clustered, the author created analytical research questions based on the FSSD. The FSSD consists of various levels and principles, which meant that it could be used only in parts to stay within the scope of a thesis. The decision of what parts were to be included in the study was made during the data analysis. The data analysis was conducted between June and August 2020. The findings of the study were written in September 2020, which was followed by writing conclusions. The research process came to an end in November 2020 after refining the thesis as a whole.

1.4 Structure of the thesis

The structure of this thesis has been built as follows. The first chapter of the thesis focuses on introducing the broad subject matter area of food waste and the importance of food waste

reduction. This is followed by an overview of the research process and the structure of the thesis.

The second chapter of the thesis sheds light on the theoretical framework of the thesis. The chapter begins by focusing on strategic sustainability and sustainable development of food systems. The chapter then goes through previous research on food surplus, losses and waste. This includes categorization of food waste, the causes of food waste and measuring methods of food waste. The theoretical framework proceeds to examine food waste prevention, reduction and management, the environmental and social impacts of food waste and the value of food waste reduction.

The third chapter of the thesis presents the methodology of the study. The chapter begins by presenting the key methodological decisions that were made at the beginning of the research process. The chapter then proceeds to describe the data collection and data analysis. The structure of the findings is presented already at the end of the third chapter.

The fourth chapter includes the findings of the study. Findings are constructed in the form of a five-level model of the FSSD. However, not all levels are included in the study to stay within the scope of a thesis.

The fifth chapter of the thesis includes the discussion and conclusions of the theoretical and organizational contribution of the thesis. Conclusions present three propositions that sum up the main conclusions of the study. The fifth chapter ends the thesis with the evaluation of research and suggestions for further research.

2 FOOD WASTE AND STRATEGIC SUSTAINABILITY

2.1 Strategic sustainable development

2.1.1 Climate change and food systems

Greta Thunberg began her speech in World Economic Forum 2019 by stating that "our house is on fire" (Fridays for Future, 2019). That was quite accurate since recent research has explored the risk that the Earth System might be approaching a planetary threshold that would lock in a continuing pathway toward much hotter conditions (Steffen et al., 2018, 6). This so-called Hothouse Earth pathway would include disruptive impacts on human societies (Steffen et al., 2018, 6). The gradual decline of the biosphere's potential to sustain human civilization in connection with growing societal needs can be described with a metaphor of a funnel (Robèrt, Broman & Basile, 2013, 2). The funnel presents the sustainability challenge, a decreasing window of opportunity (Ny, 2009, 223). The walls of the funnel are a representation of decreasing economic accessibility of natural resources and increasing levels of pollution, and they create even harsher constraints on human societies in the future (Robèrt et al., 2013, 2).

The systematically decreasing potential for the wellbeing of humankind has symptoms that are often seen as 'ordinary' environmental and societal problems, that are a 'cost' of the 'benefits' gained from today's practices (Broman & Robèrt, 2017, 18–19). Collective human action is required to stabilize the Earth in a habitable state, which may include decarbonization of the global economy, behavioural changes and technological innovations (Steffen et al., 2018). Underestimation of the sustainability challenge means missed possibilities for root solutions (Broman & Robèrt, 2017, 18–19). Humanity is facing critical decisions. Food waste prevention can play a significant role in mitigating global warming (Scherhaufer et al., 2018, 112).

The world population is likely to reach 9.7 billion by 2050 (United Nations, 2019, 1). Global population growth will result in even higher global demand for food and harsher environmental pressures (Thyberg & Tonjes, 2016, 114). The United Nations addresses that one-third of all food produced is going to waste each year, while almost 1 billion people go undernourished and 1 billion people go hungry (UN, 2020b). Altering weather conditions due to climate change contribute to increasing food losses in areas that are already experiencing difficulty providing

enough food for the community (FAO, 2017, 113). Meanwhile, the food sector is responsible for around 30% of the world's total energy consumption and produces around 22% of the world's total greenhouse gas emissions (UN, 2020b). This implies that the sustainability of food systems plays an essential role in achieving environmentally and socially sustainable development.

2.1.2 Sustainable development of food systems

A sustainable food system has been described as "one that efficiently meets current and emerging demand for food without jeopardizing the availability of scarce natural resources" (IFPRI, 2016, 9). A sustainable food system has also been defined as "a food system that ensures food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition of future generations are not compromised" (HLPE, 2014, 29). The United Nations has set targets to ensure the sustainability of food production systems and help maintain ecosystems by 2030 (UN, 2020a). Food losses and waste are considered a key challenge for the sustainability of food systems (Boschini et al., 2020, 11).

However, there is an existing need to clarify what dimensions of sustainability should be included in a sustainable food system and in what way (Béné et al., 2019, 127). Communities may find it difficult to understand their role in a national or global system of food and engage in strategic action that would support a global sustainable food system (Carlsson, Callaghan, Morley & Broman, 2017, 3). Furthermore, it has been pointed out that incremental costs of efforts to reach zero or very low levels of food loss could overweigh the social, environmental and economic benefits of reduction (HLPE, 2014, 32).

Food loss and waste have been included in the environmental dimension of sustainable food system development (FAO, 2018, 4). A shift towards reterritorialization and relocalisation of food systems, including short food chains and new ways of reducing food waste, has been introduced as an opportunity for achieving more sustainable food systems (International Panel of Experts on Sustainable food systems, 2019, 7). Previous research has drafted a plan of actions for achieving a sustainable food system. The plan presents a shift from a food system to a sustainable food system, which includes systematic consideration for food wastes (Béné et al., 2019, 125). Adding to that, increasing the efficiency of resource use has been proposed to

improve the environmental, social and economic performance of food systems (HLPE, 2014, 34).

The UN has set a target to halve per capita global food waste at consumer and retail levels and reduce food losses along production and food chain by 2030 (UN, 2020b). This has been considered a significant step towards reducing the environmental impacts of food waste (Scherhaufer et al., 2018, 99). The European Union has presented a Circular Economy Package to contribute to this target, which includes actions to reduce food waste, such as a common measurement methodology for food waste (European Parliament, 2020). However, it has been argued that instead of sparking a broader shift in values, the Circular Economy Package risks further institutionalizing food banks as recipients of surplus food (IPES-Food, 2019, 89). This thesis contributes to discussions on the relationship of food aid and food waste reduction. The study also considers the environmental impacts of food waste. The thesis endeavours to make new connections between theory and practise by constructing a framework for strategic food waste reduction activities.

2.1.3 Framework for Strategic Sustainable Development

First steps towards developing a unifying definition of sustainability and the Framework for Strategic Sustainable Development (FSSD) were taken in the 1990s by Karl-Henrik Robèrt (Broman & Robèrt, 2017, 17). This was followed by research on backcasting, which refers to an idea of planning from a future vision: what should we do today to get to the desired outcome in the future (Holmberg & Robèrt, 2000, 305). It was argued that we should think upstream in cause-effect chains and remove the underlying sources of problems (Robèrt, 2000, 244). The framework was then called the Natural Step Framework (TNS) and it presented an "A, B, C, D Analysis" (Robèrt, 2002). The study by Robèrt (2000) already presented an early version of the five-level model, which is further introduced in the next section of the thesis. The current version of the FSSD presents an outcome of an over 25-year learning process between practitioners and scientists (Broman & Robèrt, 2017, 18).

The FSSD enables organizations to thoroughly understand and put themselves in the context of the global sustainability challenge, in this case, food waste, and move strategically towards sustainability (Broman & Róbert, 2017, 17). The framework consists of basic principles for sustainability, as well as a planning mechanism for how to approach their fulfilment (Robèrt et

al., 2013, 2). This makes it a suitable framework for global sustainability problems, such as the issue of food waste. FSSD is built on the need of establishing a more thorough understanding of the magnitude and urgency of the sustainability challenge, to have sustainability as even a possible outcome (Broman & Robèrt, 2017, 18). Executives may find it hard to deal with the sustainable development concept, since they may find it somewhat fuzzy (Rauter, Jonker & Baumgartner, 2017, 151). In fact, one of the key messages of the FSSD is that many leaders do not typically understand how many of the problems they face can be rooted in a few overriding mechanisms of destruction of social and ecological systems (Broman & Robèrt, 2017, 18).

The FSSD has previously been implemented in studies focusing on planetary boundaries (Róbert et al., 2013), the drivers in developing business models for sustainability (Rauter et al., 2017) and integrating a set of sustainability principles into a governance maturity grid (Allais, Roucoules & Reyes, 2017). Previous research by the core group behind the FSSD has already highlighted a need for changes in agriculture, including the development of methods of using household waste (Robèrt, 2002, 229). However, this thesis serves as a first attempt to apply the FSSD, as it is today, to the context of food waste reduction. FSSD is considered a necessary tool for creating clarity to the assessment of sustainability activities since there is a lack of a specific goal in terms of sustainability (Rauter et al., 2017). This is why the FSSD is considered a useful framework for examining strategic food waste reduction activities in this thesis.

2.1.4 The five-level model of FSSD

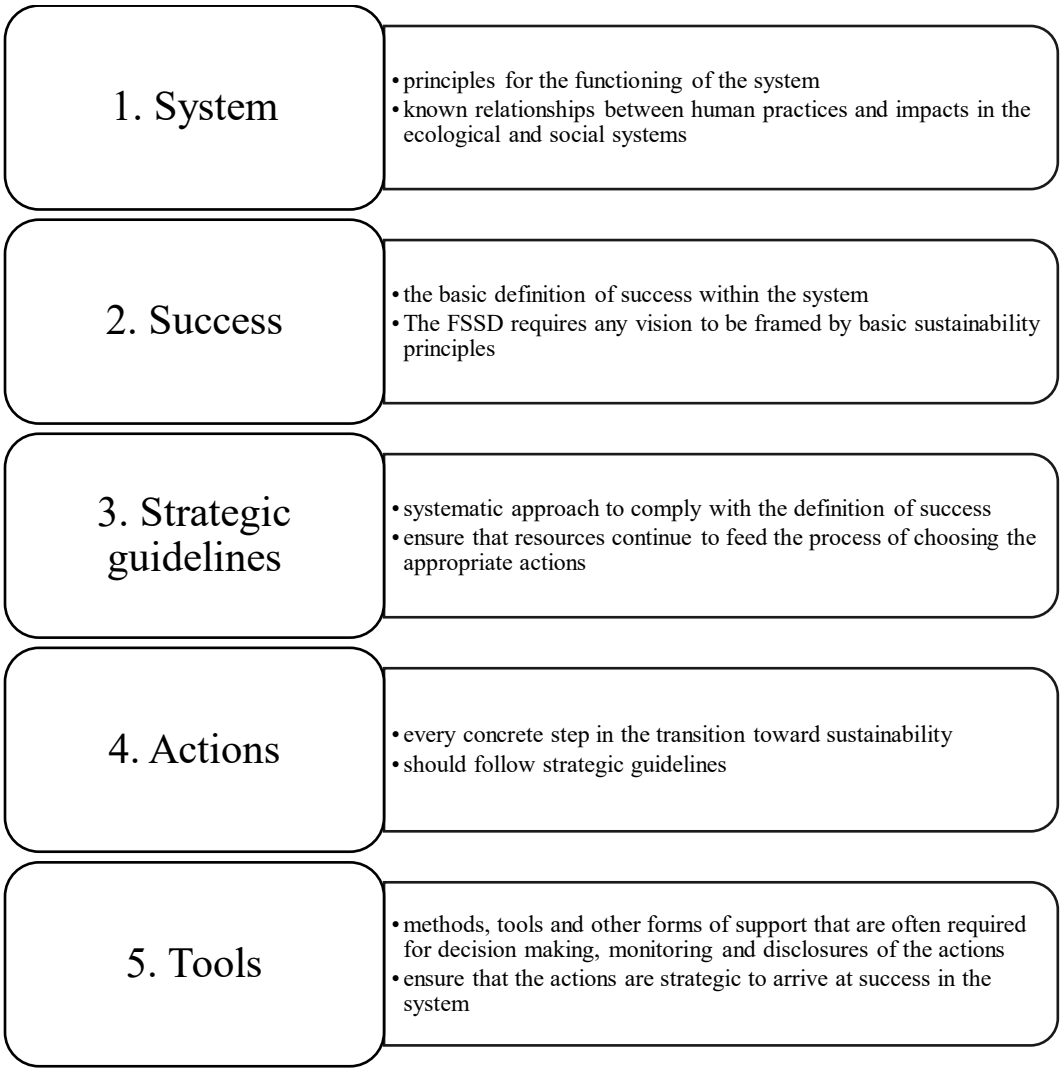

Figure 2. The five-level model of Framework for Strategic Sustainable Development (Adapted from Broman & Robèrt, 2017 and Ny, 2009)

The five-level model of FSSD clarifies the differences as well as inter-relationships between entities of a different character (Broman & Robèrt, 2017, 22). The model is presented in the figure above (Fig. 2). The first level is called the system, which represents the overall functioning of the system, and should be studied thoroughly enough to form a basic definition of success within the system (Ny, 2009, 220). The success-level is the second level of the model. It includes the definition of the vision and may also include additional success criteria like core values or core purpose, depending on the needs of the organization (Broman & Robèrt, 2017, 22). The third level of the model is called strategic guidelines -level. It presents a systematic

approach to comply with the definition of success, framed at the second level of the model (Ny, 2009, 221).

The fourth level of the model is called actions. The actions-level includes all concrete actions within a strategic plan, and these selected actions follow the strategic guidelines and the vision from previous levels of the model (Broman & Robèrt, 2017, 22). The fifth level, which is called tools, includes various forms of support that are needed for decision-making and systematic monitoring of the actions to ensure that they are chosen by the strategic guidelines (Broman & Robèrt, 2017, 22; Ny, 2009, 221). Strategic progress toward sustainability cannot be achieved by focusing on gaining ever more knowledge about the system-level (Ny, 2009, 221). All five levels of the model are needed since they represent inter-related levels of strategic planning (Robèrt, 2000, 252). The five-level model has been developed during the years. It was already presented in 2000 when the model included levels of principles of the ecosphere, system conditions, strategy, activities and concepts and tools (Robèrt, 2000, 249).

In previous research, the five-level model has been applied to topics such as structuring "relational leadership processes that support the development of strongly sustainable business model designs" (Kurucz, Colbert, Lüdeke-Freund, Upward & Willard, 2017, 193) and crafting a sustainable fashion industry (Cataldi, Dickson & Grover, 2013). The five-level model has also been applied to a context of sustainable food systems (Carlsson et al., 2017). The study contributes to research on sustainable food systems by addressing that the needs and priorities of communities should be accommodated in a way that it builds toward a sustainable global system (Carlsson et al., 2017, 11). Since the FSSD has already been applied to previous research on sustainable food systems, it is also considered applicable to this study on food waste reduction.

However, the findings of this thesis only include three levels of the five-level model of FSSD, to stay within the scope of a thesis. The selected levels are the levels of system, strategic guidelines and tools. The system-level was chosen since it is important to understand the system enough, to be able to approach other levels of the model (França et al., 2017, 159). In this thesis, the system-level is defined as "the system where food waste is generated". The thesis presents the success-level in the synthesis of the findings, as part of the framework for strategic food waste reduction activities. However, the level of success is not further analyzed in this thesis. Other levels of the model, strategic guidelines and tools, were chosen based on their emergence

from the collected data. The actions-level was not included in this thesis, to stay within the scope of a thesis.

2.2 Food losses and waste

2.2.1 Categorizing and measuring food waste

Food waste has been categorized in originally edible and inedible food waste (Silvennoinen et al., 2015) as well as avoidable and unavoidable food waste (Katajajuuri et al., 2014; Martin-Rios et al., 2018; Elimelech et al., 2018). Originally inedible food has been called "bio waste", including e.g. inedible parts of vegetables, coffee grounds, vegetable peelings and bones (Silvennoinen et al., 2015, 142). Avoidable food waste has been described as "food that is suitable for human consumption" (Elimelech et al., 2018, 74) and "all wasted food and raw material, that could have been consumed had it been stored or prepared differently" (Katajajuuri et al., 2014, 323). Furthermore, avoidable food waste has been further classified according to its state of consumption: food leftovers, unidentified food items, partly consumed food and unconsumed food (Elimelech et al., 2018, 75). Unavoidable food waste has been described to include food waste such as food scraps, packaging defects and unavoidable preparation waste in the kitchen (Martin-Rios et al., 2018).

However, the categorization of food losses and waste has been criticized by arguing that there is no universal standard of what is or is not edible (Teigiserova, Hamelin & Thomsen, 2020, 3). Chosen food waste definitions and system boundaries impact the final results and conclusions of studies (Hartikainen et al., 2018, 509). Different boundaries for definitions lead to results that are difficult to use to feed action plans (Teigiserova et al., 2020, 3). This is why definitions should be carefully selected and presented (Hartikainen et al., 2018, 509). Moreover, Teigiserova and colleagues (2020) suggest that in the face of upcoming era of the circular economy, food surplus, waste and losses should be distinguished in six categories, presented in the following table (Table 1).

Table 1. Categorization of food surplus, waste and losses in connection with edibility and possibility of avoidance
(Adapted from Teigiserova et al., 2020)

Categorization of food surplus, waste and loss	**Feedstock examples**
Surplus food – edible and avoidable	I All edible food that can still be eaten by humans
Food waste – inedible and unavoidable	II Naturally inedible (ex. bones, pits, leaves)
Food waste – inedible and unavoidable	III Processing waste residues (ex. tea leaves)
Food waste – inedible and partly avoidable	IV Became inedible due to natural causes (crops damaged due to weather)
Food waste – inedible and partly avoidable	V Became inedible due to bad management a. lack of resources b. negligence
Food loss	VI Not accounted for e.g. disappearing from accounting

Previous research has examined methods for measuring food waste. The methods have been categorized in three major types: a top-down approach where data are based on extrapolation of existing waste databases or mass balance, self-reporting methods, and physical waste surveys (Elimelech et al., 2018, 69–70). Self-reporting methods have been contested by arguing that personal estimates are a poor reflection of the actual amounts of food waste (Silvennoinen et al., 2015, 144). Interviews and waste diaries, that are included in self-reporting methods, are considered costly and only suitable for small samples (Elimelech et al., 2018, 70).

2.2.2 Causes of food losses and waste

Understanding the main causes of food losses and waste is important to effectively prevent and reduce food waste (Boschini et al., 2020, 1). There are several causes involved in food waste and these differ for product categories and individuals (Aschemann-Witzel, de Hooge, Amani, Bech-Larsen & Oostindjer, 2015, 6465). More than 40% of the food losses in industrialized countries occur at retail and consumer levels, while 40% of the food losses in developing countries occur earlier in the chain (FAO, 2011, 5). Causes of food losses and waste have been categorized in many ways in previous research, including by the levels of the food chain (Buzby et al., 2011), which is presented in the following table (Table 2).

Table 2. Food chain levels and causes for food losses
(Adapted from Buzby et al., 2011)

Level of the Food Losses	Causes for the Food Losses
Farm-Level, "Postharvest Loss"	• Crops becoming more prone to disease or spoilage during storage or transport (connected to conditions prior harvesting) • Mechanized harvesters may cause crop damage • Not meeting the quality standards by major supermarket chains
Processing and Retail -Level	• Natural shrinkage and deterioration • Transportation and handling damage • Improper packaging • Expired dell-by dates • Mold and pest infestations • Overstocking • Improper stock rotation • Additional trimming of edible parts • Failure of new product introduction
Consumer-Level	• Expanded menu choices at restaurants etc. • Overpreparation • Cooking loss • Plate waste • Product spillage and breakage • Consumer intolerance for substandard foods • Supersized portions

Causes presented in the Preparatory study on food waste across EU 27 (BIOIS, 2010) add to the categorization by Buzby and collegues (2011) by addressing various causes in the household sector. The causes include a lack of awareness of the quantity of food waste generated individually, a lack of knowledge on how to use food efficiently and cooking with available ingredients, and attitudes toward food (BIOIS, 2010, 10). A lack of connection between consumers and the production of food has also been identified as a possible cause for food waste generation at the consumer-level (Aschemann-Witzel et al., 2015, 6466).

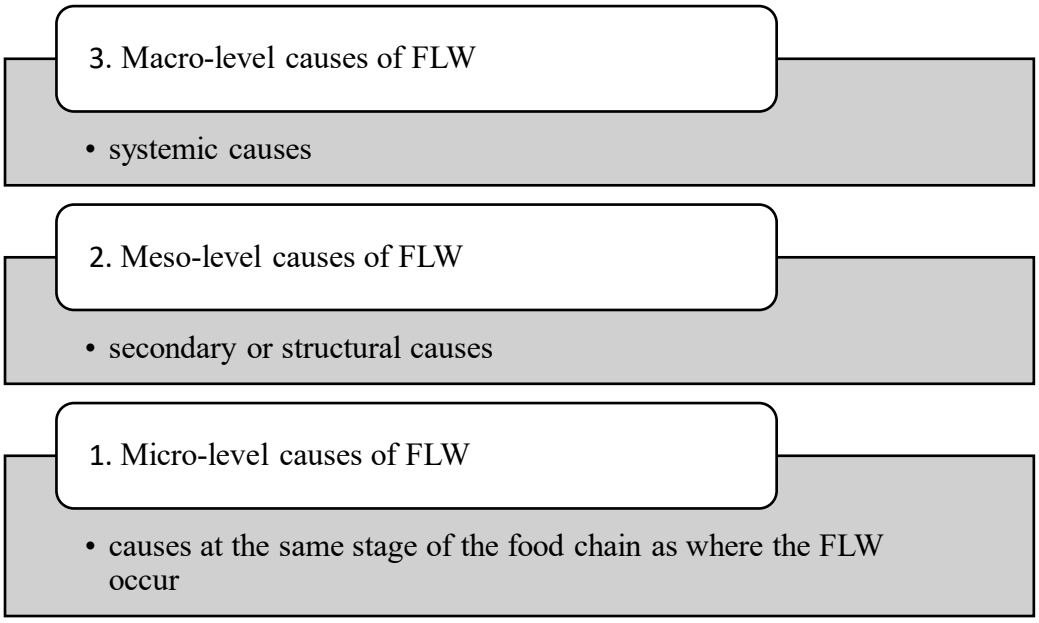

Figure 3. Causes of food losses and food waste
(Adapted from HLPE, 2014)

High Level Panel of Experts on Food Security and Nutrition (HLPE, 2014) has organized the causes of food losses and waste (FLW) in three different levels, which are presented in the figure above (Fig. 3). Food losses and waste at the micro-level result from the actions as well as non-actions of individual actors of the same stage (HLPE, 2014, 13). Secondary or structural causes of food losses and waste are included in the meso-level of causes. At the meso-level, food losses and waste can be generated by how different actors are organized together or from their relationships along the food chain (HLPE, 2014, 13).

Systemic causes of food losses and waste, presented at the macro-level of causes, include causes such as the lack of policy conditions to enable investments (HLPE, 2014, 13). Macro-economic factors of technology, legislation and economic incentives and disincentives have been introduced as causes of inefficiencies, oversupply and food wastage (Aschemann-Witzel et al., 2015, 6467). Mass production of cheap food generates systemic surplus and waste, which builds reliance on food banks (IPES-Food, 2019, 76). Systemic causes are a major reason for the global situation of food losses and waste, and they favour the emergence of all the other causes of food losses and waste of all levels (HLPE, 2014, 13). This thesis examines food waste mainly at the micro- and meso-levels of the model, including relationships along the food chain and direct

actions of consumers towards food waste reduction. However, the macro-level is also addressed when discussing the role of regulation in food waste reduction.

2.3 Food waste reduction

2.3.1 Food waste prevention, reduction and management

Food waste prevention at the source, which means keeping edible food edible, should obtain the greatest efforts in food waste management (Teigiserova et al., 2020, 4). Mechanisms to prevent food waste by focusing on the attitudes and behaviours that generate food waste have been addressed by Thyberg and Tonjes (2016). The study suggests that to successfully prevent food waste, a package of prevention policies is needed and that it should include at least three key aspects: Values, Skills and Logistics (Thyberg & Tonjes, 2016, 120). Suggested prevention policies are presented in the following table (Table 3).

Table 3. Potential food waste prevention policies
(Thyberg & Tonjes, 2016)

Category	Prevention policy
Values	Education to promote the importance of food waste prevention in terms of environmental, social, and economic impacts
Skills	Education to promote behaviour changes
Logistics	Encourage food redistribution/donation policies (for edible retail and commercial food)
	Promote food redistribution to animal feed
	Incentivize food waste prevention
	Increase research and development
	Improve food packaging
	Improve food date labelling
	Change waste collection system design
	Change the treatment of collected wastes
	Mandate targets for prevention

Thyberg and Tonjes (2016) include the improvement of food packaging and date labelling to their prevention policies, as presented above. Packaging methods and materials have been implied to impact the lifespan of food products (BIOIS, 2010, 10; Garnett, 2011, 28). The role of packaging in reducing household food waste has been addressed by Williams, Wikström, Otterbring, Löfgren and Gustafsson (2012). Their study concludes that 20–25% of the household food waste is somehow related to packaging design attributes such as "easy to empty" or "information attribute best-before-date" (Williams et al., 2012, 147). Furthermore, the study suggests that we still have a lot to do before consumers realize how food waste should be kept as a more important environmental issue than reducing packaging waste (Williams et al., 2012, 147).

Food waste reduction strategies related to specific food system sectors or food chain actors have been presented in previous research. Consumers' willingness to participate in closed loops for reducing food waste has been examined as a possible solution for food waste reduction, concluding that consumers want to be rewarded for their efforts in participating in a circular loop (Borrello et al., 2017). In the context of hospitals, various food waste reduction measures have been suggested including measures such as switching from a plated to a bulk system for meal delivery (Dias-Ferreira et al., 2015, 152) and training of nursing and food service delivery staff to actively encourage patients to eat and avoid negative comments (Williams & Walton, 2011, 239). However, it needs to be noted that better cooperation within the entire supply chain, including government support, is needed for sustainable food waste solutions (Katajajuuri et al., 2014, 328).

The current research has questioned consumers' opportunities and responsibility to reduce food waste. Even if consumers are trying to avoid wasting food, they may not be reflective of everyday routines and practices that contribute to food waste (Närvänen et al., 2019, 271). The current information and awareness campaigns may fail to target important everyday practices that are influencing the levels of food waste (Hebrok & Heidenstrøm, 2019, 1445). The contemporary environmental policy has also been criticized for relying on the ABC paradigm – attitude, behaviour and choice – and therefore, locating citizens as decision-makers and institutions as enablers who only induce people to make an environmentally conscious decision for themselves (Shove, 2010, 1280). Furthermore, it has been addressed that consumers' abilities to change their own or others' behaviour depend on their economic, social and cultural capital (Närvänen et al., 2019, 276). Consumers may have other goals that compete with the

reduction of food waste, such as ensuring food safety or being a good food provider (van Geffen, van Herpen, Sijtsema & van Trijp, 2020, 4).

Conducted and suggested measures for food waste reduction have varied by country. Although food waste in Portuguese hospitals equates to significant economic losses and environmental impacts, the issue is still widely unrecognized in Portuguese health institutions (Dias-Ferreira et al., 2015, 153). Whereas in Ireland, a 3-year program has been conducted to reduce food waste in hospitals and form best practices (Green Healthcare, 2013). Compared to Portuguese hospitals, far less food waste is generated in Irish hospitals that have made efforts to reducing food waste (Dias-Ferreira et al., 2015, 151). Previous studies on food waste generated in school canteens suggest varying measures depending on the geographical context. The food waste study conducted in Italy (Boschini et al., 2020) highlights the role of a food service provider in influencing the amount of leftover waste in school canteens. The study suggests that greater attention should be paid on the quality of the meals (Boschini et al., 2020, 11). Whereas the study conducted in Finnish food service sector suggests that pupils should be given enough time to eat and they should be educated on innovative ways about food and sustainability (Silvennoinen et al., 2015, 144).

The European Commission has indicated in its delegated decision (2019) that all Member States should conduct an in-depth measurement of the amounts of food waste generated at each stage of the food chain. To improve the measurement methods and verify the reported data, the Member States should also provide further information on the used methods of measurement as well as the quality of the collected data (EC, 2019, 4–5). Food waste statistics do not yet exist in Finland and the tracking of food waste is not currently supported by the system of national waste statistics. Although the tracking of food waste is going to be developed during the following years, the system will be based on voluntary actions, which means that food system actors should be motivated to provide statistics (Saarinen et al., 2019, 113). There is also a need for better understanding of policy coherence in order to reduce food waste (Luke, 2020).

The waste hierarchy was originally presented by the Council of the European Communities in 1975. The directive (1975) instructed the Member States to encourage prevention, recycling and processing of waste, the extraction of raw materials and other processes for the re-use of waste. Since then, the waste hierarchy has been developed further (EC, 2008) and it has been

reformed to a “Food Recovery Hierarchy”, which addresses the topic of food waste more specifically (United States Environmental Protection Agency, 2020). The most current update of the waste hierarchy is presented in the following figure (Fig. 4).

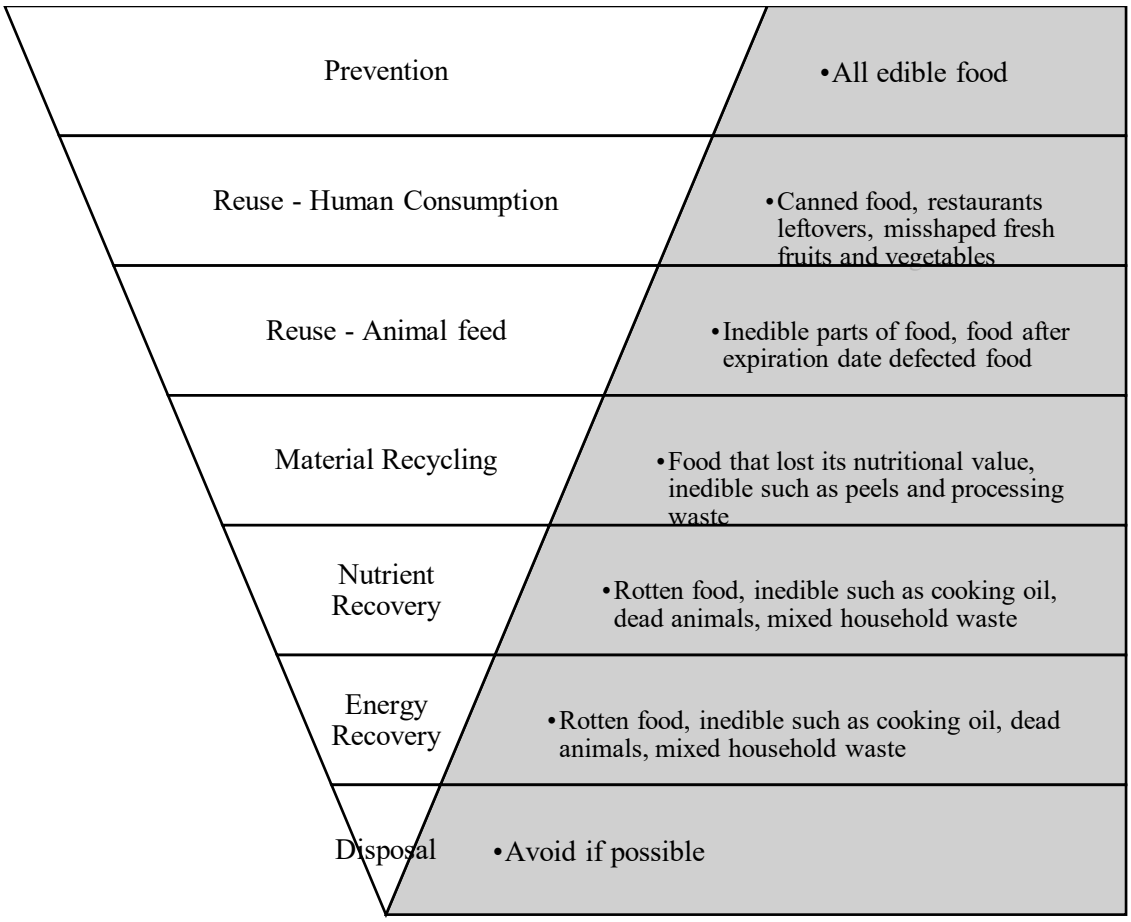

Figure 4. The updated waste hierarchy for food surplus and food waste with feedstock examples (Adapted from Teigiserova et al., 2020)

Utilizing the waste hierarchy effectively in the context of food waste has been contested by arguing that the terms included in the waste hierarchy do not have a clear scope (Teigiserova et al., 2020, 2). To distinguish food surplus and offer treatment examples in the future circular bioeconomy, Teigiserova and collegues (2020) have introduced an updated model of the waste hierarchy, which is presented in the figure above (Fig. 4). The best results have been linked to minimizing food waste at earlier stages of the consumption cycle since the external costs expand when trying to minimize food waste at later stages of the hierarchy (Bhatt et al., 2018, 58). As pointed out in the updated waste hierarchy, waste-to-energy incineration is not favoured as a method for food waste management, since the high moisture content of food waste causes a lower heating value (Thyberg & Tonjes, 2016, 115).

2.3.2 Environmental and social impacts of food waste

The environmental impacts of food waste, including impacts on global warming, eutrophication and acidification, have been studied by Scherhaufer and colleagues (2018). Furthermore, environmental impacts of avoidable food waste in the UK have been thoroughly quantified by Tonini, Albizzati and Astrup (2018). The study by Tonini and collegues (2018) present ten environmental categories in assessing the environmental impact of food waste: global warming, photochemical ozone formation, aquatic eutrophication nitrogen and phosphorous, terrestrial acidification, particulate matter, human toxicity cancer, ecotoxicity, fossil resource and water depletion. In addition to these, depletion of fishery resources, occupation of conservation areas and forests and pressure on wildlife have been presented as macro-level impacts of food losses and waste (HLPE, 2014, 33).

Previous research has studied the biggest contributors to the overall environmental impacts of food waste. Scherhaufer and collegues (2018) conclude that even though food waste is dominated by cereals by mass, the biggest contributors to the overall environmental impacts of food waste are meat products. This has been addressed in the Finnish context as well by stating that the climate impacts of pork and beef products are among the highest, although they represent only 4% of all discarded food in Finland (Katajajuuri et al., 2014, 326). Most of the food waste -related environmental impacts originate from primary production (Scherhaufer et al., 2018, 112). Adding to this, Tonini et al. (2018) assessed that food production and indirect land-use changes are contributing the most to the overall environmental impacts of food waste (2018, 757).

Environmental impacts of food waste have been studied in the Finnish context by focusing on the climate impact (Katajajuuri et al., 2014; Saarinen et al., 2019) and the eutrophication potential (Saarinen et al., 2019). The climate impact approach included identification of acceptable and eligible CO2-estimates for different food product categories in Finland, as well as an approximation for the average greenhouse gas emissions per ton of wasted food (Katajajuuri et al., 2014, 324). The total climate impact of Finnish household food waste was counted to be around 350 million kilos of CO2-equivalent per year, which equals to the annual carbon dioxide emissions of 100 000 cars (Katajajuuri et al., 2014, 326). According to the interdisciplinary collaboration of Natural Resources Institute Finland (Luke) and Finnish Environmental Institute (SYKE), consumer food waste presents only a small fracture, around 4%, of the total climate impact and eutrophication potential of a Finnish diet (Saarinen et al., 2019, 55). However, it was stated that the used evaluation methods for assessing climate impacts of food waste were imprecise in many ways and that there is an existing need for further research on the environmental and economic impacts of food waste reduction (Saarinen et al., 2019, 56).

Food waste represents a waste of all emissions generated during the production and distribution of food (Garnett, 2011, 28). Food waste reduction could reduce the unnecessary environmental impact of overproduction and processing (Scherhaufer et al., 2018). Moreover, food waste reduction through improved food system efficiency would reduce greenhouse gas emissions without compromising food security (FAO, 2017, 115). However, it has been stated that technological improvements are not sufficient enough in reducing greenhouse gas emissions of food waste, since technological change may foster new, unsustainable consumption patterns (Garnett, 2011, 31). Previous research (Katajajuuri et al., 2014) has pointed out a need for commonly approved communication methods or standards for evaluating the climate impact of food, although many international standards and guidelines have already been published. The study (Katajajuuri et al., 2014) highlights the problem of standards and guidelines being too generic to provide concrete assistance to conduct climate impact studies on food waste.

Social impacts of food losses and waste have been presented in previous research, including higher level of food prices and larger number of people below the poverty line (HLPE, 2014, 33). Reducing food losses and waste has been linked to combating hunger and improving food security in the poorest countries of the world (FAO, 2011; IFPRI, 2016). It has been addressed

that reducing food waste while maintaining current food production rates could lead to meeting global food needs (Thyberg & Tonjes, 2016, 114). The previous research on the side flows of primary production in the Nordic countries has linked the side flows to food security (Hartikainen et al., 2018, 510). However, the link between food waste reduction and increasing food security has been contested by arguing that food losses and waste provide a direct source of food and income for people involved in recovery in so-called invisible networks (Chaboud & Daviron, 2017, 5). Moreover, food redistribution can pose risks linked to food quality or additional costs of transport, monitoring and examining, which may lead to food saving efforts being too costly and difficult (HLPE, 2014, 73).

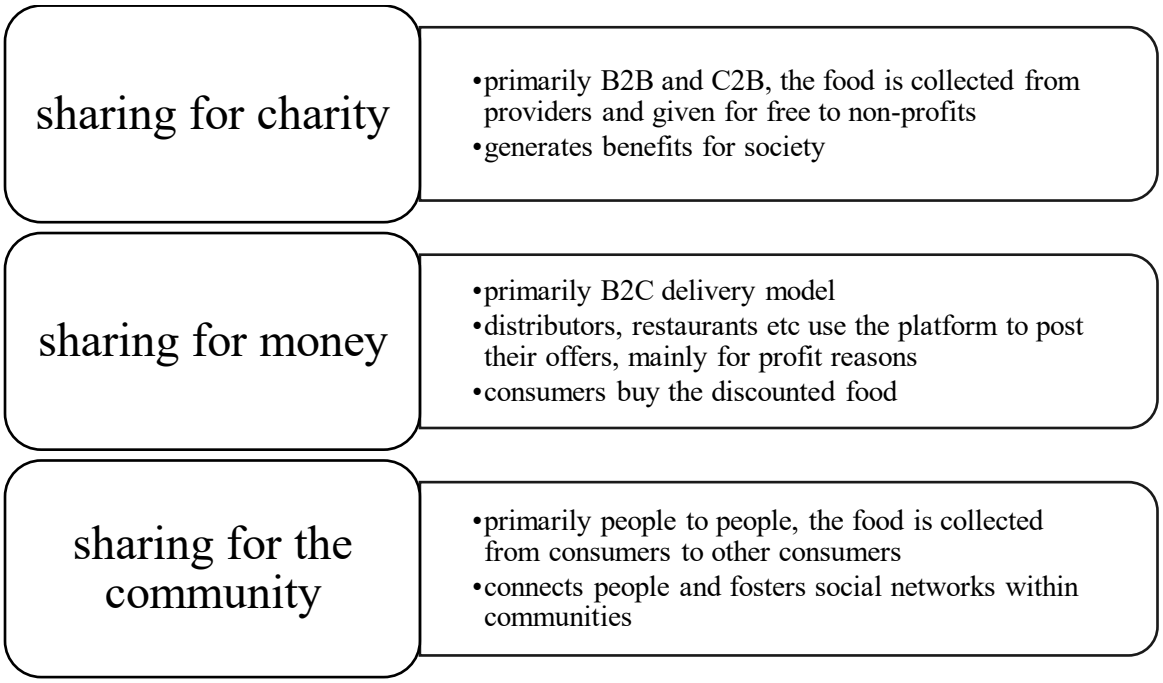

Figure 5. Food sharing models in the digital context
(Adapted from Michelini et al., 2018)

Digital development of food sharing models has been concluded to both increase and reduce the positive social impact of food waste reduction. This has been studied by Michelini and colleagues (2018). Food sharing models in the digital context are presented in the figure above (Fig. 5). Michelini and colleagues (2018) state that on the one hand, new technologies present an opportunity for food banks to widen their geographical reach and increase the positive social impact of food waste reduction (2018, 212). They present a "sharing for charity" model that primarily serves non-profit organizations and generate social value. On the other hand, the study suggests that platforms for digital sharing provide businesses an opportunity to increase their

economic profits, which may result in fewer food donations for food banks (Michelini et al., 2018, 212). The study presents a "sharing for money" model that is described to primarily benefit the providers, such as restaurants or distributors. Michelini and colleagues' study shares similar views with previous research on the downsides of sharing economy. It has been implied that low-income people may find it difficult to benefit from sharing economy platforms, and that sharing economy participants are often highly educated people who use platforms to increase their earnings (Schor, 2017, 276). However, it should be noted that the study by Schor (2017) does not focus on food sharing platforms but sharing economy platforms in general.

2.3.3 Value of food waste reduction

Finding the exact moment when the material flow with an economic value becomes waste with zero or negative value is considered quite difficult (Korhonen, Honkasalo & Seppälä, 2018, 45). Previous research has pointed out ways to calculate the economic value of food waste, including a simple cost-revenue analysis (Cicatiello et al., 2016) and estimating the baseline dollar value for fruit and vegetable losses (Buzby et al., 2011). Katajajuuri and colleagues (2014) have calculated the economic value of household food waste by using statistical data on the average retail prices of food products. Their study does not specify the type of discarded vegetables but uses the average price of the four most sold vegetables in Finland.

Measuring and communicating the financial value of food waste could help reduce the amount of food waste since it is implied that better-informed consumers would not waste food as much as they do now (Buzby et al., 2011, 511). However, when considering possible consequences arising from food waste reduction, it is important to examine the big picture. If people wasted less food, they would have more money to spend on more expensive food products, including more meat, or consume other types of products or services which all have an environmental impact (Garnett, 2011, 28). These indirect negative effects of food waste reduction may cancel out the environmental savings of prevention, and they highlight the importance of the correct use of subsidies and taxes in stirring consumer behaviour (Tonini et al., 2018, 763).

In addition to monetary value, previous research has presented additional types of value for food and food waste. Hebrok and Heidenstrøm (2019) have presented three additional types of value for food, which are also linked to food waste generation. The set of values include a utilization value, a relation and time value and a quality and taste value. The study states that it

could be possible to reduce food waste by increasing the value of food, and this could be done by attributing values related to caring, social interaction, taste and quality (Hebrok & Heidenstrøm, 2019, 1443). This thesis contributes to that by examining the social value of food waste reduction.

Value proposition, value creation and value capture in the context of food waste reduction have been addressed in the previous research (Michelini et al., 2018; de Almeida Oroski, 2020). According to de Almeida Oroski (2020, 379), defining a value proposition is an essential decision for entrepreneurs and they have to acknowledge that an extended value proposition may require more resources. However, the value proposition of food sharing models has changed in the online context, and digital platforms could allow food banks and social supermarkets to create new value (Michelini et al., 2018, 209). This study contributes to the discussion of food waste value by assessing how the value of food waste reduction activities could be measured and communicated to stakeholders.

2.4 Synthesis: Theoretical framework

The theoretical framework of this thesis can be summarized into three questions that are presented to previous research: what is considered food waste, how and why should we reduce it, and what is a strategic sustainability perspective. Starting from the strategic sustainability perspective, the thesis addresses the urgency of activities that would reduce food waste strategically, by linking food waste reduction to achieving more sustainable food systems (IPES-Food, 2019; Béné et al., 2019; FAO, 2018). A strategic approach to food waste reduction is then taken by applying the Framework for Strategic Sustainable Development (FSSD). The FSSD creates clarity for the assessment of sustainability activities (Rauter et al., 2017), in this case, food waste reduction activities. Previous research has expressed that the levels of the five-level model of FSSD represent different, interrelated levels of strategic planning (Robèrt 2000, 252). The levels are applied to this thesis in an attempt to construct a meaningful structure for the findings and in the end, a framework for strategic food waste reduction activities.

Going forward, the theoretical framework addresses the categorization of food waste, since the chosen definitions of food waste impact the final results and conclusions of studies (Hartikainen et al., 2018, 509). Understanding the main causes of food waste is considered important to prevent and reduce food waste (Boschini et al., 2020, 1), and the theoretical framework presents

multiple causes for food waste at different levels of the food chain. Measurement methods of food waste are also examined. Previous research suggests that food waste prevention should obtain the greatest efforts (Thyberg & Tonjes, 2016; Teigiserova et al., 2020). The role of packaging in food waste prevention and reduction is discussed (BIOIS, 2010; Garnett, 2011; Williams et al., 2012).

The theoretical framework presents various strategies for food waste reduction that have been analyzed and proposed in previous studies. Consumers' opportunities and responsibility to reduce food waste have been considered particularly interesting (Närvänen et al., 2019; Hebrok & Heidenstrøm, 2019; Borrello et al., 2017; van Geffen et al., 2020). Different approaches to food waste reduction have been selected depending on the country (Dias-Ferreira et al., 2015; Green Healthcare, 2013; Boschini et al., 2020; Silvennoinen et al., 2015).

The theoretical framework examines the impacts and the value of food waste reduction separately. The framework first points out ways to assess the environmental impacts of food waste (Scherhaufer et al., 2018; Tonini et al., 2018; Katajajuuri et al., 2014; Saarinen et al., 2019) and how could it be possible to reduce the environmental impact (Garnett, 2011; Katajajuuri et al., 2014). Social impacts of food waste reduction are also discussed, including the link between food waste reduction and food security (FAO, 2011; IFPRI 2016; Thyberg & Tonjes, 2016; Hartikainen et al., 2018). At the end of the framework, the value of food waste reduction is discussed, especially the economic value that has been used in previous research (Cicatiello et al., 2016; Buzby et al., 2011; Katajajuuri et al., 2014). Indirect negative effects of food waste reduction are included in the discussion (Garnett, 2011; Tonini et al., 2018). In addition to the economic value, additional types of value are also presented (Hebrok and Heidenstrøm, 2019; Michelini et al., 2018).

The future of food waste reduction is examined especially in two sections of the theoretical framework. Firstly, the theory addresses the new delegated decision of the European Commission, which states that the amounts of food waste at each stage of the food chain should be measured in all Member States (EC, 2019). This sets a more ambitious and coordinated goal for food waste reduction in Europe. However, it is noted that the system remains voluntary-based (Saarinen et al., 2019). Secondly, the theory presents the development of the waste hierarchy (EC, 1975; EC, 2008; USEPA, 2020). The hierarchy has been recently updated to fit the future needs of circular bioeconomy (Teigiserova et al., 2020).

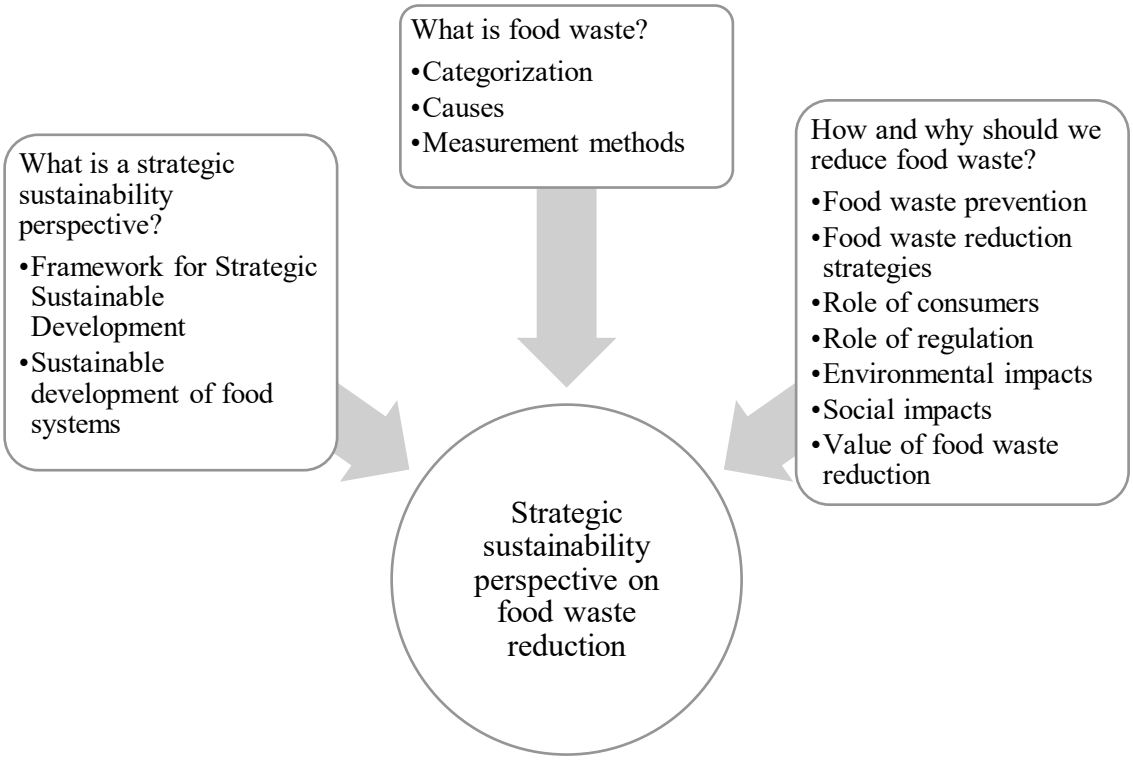

Figure 6. The theoretical framework of the thesis

Synthesis of the theory is constructed in the form of a strategic sustainability perspective on food waste reduction, presented in the above figure (Fig. 5). The theoretical framework combines the findings of previous studies on food waste, food waste reduction and strategic sustainable development. The main research question of this thesis, "How can food waste reduction activities be developed from a strategic sustainability perspective?", is to be answered by applying the strategic sustainability perspective to the empirical data of food waste reduction activities. The following chapter 3 describes the methodology of the study. The thesis then proceeds to present the empirical findings in chapter 4.

3 METHODOLOGY

3.1 Qualitative research

Planning the study beforehand plays a crucial role since it enables understanding of the key decisions that have to be made during the process (Hirsjärvi & Hurme, 2008, 65). This section provides information on the conducted decisions concerning the methodology of the study: qualitative research methods, the data collection method and the method for data analysis. Qualitative research methods enable the researcher to get closer to the meanings that people give to certain phenomena and which bring up the perspective and voice of research objects (Hirsjärvi & Hurme, 2008, 28). This was considered important when analyzing food waste reduction activities from the perspective of food waste professionals. Qualitative research methods were seen as suitable for the study since the intention was not to form statistical generalizations, but thoroughly understand the phenomenon of food waste reduction (Tuomi & Sarajärvi, 2018).

When deciding between different research methods for a specific research topic, one has to consider criteria such as efficiency, economic efficiency, accuracy and reliability (Hirsjärvi & Hurme, 2008, 34). However, the virtues and limitations of qualitative interviews should be carefully considered and give a reason for their use (Eriksson & Kovalainen, 79). Interview study is a method where the interviewer is in direct interaction with the interviewee, which creates an opportunity to direct the data collection and reveal possible motives behind the answers (Hirsjärvi & Hurme, 2008, 34). This opportunity was considered valuable in collecting rich and in-depth data, and therefore interview study was seen as a useful data collection method for answering the research question.

Qualitative content analysis can be used for analyzing various types of documents systematically and objectively (Tuomi & Sarajärvi, 2018, 87). Qualitative content analysis was seen as a useful method for analyzing the data collected from interviews. However, qualitative research has been criticized by pointing out that some qualitative researchers may jump into conclusions based on rather thin evidence (Gioia, Corley & Hamilton, 2013, 18). This was taken into consideration since there was a limited number of food waste professionals participating in the study. Previous research has pointed out that asking questions from data enables the

researcher to probe deeper into the data and avoid shallow or uninteresting findings (Corbin & Strauss, 2012, 7). The risk of uninteresting findings was mitigated by using the structure of an inductive model presented by Gioia and collegues (2013). The theory-driven phase of the model included asking analytical research questions from the data. The model is further introduced in section 3.3. The following two sections present the processes of data collection and data analysis in more detail.

3.2 Data collection

Data collection process started in spring 2019 with finding interviewees and selecting themes for interviews. When conducting qualitative research, it is important to find interviewees that know as much as possible about the research topic (Tuomi & Sarajärvi, 2018, 73). Interviewees were selected based on their experience in working towards food waste reduction. The first round of interviews was conducted in May 2019. Interviewees of the first round were food waste professionals working in a sustainable development consulting company, a food waste restaurant and a non-profit organization. Interviewees had differing backgrounds before joining food waste reduction activities, which made the interviews multidimensional.

Interview study may lead to errors such as reduced reliability of interviewee's answers, and it can be time-consuming to conduct (Hirsjärvi & Hurme, 2008, 35). However, time management of interviews was considered quite easy, since all interviews were conducted remotely and there was no need for travelling. Interviews were conducted through Skype or Teams meeting. Remotely conducted interviews may have similar positive and negative sides as phone interviews. Previous research (Hirsjärvi & Hurme, 2008) has pointed out that the interviewing technique in remote interviews has to be altered to fit the purpose: questions should be shorter, and the interviewer should talk slower than in face-to-face interviews. This was taken into consideration, and the interviewer paid special attention to the clarity of questions and her voice.

Selected themes form a platform for the interviews, and the interviewer can continue discussions as far as it is useful for the study (Hirsjärvi & Hurme, 2008, 67). Themes were selected for the first round of interviews as follows: introduction to interviewees' background and basic concepts of the study, development of food waste reduction activities, challenges and opportunities of food waste reduction activities, stakeholders, communication and knowledge sharing. Interviews were semi-structured, meaning that some aspects in interviews have been

decided beforehand, but not all of them (Hirsjärvi & Hurme, 2008, 47). Some questions were formed beforehand, to nourish the discussion within the selected themes. All questions were not used in all interviews but were used case-by-case. The author took a role of a "glorified reporter", meaning that she did not want to impose prior constructs to interviewees, but instead made an effort to give them a voice in the early stages of data collection and analysis, as well as represent the interviewees' voices prominently when writing reports (Gioia et al., 2013, 17).

However, qualitative research does not usually follow a strictly planned design but allows for surprises and deviations that might happen during the data collection and analysis (Eriksson & Kovalainen, 2008, 26). This was also the case with this thesis study since after the first round of interviews and a careful examination of the collected data, the author decided to conduct another round of interviews a year later. The second round of interviews was conducted in May and June 2020. Original themes from previous interviews were slightly altered: themes of communication and knowledge sharing were replaced by focusing on the value of food waste. Previous research had shed some light on the value of food waste and food waste reduction, and the author was eager to contribute to the discussion. The value of food waste reduction was seen as an important element to consider when analyzing food waste reduction.

The second round of interviews consisted of four interviews, including one interviewee that already participated during the first round. This interview supported the first interview with the same interviewee since it provided more information on topics such as the social value of food waste. Other interviewees of the second round worked at the Ministry of Agriculture and Forestry and a food waste business. The second round of interviews was transcribed and processed for the analysis. The collected data consisted of 86 transcribed pages and 314 minutes in total. Interviewees as well as the details of interviews are presented in the following table (Table 4). At this point, it should be noted that the data was collected and transcribed in Finnish, and the data analysis was mostly conducted in Finnish. Parts of the data were translated from Finnish to English by the author during the research process to perform as examples in the Findings -chapter.

Table 4. Interviewees and interview details

Interviewee	Organization of the interviewee	Position	Date	Length	Pages transcribed (in Finnish)
1	Sustainable Development Consulting Company	Circular Economy Specialist	2.5.2019 & 4.6.2020	57 min & 38 min	21
2	Food Waste Business	CEO	4.6.2020	37 min	10
3	Ministry of Agriculture and Forestry	Ministerial Adviser	3.6.2020	48 min	14
4	Ministry of Agriculture and Forestry	Ministerial Adviser	27.5.2020	29 min	9
5	Food Waste Restaurant	Former CEO	2.5.2019	46 min	13
6	Food Waste Non-Profit Organization	Events & Volunteers	2.5.2019	59 min	19
in total				314 min	86

Interview study is applicable in a situation where the interviewed person is considered an active party and wanted to be seen as a subject, rather than an object (Hirsjärvi & Hurme, 2008, 35). Using the interview method for data collection also enables flexibility, since the interviewer has a chance to ask a question again, correct possible misunderstandings, as well as to offer some clarification if needed (Tuomi & Sarajärvi, 2018, 63). This was experienced during the interviews, and the interviewer sometimes went back to already discussed question, in case she felt a need for a more in-depth discussion on the topic.

3.3 Data analysis

Data analysis started already during the interviewing process. The interviewer may observe themes arising from interviews and decide to collect more data to inspect a hypothesis that is formed during the data collection process (Hirsjärvi & Hurme, 2008, 136). This was also the case with this study. Interviewer observed some themes, including the value of food waste,

arising from interviews, and these were included in the data collection as themes, although they were not considered as themes during the first round of interviews. Data analysis process that was conducted after the data collection is presented in the following figure (Fig. 6). However, to keep the analysis figure as clear as possible, the figure does not include the hypothesis inspection that was conducted already during the interviewing process.

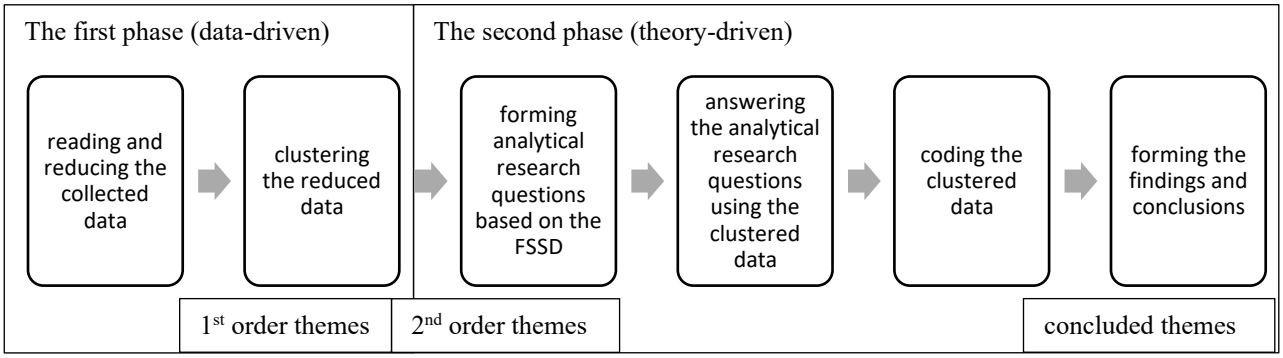

Figure 7. Data analysis

Data analysis consisted of two phases following the inductive method previously presented by Gioia and collegues (2013). Two phases of the data analysis are seen in the figure above (Fig. 6). The first phase was data-driven. During the first phase, the data was read through and reduced, which included eliminating irrelevant parts of the data and finding parts that could answer the main research question (Tuomi & Sarajärvi, 2018, 92). Classification of data is a crucial part of data analysis and it enables comparison between different parts of the data (Hirsjärvi & Hurme, 2008, 147). The classification has also been described as clustering of data (Tuomi & Sarajärvi, 2018, 92). Clustering process was started first by familiarizing on the data, then clustering the data into an excel sheet and in result, 31 classes were identified in total. These classes were called 1st order themes in the analyzing process. 1st and 2nd order themes, as well as concluded themes of the findings, are introduced later in table 6.

The second phase of the analysis was theory-driven. It included forming analytical research questions based on the five-level model of FSSD. However, it was necessary to exclude some levels of the five-level model of FSSD from the analysis, to stay within the scope of a thesis. Analytical research questions were based on the levels of system, strategic guidelines and tools. Success-level was also considered in this thesis, but only to address that defining a vision should be included in the framework for strategic food waste reduction activities. Actions-level was

not included in the analytical research questions. The analytical research questions were designed to examine the clustered data from the perspective of strategic sustainable development, and they are presented in the following figure (Fig. 7). The analytical research questions were considered 2nd order themes of the analysis, as described in figure 6 and table 6. The idea behind these 2nd order themes was to find key pieces of the data that could be used in answering the main research question, "How can food waste reduction activities be developed from a strategic sustainability perspective?". The author analyzed the clustered data with help of 2nd order themes.

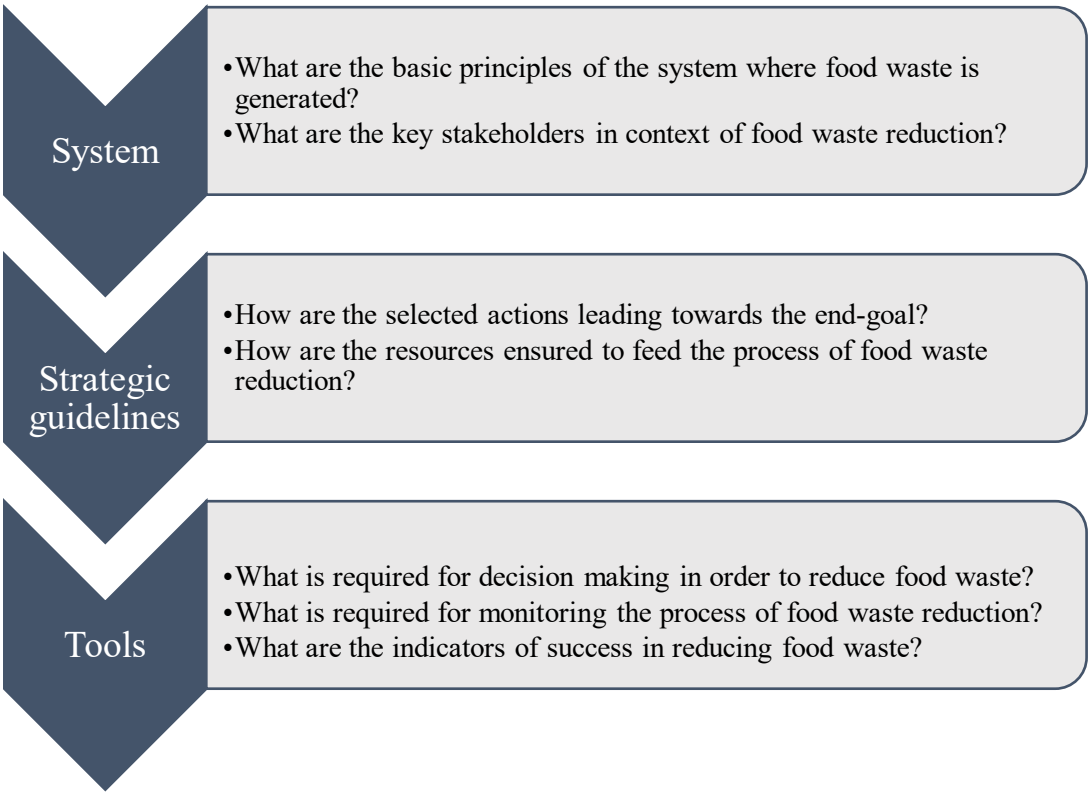

Figure 8. Analytical research questions (2nd order themes)

The next step in the data analysis was the coding of the clustered data that was selected using the 2nd order themes. Coding included writing down simplified expressions of direct quotes and forming a code to express the main content in a summarized form. The following table presents an example of the coding process (Table 5). The most common codes represented the content that was highlighted in the data. Codes enabled structuring findings of the thesis by clarifying the issues that food waste professionals brought to the discussion.

Table 5. Example of the coding process

Interviewee no.	Quote from the original text	Simplified expression	Code
1	"We should be able to discuss food waste as all organic side flows coming from the food economy, from food production, from the system."	Food waste should include all side flows from the food system	Side flows of the food system
2	"It is clear that the products that are very close to exceeding best before do not have any other sales channels in Finland than us, those would usually go to waste."	Food waste includes food that has difficulty in getting sold before spoilage	Food at risk of going to waste
3	"Food waste thematic has this division into what is edible and what is inedible food. Both can come from the same plate if we eat e.g. a pork stake, where there are bones, so there would be bio waste and food waste as well."	The division into food waste and bio waste is determined by whether the food is edible	Edibility of food
4	"How was it defined again by Luke? In Finland, we look at what is edible and what is not edible."	Food waste is edible	Edibility of food
5	"In practice, food waste included shares of food that were at risk of going to waste, that was the term that we used. Those that would have gone to the trash in a store."	Food that is at risk of going to waste is considered food waste	Food at risk of going to waste
6	"Food waste can be divided into food surplus that is edible and spoiled food that is going to bio waste and is beginning to be inedible."	Food waste is food surplus that is still edible	Edibility of food, Food surplus

The last part of the analysis was forming the findings and conclusions of the thesis. Concluded themes were formed by using the 2nd order themes in analyzing the data under the 1st order themes. For instance, the 2nd order theme "What is required for monitoring the process of food waste reduction?" was used when analyzing the clustered data under the 1st order theme "Environmental value of food waste". The data answered the question by highlighting the use of greenhouse gas emissions as a way to measure the value of activities, therefore greenhouse gas reduction value was chosen as one of the concluded themes. An example of the 1st and 2nd order themes and concluded themes are seen in the following table 6. It should be noted that the table does not present an overview of all the themes identified, but an example of the process.

Table 6. Example of the 1st and 2nd order themes and concluded themes

1st order themes	**Analytical research questions based on the FSSD (2nd order themes)**	**Concluded themes**
Global food system	What are the basic principles of the system where food waste is generated?	Food system
Definition of food waste		Food waste
Development of food waste reduction activities	How are the resources ensured to feed the process of food waste reduction?	People as a key resource
Communication on food waste reduction activities	What is required for decision making to reduce food waste?	Reducing the stigma around food waste
The environmental value of food waste	What is required for monitoring the process of food waste reduction?	Greenhouse gas reduction value

3.4 Structure of the findings

The following chapter presents the key findings of the thesis study. Findings include three levels of the five-level model of FSSD: system, strategic guidelines and tools. Although the FSSD includes five levels, only three levels were selected for further inspection to stay within the scope of this thesis.

The first section of the findings presents the system-level, which consists of basic principles of the system where food waste is generated. The data emphasize key stakeholders of food waste reduction activities. The system-level also highlight the concepts of food waste and food system to be analyzed in this thesis.

The second section of the findings consists of strategic guidelines. The section begins with a brief introduction of food waste reduction activities. As presented earlier in section 2.1.4, strategic guidelines should ensure that key resources continue to feed the process of choosing the appropriate actions towards sustainability. This is why the study first identifies the key resources of food waste reduction activities. Then the process continues by forming strategic guidelines to support these key resources.

The third and fourth sections of the findings consist of tools. As the section 2.1.4 addresses, according to the FSSD, tools should ensure that the actions are strategic to arrive at success in the system. The tools section first identifies the types of value that are linked to food waste reduction in the data, as well as the issues that could affect the decision-making of consumers and retail actors. Finally, findings suggest ways to measure and communicate identified types of value and ways to tackle the issues affecting consumers' and companies' decision-making to reduce food waste strategically.

4 FINDINGS

4.1 System-level: The basic principles of the system where food waste is generated

4.1.1 Food waste

The collected data examine the concept of food waste via two main factors: the edibility of food and the risk of food going to waste. Multiple causes are found to increase the risk of the food going to waste, including a lack of shelf space, the amount of food surplus, visual defects, incorrectly labelled goods and a lack of sales channels. Causes can be summarized into an idea that food waste is edible food which has been misplaced: food products are exceeding best before because of the food surplus in a particular place, e.g. a store. The store does not have enough shelf space, neither does it have other sales channels for the food. The food could still be consumed if it was in a place where it could be found by a consumer. The data suggest some solutions. One of the interviewees suggests that there should be a channel for food waste that could still preserve the embedded nutrients. Another interviewee points out that there should be a channel, perhaps an application or social media platform, that companies could use to share their food waste that is generated in company events.

The concept of edibility is underlined in the collected data as a determining factor. Food waste and food surplus are considered edible in the data, whereas bio waste is considered inedible, including spoiled food. It is concluded that bio waste and food waste can come from the same plate, e.g. the bones of an edible steak are considered bio waste. Although the factors of edibility and risk of food going to waste are mentioned quite consistently among interviewees, one interviewee suggests that all side flows from the food system should be considered as food waste. This wider perspective on food waste is expressed in the following quote.

We should be able to discuss food waste as all organic side flows coming from the food economy, from food production, from the system. (Interviewee 1.)

4.1.2 Food system

The data draw a diverse picture of the system where food waste is generated. The topic of the food system is discussed at both global and local levels, and some interviewees view local as Finnish, whereas some interviewees consider local as the European market. The interviews highlight six key topics in the context of the food system that can be linked to food waste generation: power imbalance, the role of consumers, greenwashing, locality of the food market, financial gain from food waste and role of regulation.

Firstly, the data present ways of how food waste generation can be linked to the power imbalance of the food system. Structural causes of food waste can lead to one stage of the food chain producing food waste, although the actual cause of food waste can be found at some other stage of the food chain. Interviewees mention examples such as powerful retail chains setting strict conditions to importers and producers on e.g. best before -dates to manage their own risk of food waste. This kind of behaviour may lead to clumps of food waste that occur earlier in the food chain before even entering the retail stage. Another example from the data is the launching system of new food products that may encourage the food industry to produce food waste unintendedly. According to the data, the retail stage may accept only small quantities of new launches, while the technical constraints of the food industry may lead to larger quantities produced.

Secondly, the power and responsibility of consumers to reduce food waste is discussed in the data. Interviewees share differing perspectives on the topic, as presented in the following quotes. The role of consumers and their decision-making on food waste reduction is further discussed in section 4.4.

An individual consumer does not have a power on almost anything. Consumers and the power that they acquire is always presented in a way that it needs to be a certain size of a consumer group to acquire at least some amount of power. I think it is a bit misleading to dash the responsibility on consumers since they fully depend on how much money they have on hand and what is the supply. (Interviewee 3.)

The point where it can be showed that the amount of food waste at the consumer-level is smaller than at other levels, other actors can also begin to do more, but if the collected data show that

consumers generate the biggest amount of food waste, then it is consumers' responsibility. (Interviewee 1.)

Thirdly, greenwashing is discussed during two interviews in connection to food waste reduction. Greenwashing is used directly as a term and indirectly without using the actual term but implying that usually the biggest motivating factors for retail chains to donate food are not the social benefits but cost savings or less effort compared to waste management. One of the interviewees explains, that in bio waste management case, retail chains are obliged to cover the costs themselves. Whereas in food waste donations, the costs of logistics are carried by the charity organization. This may be viewed as greenwashing.

Fourthly, the locality of the food market is discussed during interviews. One of the interviewees states that the global pandemic COVID-19 has shown our dependence on the local food market, meaning the European market. The value of a global food market is questioned, and a possibility for more local food market is suggested. The locality of the food market is also linked to the sustainable development of developing countries. It is implied that developing countries are experiencing food losses earlier in the food chain. This should be taken into consideration when developing new approaches to food losses and waste. However, it is also emphasized that we should find ways to assist the developing countries in strengthening their food system. It is crucial to build a food system that is producing food to feed the local system, that preserves value for the local system, that is not drained or supported from outside.

The data are painting a bigger picture of the food system development than merely focusing on buying local or closing borders. Furthermore, the locality is linked to biodiversity in terms of what we are used to eating. The data suggest that to become environmentally sustainable, our diet should be more diverse with the use of locally produced seasonal ingredients. According to one interviewee, we might be too fixated on using certain ingredients throughout the year, without questioning the energy inefficiency of their production. However, this would require changes in the entire food chain, since the system is planned to process certain raw ingredients while consumers would need to acquire the cooking skills to utilize new types of ingredients.

Fifthly, the data imply that there are some differing views on the possible financial gain from food waste generation seen across various food system actors. However, the most popular view is that no actor in the food system has economic or other types of interest to generate food waste

in the long run. Achieving a more sustainable food system in terms of food waste reduction is held as a win-win situation for all food system actors.

Lastly, the role of regulation in the context of food waste is discussed in four interviews. The data express multiple perspectives on regulation. Regulation is presented as a shield to protect voluntary-based food waste reduction activities from misconduct since it bans retail chains from donating spoiled goods. Regulation on utilizing and serving food waste is viewed as quite flexible from the perspective of food waste reduction activities and it is expected to create new business opportunities in the future. The consumer-level is considered the most difficult to reach by policymakers. That is also the reason why the organization of one of the interviewees is directing most of its efforts to impact consumers' behavioural patterns. In terms of regulation, the data present the EU as a potential forerunner in achieving a more sustainable food system since it already has high-quality regulation on food safety in place.

4.1.3 Key stakeholders of food waste reduction activities

The data present nine key stakeholders of food waste reduction activities: media, consumers, business partners, retail industry, policymakers, producers and importers, volunteers, charity organizations and investors. Stakeholders and their importance to food waste reduction activities vary between different organizations. A food waste business highlights the importance of consumers, business partners, investors, producers and importers. Whereas a non-profit organization underlines the importance of volunteers and the retail industry, meaning the stores that donate food waste.

Media as a stakeholder offers visibility for food waste reduction activities through advertising platforms and news articles. One of the interviewees mentions that food waste reduction is considered to be an interesting topic in the media, hence their food waste business has gained visibility from almost all big media houses in Finland. Another interviewee agrees that food waste articles get a lot of attention in the media. Consumers are one of the key stakeholder groups in food waste reduction activities. Consumers are targeted by activities such as a food waste restaurant, a non-profit and a food waste business. The data highlight campaigns and courses that educate consumers about the importance of food waste reduction and instruct how to use food waste ingredients in cooking. The data imply that there are many types of consumers

who engage in food waste reduction activities. Additionally, interviewees mention that most of their customers value the positive environmental impacts of food waste reduction activities.

Business partners, such as logistics partners, warehousing and delivery partners, are considered important, especially for a food waste business. The data note that these partners are expecting financial returns from food waste reduction activities. The retail industry is a stakeholder for those food waste reduction activities that collect food donations and utilize them in a food waste restaurant or offer them free of charge in non-profit activities. Producers and importers are a key stakeholder group especially for those food waste businesses that sell the food to consumers directly from importers or producers and skip the retail stage.

Policymakers are a stakeholder group for all food waste reduction activities since regulation enables utilizing and sharing of food waste. The data imply that the regulation on food waste is expected to create new business opportunities for the future. Volunteers are an important stakeholder group, especially for non-profit organizations. Charity organizations are a stakeholder group for those food waste reduction activities, for instance, food waste restaurants, that share their logistics system with charities that provide food aid.

Lastly, the data address that investors are a key stakeholder group for a food waste business. Investors enable scaling of food waste reduction activities and recruitment of new team members, which helps founders to focus on their key areas of expertise and share responsibility. The system-level findings are summarized in the following table 7.

Table 7. System-level findings

System-level	
Elements of the system where food waste is generated	**Identified factors of the system elements**
Food waste	• Risk of food going to waste • Edibility
Food system	• Power imbalance • Role of consumers • Greenwashing • Locality of the food market • Role of regulation
Key stakeholders	• Media • Consumers • Business partners • Retail industry • Policymakers • Producers and importers • Volunteers • Charity organizations • Investors

4.2 Strategic Guidelines -level: Key resources to feed the process of food waste reduction

4.2.1 Food waste reduction activities

The collected data include three types of food waste reduction activities, which all have different strategies on how their selected actions are leading towards food waste reduction. However, more in-depth analysis of their end-goals is left for future studies to investigate.

Firstly, the data include a food waste business that sells food surplus to consumers with discounted prices. Secondly, the data include a non-profit organization that is run by volunteers. The organization collects food waste donated by stores and offers it to consumers free of charge in a physical space. Thirdly, the data include a food waste restaurant that cooks dishes with donated food waste ingredients. In addition to these activities, the data include interviews of food waste professionals from the Ministry of Food and Agriculture and a sustainable development consulting company that operates as an intermediary between consumers and the public sector.

The primary goal of all the food waste reduction activities is to reduce food waste. All of these organizations aim to grow and scale their activities to have an even bigger, positive environmental impact. The interviewees point out that the scaling of food waste reduction activities has the direct correlation to the positive impact on the environment: the more their activities grow, the larger is their positive impact on the environment. The interviewees emphasize that food waste reduction activities should operate as efficiently as possible to generate close to zero waste.

This section of the findings focuses on the key resources that are needed to feed the process of strategic food waste reduction. The data highlight four resources: people, logistics, finance and knowledge and data. The thesis forms strategic guidelines on ensuring these resources continue to support strategic food waste reduction activities in the future.

4.2.2 People

The data identify people as a key resource for food waste reduction activities. The interviews underline three main factors that are essential to support the resource of people: knowledge, responsibility and motivation.

Firstly, the data express that food waste reduction activities may rely on the knowledge of only a few people in the organization, and their knowledge is perceived as essential for the continuity of the process. The lack of professionals may slow down the development process or increase the pressure that is put on existing professionals. The correct timing of recruitment is identified to play an important role in the development of food waste reduction activities. However, the data show that although there would be a high demand for staff, food waste reduction activities do not necessarily have the financial resources to enable the recruitment of paid employees. Activities may rely on volunteer work which interviewees do not consider a very sustainable ground to ensure the continuous development of activities. This is described in the following quote by an interviewee that volunteers in a non-profit organization:

We have 70 volunteers, no one as a paid employee at the moment. ... Since this is very time-consuming, (how about) your own resources, maybe you should get some monetary compensation ... maybe the foundation of activities would then be more sustainable. (Interviewee 6.)

Secondly, the data express that food waste reduction activities may include responsibilities that require a certain type of volunteer or employee. The data imply that focusing on core activities requires that key personnel can hand some of their responsibilities to skilled and trusted employees or volunteers.

Thirdly, the interviews highlight the importance of motivating the staff. Motivating is performed in many ways, including reminding the staff about the previous successes, celebrating the continuous development regularly and openly highlighting the skills of employees and showing appreciation. Measuring the impact of food waste reduction activities is seen as a tool to motivate employees since it concretizes the value of their work. However, the data express that the roots of motivation may lay deeper and be closely connected to environmental concerns, as expressed in the following quote by an interviewee who works in a sustainable development consulting company. The quote expresses how important it is to inform the staff on how their work is connected to climate change mitigation.

I'm motivated by the climate change, as a global phenomenon, including not only carbon emissions, but we talk about biodiversity, a big environmental change, an environmental catastrophe. (Interviewee 1.)

To summarize the findings of this section, three key factors are essential to support the resource of people in food waste reduction activities: knowledge, responsibility and motivation. Financial resources and tools to measure the impact of activities help support the resource of people.

4.2.3 Knowledge and data

The data link four factors to the resource of knowledge and data: modelling and written directions, networks, data collection for organizational development and measuring the impact.

Firstly, two interviewees mention using written directions, modelling and documentation as a way to introduce newcomers to food waste reduction activities and train new volunteers. Modelling and finding a structure for activities have been used in guiding a food waste restaurant to a more financially stable direction, which concludes that knowledge and data can

help an organization to evaluate their cost structure. One of the interviewees expresses how modelling and documentation have been used in forming a guidebook for non-profit food waste reduction activities. The goal of the guidebook was to multiply the concept and support others engaged in similar activities.

Secondly, the data address the value of networks for developing food waste reduction activities. Two of the interviewees express that they share their tacit knowledge eagerly in networks and are happy if someone benefits from using their knowledge to reduce food waste. It is also mentioned in the data that knowledge sharing in the hectic world is considered difficult and that knowledge is still kept secret in many cases in Finnish society. The data suggest that there is a certain degree of fear connected to people benefiting from the knowledge of others. However, a lack of knowledge sharing can lead to certain disadvantages, as it is likely for someone else to obtain the same knowledge, hence keeping the expertise a secret can pose a risk to the professional. According to the data, networks generate value by enabling communication and knowledge sharing between professionals. Networks are linking different actors together to reach the target group more easily and effectively. Furthermore, activities that collect donated food from stores and offer it to consumers require a reasonable size of a network of donors to work efficiently. This is because the demand for food is relatively high, which is expressed in the following quote by a volunteer of a non-profit organization.

We have been woken up by the fact that our original contracts with stores are not a sufficient amount of food, the food vanishes quite quickly. Maybe we should get more food donations. (Interviewee 6.)

Thirdly, data collection in the context of food waste reduction is part of organizational development. One of the interviewees describes how they collect data to get information on the reach of their food waste reduction activities, including the number of received food donations, customers and collected food. This type of data collection is a part of organizational monitoring, which enables development.

Fourthly, the data suggest that the impact of food waste reduction activities should be measured and verified accordingly. Furthermore, the impact needs to be communicated to clients to help them understand the value of food waste reduction activities. One of the interviewees, working in consultancy, addresses that the tools to measure the impact of food waste reduction have to

be presented already in the very beginning of the project, in order to "sell" the project to clients. This adds to the importance of proper measuring and evaluation tools. The following quote by a food waste professional working in a consulting company is referring to the subject.

The core of everything we do is that we should be able to measure the impact, because that leads to results, and I think it is extremely responsible and supports the development that we can somehow tell what the impacts are when we do this or that. (Interviewee 1.)

When considering how to ensure that the resource of knowledge and data is feeding the process of food waste reduction, it is essential to view the tools that are used for modelling the activities and documentation, as well as measuring and communicating the value and impacts of activities. Tools to measure and communicate the value of food waste reduction activities are further examined in the following section of the thesis, 4.3. It is concluded that continuous development of activities should be based on data and received feedback. The current practices should be challenged to reach new people and generate an even more significant, positive impact on the environment.

4.2.4 Logistics

The resource of logistics is seen in the collected data as highly important to succeed in food waste reduction activities. Logistics is a key resource for many food waste reduction activities. It is irreplaceable as it enables food donations, though it also generates costs that may be difficult to manage, especially by a non-profit organization. One of the interviewees adds that it is not fair to volunteers as handling logistics takes nearly 5 hours at a time due to a low transportation capacity.

The data suggest that logistics could offer a possibility for collaboration between different actors working for similar goals. The data present a question of who should be responsible for taking care of the logistics in food waste reduction activities. Should the party that donates the food have some level of responsibility in organizing, helping or paying for the logistics? The question remains open. The importance of logistics is presented in the two following quotes. The first quote is by the CEO of a food waste business, and the second quote is by a volunteer of a non-profit organization.

We have outsourced our entire logistics system and it is the core of our functions, we wouldn't operate without it. So, we have outsourced warehousing, collecting, packaging and then (delivery firms) collect the packages and deliver them to customers. (Interviewee 2.)

Many stores want to donate their food waste, but the logistics cost and someone should take care of it. (Interviewee 6.)

4.2.5 Financial resources

A matter that is emphasized throughout the collected data is the need for financial resources to enable the sustainable development of food waste reduction activities. Food waste reduction activities that are represented in the data are funded by investors, voluntary work, business profits or allowances. Some interviewed professionals have faced hard decisions for their organization to survive financially. They have formed strategic guidelines on what is the core of their activities. One of the interviewees even implies that it would be irresponsible to organize activities that are not financially stable. When discussing sustainable business activities, financial sustainability is still considered first, but it should cover all other aspects of sustainability as well, meaning ecological, social and cultural sustainability.

As mentioned previously in section 4.2.2, voluntary-based activities are not considered financially sustainable in the long run. The data imply that the financial stability of activities is essential to ensure long-term development. One of the interviewees expresses that engaging in voluntary-based work in food waste reduction is hard to combine with having a paid job and studies on the side. There is an identified need for monetary compensation for organizing food waste reduction activities.

Investors are mentioned in one of the interviews as a way to ensure financial stability, enable scaling of activities and recruiting employees. Impact investing is linked to a will to do good for the environment. However, it is concluded that investors, business partners and other stakeholders are usually expecting financial returns in the long run, as can be seen in the following quotes. The first quote is by the CEO of a food waste business, the second quote is by a ministerial adviser of the Ministry of Food and Agriculture.

Many investors are also involved because they want to invest in companies that do good for the environment, which means impact investing -thinking. But of course, our investors also expect financial returns and we are hoping to make returns for them in the longer term. And all our business partners as well, this should be profitable for them within some time frame. (Interviewee 2.)

For our stakeholders, finance is a very crucial factor, it sets the ground for everything. If environmental actions are being taken, they should be financially profitable. (Interviewee 4.)

Strategic guidelines to feed the process of food waste reduction are presented in the following table 8.

Table 8. Strategic guidelines -level findings

Strategic Guidelines -level	
Key resources to feed the process of food waste reduction	**Strategic guidelines for food waste reduction activities**
People	• It is essential to have people of knowledge, responsibility and motivation engaging in food waste reduction activities
Knowledge and data	• It is essential to model and document food waste reduction activities to ensure continuity and development of activities • It is essential to have tools to measure and communicate the value of food waste reduction activities to stakeholders • It is essential to have a wide enough network of food donors and professionals to enable effective food waste reduction
Logistics	• It is essential to have a well-functioning logistics system to ensure food waste reduction
Financial resources	• It is essential to have financial resources to ensure continuity and development of food waste reduction activities

4.3 Tools-level: Tools to measure and communicate the value of food waste reduction activities

4.3.1 Financial value

The financial value of food waste reduction activities is widely discussed in the collected data. Financial value is seen as a concrete, impactful and easy way to communicate the value of activities. Interviewees share a common understanding on how people and organizations are slowly beginning to understand how food waste is, in fact, a waste of money. The financial benefit is considered a reason for many companies and consumers to reduce food waste. However, the data express that one should use the financial value of the food wasted by an entire family or the value of food wasted per year to get impactful enough results. Benefits of using the financial value of food waste reduction activities are presented in the following quote by a professional of a sustainable development consulting company.

I think euros are the easiest to understand. Euros affect politics. Euros are a concept that is very easy for all of us to understand. (Interviewee 1.)

The data also suggest that other than financial aspects of food waste should be given a price to ensure including them to calculations, as seen in the following quote by a ministerial adviser of the Ministry of Food and Agriculture.

If we consider the economic impacts of food waste, we should definitely include all other than economic aspects as well, give them a price, and if we pursue to examine the big picture of food waste (including metabolic food waste), there are plenty of calculations available of the cost of obesity. (Interviewee 3.)

4.3.2 Social value

The issue of food waste is seen as an ethical issue in the collected data, by pointing out that food waste is generated while millions of people globally are suffering from hunger. Interviewees are observing the social value of food waste reduction activities either by considering food waste as an ethical issue globally and locally or in practice by discovering the generation of social value in food waste reduction activities. The data connect food waste reduction to food security in two ways.

Firstly, food security is implied to increase globally by reducing food loss in low-income countries and reducing food waste in developed countries, since a larger amount of produced food could be used for human consumption. Secondly, the fact that food waste can be used in food aid is viewed quite critically. Interviewees point out that there should be other ways to tackle hunger than offering food waste since it is impossible to properly plan one's nutrition based on received random ingredients. The problematic link between food aid and food waste is expressed in the following quote by a ministerial adviser of the Ministry of Food and Agriculture.

When discussing food aid, we should remember that while all the food that cannot be used should always be donated, the other side of the issue is that how could we organize this food aid system to be as open and predictable as possible. We should not have excess people that we feed with excess food. Everyone should have the right to food citizenship – to decide what and when do I want to eat. (Interviewee 3.)

Interviews discuss the generation of social value in food waste reduction activities. The data express four ways of how food waste reduction activities can be organized to enhance the generation of social value.

Firstly, food waste reduction activities can be organized by creating a physical space to enable social interaction between customers, volunteers or employees. Customers and volunteers of these activities can experience social value in a form of new social contacts. Secondly, the data present the volunteer organizations that reduce food waste as ways to build a community for people who do not yet have a network of their own, such as immigrants. According to the data, volunteerism can give people a sense of belonging, an activity to engage in and a cause. This as well can be considered as a social value.

Thirdly, the data present a model of recruitment in food waste reduction activities to enhance the generation of social value. The model includes the recruitment of people with previous difficulties in finding employment, by recruiting them to cook and serve donated food. The data also highlight this model as a possible solution for the dilemma of unpredictable food aid. Customers of this kind of service would have access to a proper meal instead of a set of random ingredients. The event of a joined meal would also generate social value. Another interviewee

presents a similar concept, where food waste is utilized in cooking events that are organized to feed homeless people.

Fourthly, the data express that a food waste business rather sells at a loss than generates food waste. They use price as a driver to make sure that all purchased food is getting sold. This presents an opportunity to generate social value since affordable prices can create accessibility to food for the people in need. Moreover, the model of a food waste business that sells with very affordable prices may offer a possible solution for the dilemma of unpredictable food aid. The people in need could buy the food instead of receiving a random set of ingredients, which would give them an opportunity for food citizenship, to decide when and what they want to eat. The following quote by the CEO of a food waste business expresses their values on pricing and food waste generation.

We do not generate any food waste. We sell everything we buy, and we use price as a driver to force the food to circulate. We rather sell at a loss than generate food waste, because that would go against our values. (Interviewee 2.)

4.3.3 Resource value

Food waste reduction activities are presented in the data as clever ways to manage the resources embedded in food that otherwise would go to waste and food waste reduction activities are linked to resource efficiency. The data present the waste hierarchy as one of the commonly used guidelines to preserve as many resources embedded in food waste as possible. Using the kilos of food waste saved through food waste reduction activities is examined in the data as a tool to communicate the value of food waste reduction activities.

There are differing views on how applicable and concrete kilos are to express the value of food waste reduction activities. Four interviewees mention kilos as a possible way to communicate the value. The number of saved kilos of food waste can be seen as an applicable tool to share the value of food waste reduction activities regularly. However, kilos are also considered non-concrete and unclear, since the number of kilos does not imply what kind of food the number consists of. One of the interviewees views saving meat as highly important since the energy consumption of meat production is massive. However, it is pointed out that offering meat portions in a food waste business may conflict with the values of the main customer group,

since the group consist of environmentally conscious consumers who do not consume meat. Differing views on kilos as a tool to communicate the value of food waste reduction activities are presented in the following quotes by a former CEO of a food waste restaurant, a professional of a consulting company and a CEO of a food waste business.

We saved 400–800 kilos of food, depending on the day, that otherwise could have been wasted. It was sort of a waste resource that would have been a burden on this planet but was instead utilized and converted to good dishes for people. (Interviewee 5.)

If we talk about kilos, 1000 kilos of bread is different from 1000 kilos of meat. (Interviewee 1.)

We use the saved kilos of food waste and saved car emissions as our monthly metrics, to have mission-based metrics instead of the usual business metrics like the number of new customers. (Interviewee 2.)

4.3.4 Biodiversity value

Biodiversity is viewed in the data from the perspective of how the current food system is non-diverse and depends only on a few key species of crops and feedstock. The data present a risk that if the food system is too unilateral and vulnerable, future catastrophes due to climate change may create massive difficulties in the food chain, which can contribute to the generation of food waste. To be more diverse, the data suggest that the entire food chain from primary production to consumers should be reconstructed to enable biodiversity growth. This would require changes, for instance, in mills, production systems and consumer cooking habits.

Measuring the biodiversity value of food waste reduction activities is suggested in one interview. The ministerial adviser of the Ministry of Food and Agriculture suggests a way to measure and communicate the biodiversity value of food waste reduction activities, which is expressed in the following quote. However, the data also point out that biodiversity action should always be included when producing food by planning on how to nurture the soil and its vitality.

I think that it would be useful to look, how much land area we could preserve for biodiversity action if we consumed all produced food and not wasted it. (Interviewee 4.)

4.3.5 Greenhouse gas reduction value

The data point out that greenhouse gas emissions are, in fact, a small part of the total environmental impact of food waste. The impacts of food waste also include e.g. nutrient emissions of food production and decreasing biodiversity. Greenhouse gas emissions and the carbon footprint of food waste are mentioned in multiple interviews. The data show that some organizations use carbon footprint as a representation of the amount of food that is saved through food waste reduction activities. The carbon footprint is seen as a way to visualize and concretize the positive impact of food waste reduction activities. However, there is no consensus found between interviewees on how the reduction of greenhouse gas emissions should be used in communicating the value of food waste reduction activities effectively. This is presented in the following quotes by professionals from a food waste business and a consulting company.

We have felt using car emissions as concrete, our team members find it easy to think how 2500 cars would look like in the traffic. (Interviewee 2.)

If you say that food waste represents carbon emissions of 100 000 cars, what do you compare it with? It just tells you that wow, quite a lot, but what could it be compared to, or what do I get from 100 000 cars not emitting? (Interviewee 1.)

4.3.6 Nutritional value

The data suggest that nutrition and food waste link to each other in a form of metabolic food waste. Metabolic food waste includes the food that is consumed in excess and therefore produced unnecessarily. This form of food waste adds to the resources that are wasted in food production. The data imply that metabolic food waste is a nutritional and environmental problem that is beginning to be seen in food waste discussions. It is also considered an economic problem since it creates expenses in the health care sector. The data emphasize the dilemma in tackling metabolic food waste, presented in the following quote by a professional working in a consulting company.

There is an existing conflict that you should eat everything that is on your plate and what you have purchased, but then again, you should think about not eating too much. Surely the right decision would be that, first of all, you should know how much you eat and then you should consume accordingly, but it is a challenging subject to address. It gets so personal. (Interviewee 1.)

The nutritional value of food waste reduction activities is discussed in two interviews. The data imply that food waste reduction activities can generate two types of nutritional value.

Firstly, the former CEO of a food waste restaurant explains how the food, that originates from the retail sector and is cooked and served by a food waste restaurant, is usually high in nutrients, healthy and non-processed. Comparison is made with the types of restaurants that often use processed and semi-ready ingredients. In this way, food waste reduction activities can generate nutritional value that could be measured and communicated.

Secondly, the data imply that the value of food waste reduction activities could be measured by using nutritional assessment metrics or calories. However, using only calories as a tool to measure the value of food waste reduction activities is seen as a too narrow perspective, since a human body requires both the calories and the nutrients to be sustained. It is also added that food products high in calories are, in many cases, also low in nutrients. Saving valuable nutrients of the food that is already inedible is pointed out in the following quote by a professional from the Ministry of Food and Agriculture.

As far as I can say, there is always a risk of food going to waste, but in case it occurs, there should be agile ways to change current practices and there should always be a channel for the food waste: what could be done with it to preserve and utilize the nutrients? (Interviewee 3.)

The first part of the tools-level findings is presented in the following table 9.

Table 9. Tools-level findings, part 1

Tools-level	
Types of value generated in food waste reduction activities	**Tools to measure and communicate the value of food waste reduction activities**
Financial value	• Annual price value of household food waste • Estimating a price for other than economic aspects, including metabolic food waste
Social value	• New social contacts for consumers and volunteers • Development of the sense of belonging and community among volunteers • Recruited people with the previous difficulty in finding employment • Joined meals cooked from donated food waste • Affordable prices to enhance accessibility
Resource value	• Saved kilos of food, including the type of food
Biodiversity value	• Land area preserved for biodiversity action
Greenhouse gas reduction value	• Carbon footprint combined with other environmental metrics
Nutritional value	• Use of non-processed ingredients • Nutritional assessment metrics

4.4 Tools-level: Tools to support decision-making towards food waste reduction

4.4.1 Consciousness about the impacts of food waste

The conducted interviews underline the importance of conscious decision-making in the everyday lives of consumers to reduce food waste. The consumer-level is widely discussed in the data since most of the interviewed professionals have gained experience in working especially at the consumer-level. One of the interviewees links the embarrassment of producing food waste to a somewhat similar feeling than a so-called “flying shame”. However, interviewees share a common understanding of how consumers do not realize their contribution to the food waste problem because their waste flows are small streams that make wide rivers when joined. This is expressed in the following quote by a ministerial adviser of the Ministry of Food and Agriculture.

Educated women that are living alone generate the highest amount of food waste in Finland. The better the financial situation, the easier it is to generate food waste, and I believe that not knowing these other scopes of food waste plays a key role in this. You can think very green and protect the forests, but at the same time you do not realize that by throwing food away, you are actually contributing to global deforestation. (Interviewee 3.)

The data show that professionals may anticipate people slowly changing their behaviour into wasting less food, but not by the reinforced rule, but rather a rising levels of consciousness on the subject. Technological innovations embracing the possibilities of Internet of Things are mentioned in the data to assist consumers in changing their behaviour towards waste-free lifestyle. The following quote by a professional of a consulting company describes the process of a behavioural change.

In many cases, when it comes to consumer behaviour, there has be an understanding of the subject and finding its purpose to your own life, before it develops into a continual practice. (Interviewee 1.)

When discussing concrete actions that food waste professionals have generated to affect consumers' behaviour and their wasting habits, three interviewees discuss ways to communicate the food waste issue to the general public or pupils. However, only one out of three interviewees shares the concrete practices their organization has already implemented in communicating the environmental impacts of food waste. Two interviewees explain that they have had plans on how to enhance communication around environmental issues and food waste reduction, but there has been a lack of resources to execute the plans. Furthermore, it is highlighted in the data that there is still a need for a wakeup call for consumers to realize the importance of food waste reduction.

4.4.2 Reduction of stigma around food waste

Interviewees express that there is a stigma associated with food waste reduction activities, which stems from the connection with food aid and negative mental images of food waste ingredients. The data emphasize how people still easily connect food waste reduction activities with food aid and assume that the activities would mainly focus on helping people in need.

Activities that include giving away free food are easily associated with breadlines. The stigma may make it more difficult to reach a wider customer base and scale activities. The data also suggest that people may associate food waste with unappealing food that is almost exceeding its best before date, although ingredients received through food waste reduction activities are often high-quality. The data emphasize ways to reduce the stigma around food waste and to normalize food waste reduction activities.

Firstly, food waste professionals are trying to change the negative mental images of food waste by using social media as a platform to post beautiful and appealing photos on food waste ingredients. This is emphasized in the following quote by the former CEO of a food waste restaurant.

We wanted to bring up the ingredient (waste food) a lot in our social media. Surely, there are many mental images linked to food waste, that I as well had at first when I joined, ... that everything is kind of unattractive looking, you know, passing best before... And we had that kind of food as well for sure, but we also had very much of good-quality food, so we took photos, communicated that, and told what dishes we will cook with those. (Interviewee 5.)

Secondly, the data suggest that food waste reduction activities have already partly succeeded in changing people's decision-making towards food waste reduction by focusing on the advantages of food waste reduction activities. An element of surprise is mentioned by two interviewees as a way to create positive emotions in customers. The fact that a food waste restaurant does not have a fixed menu but instead a different set of choices changing daily is considered appealing among some customers. In addition to that, a business that sells food surplus with low prices appears to be fun and exciting since its selection varies almost daily. Food waste reduction activities can also appear as easy to use, even easier than going to an ordinary grocery store if the key resource of logistics is properly managed.

Thirdly, the data emphasize that food waste reduction activities should engage customers in activities. One of the interviewees underlines that customers find it highly important to have an opportunity to participate in food waste reduction. Reducing food waste creates a good feeling for those customers. In the case of a food waste business, social media has enabled building a virtual community around food waste reduction activities, which consists of shared photos and

customer reactions and stories. This is described in the following quote by the CEO of a food waste business.

We have quite an active social media, which means that customers comment and like and share photos of the packages they have received. That sort of hype around our concept has actually surprised us. (Interviewee 2.)

Fourthly, the data suggest that the words used in the context of food waste reduction activities play a significant role in reducing the stigma around the topic. One of the interviewees mentions that they use the word food surplus instead of food waste to communicate the fact that their service cannot be used as a replacement for waste management, and that they only serve edible food. This suggests that the use of words and the meaning they carry should be considered when developing food waste reduction activities.

Lastly, regulative measures are assessed to influence the attitudes of retail actors toward food waste reduction activities. It is explained that in the past, stores in Finland were not allowed to donate their food waste. Although the food could have been fit for human consumption, it was thrown to waste and even deliberately spoiled so that it could not be harvested by dumpster divers. Nowadays, when the regulation on food waste has been developed to a more allowing direction, also enabling food donations, stores have a more positive attitude towards food waste reduction activities. The data address the French legislation that prohibits stores from wasting food and instead encourages food donations. Two of the interviewees suggest that Finland may be on route to a similar direction, where food chain actors are expected to manage their food waste differently than throwing it to waste. These kinds of regulative measures could also help reduce the stigma around food waste and normalize food waste reduction activities.

4.4.3 Know-how on utilizing food waste ingredients

A matter that is emphasized widely throughout the data is the importance of know-how on how to utilize food waste ingredients.

Firstly, the data highlight campaigns, workshops and courses that are organized with the goal to teach people how to utilize ingredients that are usually found at home and are easily wasted. These activities include teaching people about the impacts of food waste and food waste

reduction and embracing the creativity of cooking. Creativity is also enhanced through social media by taking photos of food waste ingredients and sharing information on how to cook dishes with them.

Secondly, the data link the know-how to biodiversity. One of the interviewees states that to increase biodiversity and produce a more diverse, local and seasonal selection of raw ingredients, consumers would have to know how to utilize them in cookery. However, another interviewee points out that people who experience social issues in their lives may not have the resources to take care of themselves, which includes cooking for themselves. Therefore, these people are usually left with food that is low in nutrients.

Lastly, the data link the power of example to increasing know-how. The data imply that the food service sector plays a key role in familiarizing people with different kinds of dishes. The food service sector could provide examples on how to use seasonal and locally produced raw ingredients in cooking.

The tools-level findings of this section are presented in the following table 10.

Table 10. Tools-level findings, part 2

Tools-level	
Factors affecting decision-making on food waste reduction	**Tools to support decision-making towards food waste reduction**
Consciousness about the impacts of food waste	• Technological innovations • Communicating the environmental impact of food waste reduction
Reduction of stigma around food waste	• Social media platforms • Focusing on the advantages of food waste reduction activities (i.e. element of surprise, affordable prices) • Engaging customers in a virtual community around food waste reduction activities • Words used in the context of food waste and considering the meaning they carry • Regulative measures
Know-how on utilizing food waste ingredients	• Courses, workshops, campaigns on utilizing food waste ingredients • Embracing creativity of cooking through social media platforms • Power of example provided by the food service sector

4.5 Synthesis of the findings

This section presents an overview of the findings of this study. The theoretical framework for the study was formed earlier in chapter 2, which presents a strategic sustainability perspective on food waste reduction. The findings were formed by analyzing the empirical data from a strategic sustainability perspective. Key elements of the findings were emphasized using direct quotes from the interviews. The goal of the thesis was to construct a framework for strategic food waste reduction activities.

Findings were constructed in a form of three levels of the framework for strategic sustainable development (FSSD): system, strategic guidelines and tools. However, the framework for strategic food waste reduction activities includes four levels of the FSSD: system, success, strategic guidelines and tools. The level of success was added to the framework by using the generic description from the previous research: the level includes the definition of the vision (Broman & Robèrt, 2017, 22). The thesis states that food waste reduction activities can be

developed from a strategic sustainability perspective by applying the framework for strategic food waste reduction activities, presented in the following figure (Fig. 8).

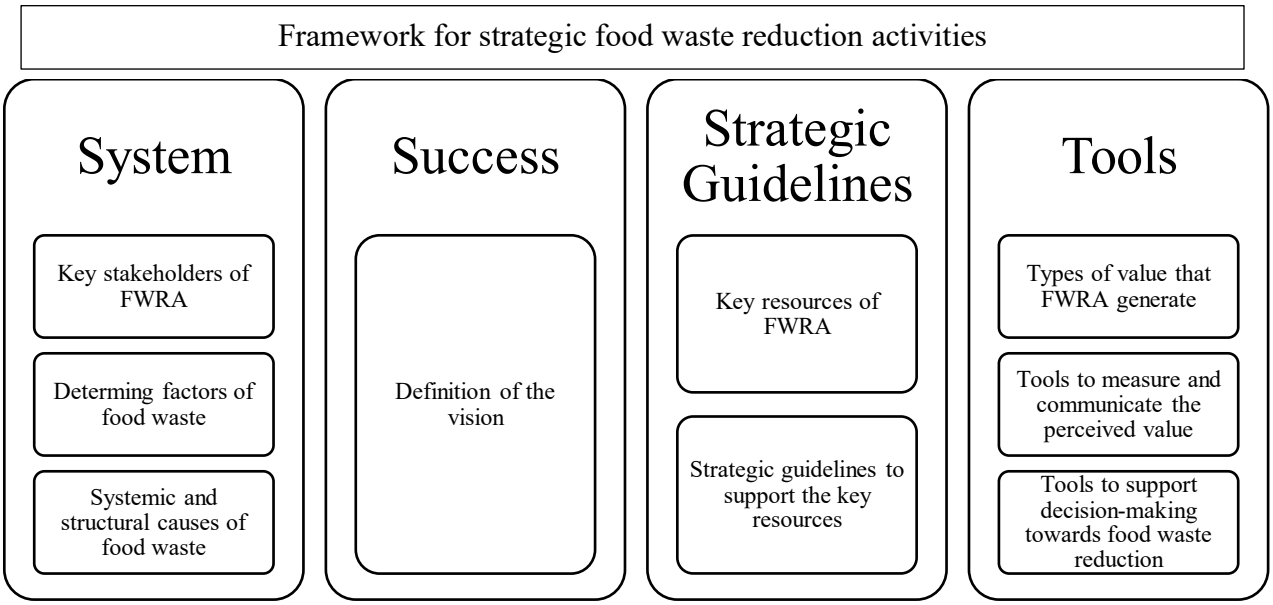

Figure 9. Framework for strategic food waste reduction activities

The first part of the framework focuses on the system of food waste reduction activities. The system includes the key stakeholders of food waste reduction activities. The first part also identifies the factors that determine what is considered food waste in food waste reduction activities and why. This study suggests that the edibility of food and the risk of food going to waste are determining factors. The first part examines the systemic and structural causes of food waste. This study implies that the power imbalance of the food system is a structural cause of food waste. Furthermore, the study discusses the role of regulation, the role of consumers, the locality of the food market, financial gain from food waste and greenwashing in the context of food waste reduction.

The second part of the framework suggests that food waste professionals should define the vision of their activities, which represents the definition of success. The third part of the framework examines the key resources of food waste reduction activities. This thesis concludes that people, logistics, knowledge and data and financial resources are key resources of food waste reduction activities. The study presents strategic guidelines to ensure that the key resources continue to feed the process of food waste reduction.

The fourth part of the framework focuses on identifying the types of value that can be generated in food waste reduction activities. The study identifies six types of value: financial value, social value, resource value, biodiversity value, greenhouse gas reduction value and nutritional value. Findings suggest multiple tools to measure and communicate the types of value to stakeholders. The fourth part of the framework also considers the factors that affect the decision-making of consumers and other food chain actors on food waste reduction. These include consciousness about the impacts of food waste, reduction of stigma around food waste and the know-how on utilizing food waste ingredients. This thesis provides multiple tools to support decision-making towards food waste reduction, including the use of social media platforms, consideration of words and the meanings they carry and engaging customers in a virtual community around food waste reduction activities.

This thesis suggests that the framework for strategic food waste reduction activities can help structure and develop food waste reduction activities from a strategic sustainability perspective, to ensure that activities are contributing to sustainable development.

5 DISCUSSION AND CONCLUSIONS

5.1 Theoretical contribution

The aim of this study was to analyze food waste reduction from a strategic sustainability perspective. Strategic sustainability perspective on food waste reduction was constructed in the theoretical framework by combining the findings of previous studies on food waste, food waste reduction and strategic sustainable development. The data of this qualitative study were collected from seven interviews with professionals from the Finnish food waste sector. Data analysis was conducted by following the inductive method, which includes both data-driven and theory-driven phases of qualitative content analysis. The analytical framework of the study was built on the Framework for Strategic Sustainable Development. The findings of the study included the system-level findings of key stakeholders, food waste and food system. The strategic guidelines -level findings introduced the key resources of food waste reduction activities and formed strategic guidelines to ensure that the resources keep feeding the process of food waste reduction. The tools-level findings presented the types of value generated in food waste reduction activities as well as tools to measure and communicate the value of food waste reduction activities. The findings also examined the factors affecting the decision-making of consumers and other food chain actors and suggested tools to support decision-making towards food waste reduction.

The concept of food waste has been widely discussed and defined in previous research. Edibility of food has been used as a criterion in categorizing food waste (Teigiserova et al., 2020; Silvennoinen et al., 2015). This study contributes to that by considering the factors that determine what kind of food is processed and shared in food waste reduction activities. The study states that edibility is the key element in categorizing food waste in food waste reduction activities. However, the study points out that food waste reduction activities also assess the risk of food going to waste. Edibility is only one of the aspects that increase or reduce the risk of food going to waste. The thesis addresses that a lack of shelf space and a lack of sales channels can also increase the risk of food going to waste. The study suggests that the risk could be avoided or reduced by innovating new types of channels for food waste that would still preserve the valuable nutrients embedded in food waste, even though the food would already be inedible and not fit for human consumption. In fact, one of the interviewees suggests that we should

define food waste as all the side flows of the food economy to have an ambitious enough perspective on food waste reduction.

Previous research has presented multiple causes for food waste generation (Buzby et al., 2011; BIOIS, 2010; Aschemann-Witzel et al., 2015; HLPE, 2014). The High Level Panel of Experts on Food Security and Nutrition (2014) has described the structural causes, including the way different actors are organized together along the food chain. This thesis contributes to that by assessing how the power imbalance in the food system can lead to generation of food waste. The power imbalance can be seen in the strict conditions for best before -dates that retail chains give to producers and importers. Another example of the power imbalance is how only small quantities of new launches are accepted by retail chains, although the food industry needs to produce more due to technical constraints. The study suggests that food waste reduction activities should analyze the systemic and structural causes of food waste when developing their activities from a strategic sustainability perspective, as highlighted in section 4.5.

This study finds a common ground with the previous research by Garnett (2011), which presents actions for achieving low GHG food behavior. Garnett (2011) points out that eating no more than needed to maintain a healthy body weight is leading towards lower GHG emissions. The issue of metabolic food waste and its economic and environmental impacts is also considered in the system-level findings of this thesis. However, Garnett implies that the overconsumption of food needs to be addressed with a comprehensive approach to consumerism (Garnett, 2011, 30). This thesis contributes to that by expressing that the discussion about metabolic food waste is still considered challenging among food waste professionals, since it may easily cross a personal boundary. However, food waste professionals have noticed the topic slowly emerging to the food waste discussion.

This thesis contributes to the discussion on regulative measures for food waste reduction and the relationship between food aid and food waste reduction. Firstly, the findings state that the EU is seen as a potential forerunner in achieving a more sustainable food system, since it already has high-quality regulation on food safety. Secondly, the findings imply that Finland could perhaps follow the steps taken by France in legislative measures and prohibit disposal of unsold food that is still fit for consumption. The data present France as a good example in food waste reduction due to its regulative approach. However, the French model of food waste reduction as well as the Circular Economy Package presented by the European Commission have been

criticized by IPES-Food, which has argued that these regulative measures could actually further institutionalize food banks as recipients of surplus food (IPES-Food, 2019, 89). The relationship between food aid and food waste reduction is acknowledged in this thesis by addressing that planning one's nutrition based on random ingredients received from food aid is impossible. The thesis states that there should be other ways to tackle hunger than providing food waste. In fact, the data suggest that everyone should have a right for equal food citizenship: to be able to decide when and what they want to eat. Furthermore, the interviewed professionals emphasize that food waste reduction activities are still easily associated with food aid and therefore stigmatized. Food waste professionals are trying to steer away from this stigma to enable scaling of activities.

It has been stated that increasing the perceived value of food, including also other than monetary values, could help reduce food waste (Hebrok & Heidenstrøm, 2019). This study contributes to that by presenting multiple types of value of food waste reduction activities, including biodiversity value, greenhouse gas reduction value, resource value, nutritional value and social value. Previous research by Michelini and collegues (2018) address that new food sharing models that utilize digital platforms provide an opportunity for businesses to sell their food surplus and increase their economic profits. The "sharing for money" food sharing model is concluded to primarily benefit providers and that the platforms are used for profit reasons (Michelini et al., 2018, 211). Their study suggests that the development of "sharing for money" model has limited the development of models promoting social welfare (Michelini et al., 2018, 213). This thesis contributes to Michelini and collegues' (2018) research by stating that the profit-oriented model "sharing for money" is a too simplistic description of a food waste business that sells food surplus to consumers. The findings of this thesis express that a food waste business has strong environmental values and they rather sell at a loss than generate any food waste. The business uses cheap price as a driver to make sure that all products get sold. Therefore, the business can be seen to provide a new solution to the dilemma of unpredictable food aid since it creates accessibility to food for the people in need. The thesis states that the "sharing for money" model can generate social value and provide an opportunity for food citizenship: to decide when and what the person wants to eat.

The role of consumers' attitudes towards food waste and consumers' knowledge on the impacts of food waste have been widely discussed in previous research. On the one hand, previous research has expressed that promoting the importance of food waste prevention and providing

knowledge for consumers could serve as potential factors in changing consumer behavior (Aschemann-Witzel et al., 2015; Thyberg & Tonjes, 2016). Consumer acceptance and attitudes towards utilizing food waste ingredients have also been discussed (Bhatt et al., 2018). On the other hand, previous research has argued that consumer awareness campaigns may not succeed in addressing the everyday practices that affect food waste levels (Hebrok & Heidenstrøm, 2019) and that consumers' abilities to reduce food waste depend on their resources (Närvänen et al., 2019). This thesis contributes to the discussion by acknowledging the importance of raising consciousness about the impacts of food waste. However, instead of focusing on how to change the attitudes of consumer, the thesis focuses on the attributes of the main ingredient: food waste. The study highlights ways to lose the stigma around food waste, including marketing measures that can be applied to food waste reduction activities.

Previous research has also acknowledged the importance of cooking skills in utilizing leftover ingredients (van Geffen et al., 2020) and suggested that the creativity of cooking with food waste ingredients can be enhanced by using social media platforms (Närvänen et al., 2018). However, previous research has also addressed that consumers may associate improved cooking skills with less enjoyment of food and a less healthy diet (van Geffen et al., 2020). The thesis contributes to the discussion by referring to possibilities that social media has to offer for food waste reduction activities, including building a virtual community. A strong virtual community would engage consumers in food waste reduction. This contributes to previous research that has addressed the use of social media platforms to engage consumers in the discussion (Närvänen et al., 2018). However, the thesis also acknowledges that people struggling in their daily lives do not necessarily have the resources or abilities to cook or plan their nutrition.

Eating seasonal has been addressed in previous research as a way to reduce the environmental impacts of food (Garnett, 2011, 30). The relocalisation of food systems, including short food chains and new ways of reducing food waste, has been introduced as an opportunity for achieving more sustainable food systems (IPES-Food, 2019, 7). This thesis contributes to these by examining the locality of the food market. The data suggest that we should learn to eat more seasonal, locally produced and more diverse to increase biodiversity and the energy efficiency of food production. However, it is acknowledged that this would require changes in the entire food chain, since the system is planned to process certain raw ingredients. Additionally, consumers would have to acquire the cooking skills to cook with local and seasonal ingredients.

The study suggests that restaurants and other food services play a key role in introducing consumers to different ingredients.

The study concludes that strategic food waste reduction activities should define their vision, which represents the success in the system they operate. Definition of the vision is part of the framework for strategic food waste reduction activities, presented in section 4.5. However, food waste professionals should consider the costs of efforts that are necessary to take in order to reach the defined vision. Previous research has pointed out that food redistribution requires resources for monitoring and examining and food waste reduction activities may pose risks in terms of food quality and the cost of transport (HLPE, 2014, 73). This thesis suggests ways to examine the incremental costs of food waste reduction, including the collection of data on their activities. Knowledge and data can help build a manageable structure for activities. Modelling and documentation can guide the activities to a more financially stable direction. Furthermore, the thesis suggests that the key resources of activities should be identified and supported by strategic guidelines. All these measures can help the organization examine the costs of efforts that are needed to reach the defined vision. As presented in previous research, the optimum pathway for sustainability may not be zero food loss, but substantially less food loss than today (HLPE, 2014, 32). This emphasizes how the vision of food waste reduction activities should not be taken as self-evident zero loss, but the vision should be evaluated together with the big picture of the activities.

5.2 Contribution to organizational practice

Proposition 1: There is an existing gap between the perceived value of food waste reduction activities and concrete tools to measure and communicate the value of food waste reduction activities to stakeholders.

The matter that should be emphasized when considering the findings of this thesis is the gap between the perceived value of food waste reduction activities and concrete tools to measure and communicate that value to stakeholders. Tools that are widely used by food waste professionals to measure and communicate the value of their activities are euros, kilos and reduced carbon emissions. However, when discussing the content of these activities, additional types of value are identified. This thesis suggests that the currently used tools do not support forming a big picture of the value of food waste reduction activities.

Identified additional types of value include social value, nutritional value and biodiversity value. Social value is generated by community building among volunteers, new social contacts, providing accessibility to food for the people in need, a sense of belonging and by recruiting people that have experienced difficulties in getting employed in the past. Biodiversity value can be highlighted by estimating the land area preserved for biodiversity action and by encouraging consumers to eat more seasonal and diverse food. Nutritional value can be generated by utilizing food waste ingredients that are high in nutrients. The thesis suggests that the additional types of value should also be measured and communicated to stakeholders. This would enhance the strategic development of food waste reduction activities.

Proposition 2: People, logistics and financial resources are critical resources for food waste reduction activities.

This thesis identifies four key resources to ensure the strategic development of food waste reduction activities. Three resources are identified as particularly critical since food waste professionals emphasized their importance. Critical resources are people of knowledge, motivation and responsibility, a well-functioning logistics system and financial resources. If there was a lack of one or more of these resources, it could affect the development and success of food waste reduction activities. Interviewed food waste professionals have experienced difficulties with having enough of these critical resources, and that has resulted in problems in delivering services, exhaustion of employees or volunteers and slower progress.

In order to ensure the continuity of food waste reduction activities, the study suggests strategic guidelines to support the resources. It is suggested that food waste reduction activities should have at least one paid employee in order to ensure the continuity of activities and avoid exhaustion of volunteer resources. The study also suggests that when it comes to food waste reduction activities, there could be a common interest found between different actors to share logistics. The resource of logistics can otherwise be too expensive or difficult to manage by a single organization. Furthermore, it is pointed out that the cost of logistics could be spread more equally between different food chain actors to have food waste reduction as a common goal.

Financial resources may be difficult to acquire especially in non-profit activities. However, the study suggests some measures that can help with acquiring more financial resources. The study

suggests that food waste reduction activities should focus on their core mission and core activities, build a structure that can be managed, and find investors that are interested in impact investing and supporting environmental actions.

Proposition 3: Food waste reduction activities should be scaled to have an even more significant positive impact on the environment.

In order to succeed in making an impact, it is essential to know how to scale and normalize sustainable consumption practices (Närvänen et al., 2019, 276). This thesis proposes that in order to reduce food waste effectively, food waste reduction activities should reach new consumers and scale their activities. The interviewed professionals point out that the scaling of food waste reduction activities has the direct correlation to the positive impact on the environment: the more their activities grow, the larger is their positive impact on the environment. The data find out that food waste professionals already have the motivation to scale their activities, but they have encountered some obstacles.

The study points out the reasons why some food waste reduction activities have not been able to scale yet. These include a lack of resources and an existing stigma around food waste. Findings suggest that food waste professionals struggle with acquiring enough critical resources, including people, logistics and financial resources. Furthermore, food waste reduction activities are still easily stigmatized as food aid and perceived to only serve people in need. The study also highlights the problem that food waste can be seen as unappealing and low-quality, although the food at risk of going to waste may be in an immaculate shape.

The thesis suggests ways to develop food waste reduction activities strategically. Strategic development could help reach new consumer groups and scale the activities. Suggested measures could reduce the stigma around food waste and create positive mental images of food waste ingredients. The study addresses that technological innovations may assist consumers in reducing food waste in the future. Furthermore, the study points out that food waste reduction activities can be seen as exciting, easy to use, affordable and surprising. Food waste ingredients can be emphasized in marketing as high in nutrients and healthy.

In conclusion, strategic food waste reduction activities could be scaled by reducing the stigma, supporting critical resources and emphasizing the various positive elements attached to food waste reduction.

5.3 Evaluation of research

Evaluation criteria for assessing quantitative research do not necessarily serve the needs of qualitative research, which may even lead to poor-quality research (Eriksson & Kovalainen, 2011). Qualitative research methods arrive closest to the traditional concept of reliability when the evaluation focuses on the quality of data and the actions committed by the researcher (Hirsjärvi & Hurme, 2008, 189). Research should be evaluated continuously during the research process (Eriksson & Kovalainen, 2011). Evaluation of this thesis already started in the data collection phase, when the selection of interviewees, interview questions and the technical needs of data collection were considered.

Hirsjärvi and Hurme (2008) have pointed out multiple ways of how the researcher can enhance and evaluate the quality of the study during the research process. These include constructing a good framework of interview questions and making sure that the technical equipment for interviews is in order. The author paid attention to the refinement of interview questions and the overall framework for interviews to prepare herself for asking further questions and dive deep enough into the research themes. All interviews were conducted remotely using the same technical equipment to maintain the high technical quality of interviews. If the data are to be transcribed by multiple people, they should be trained for conducting the work (Hirsjärvi & Hurme, 2008, 185). This aspect was also taken into account, and the entire data including both rounds of interviews were transcribed by the same professional transcribing service. The whole transcribed data were included into the data analysis.

When evaluating the validity of a qualitative study, collected data can be compared to data acquired from other sources. Triangulation is a basis for evaluation that uses multiple perspectives to clarify the findings of the research (Eriksson & Kovalainen, 2011). Triangulation was also practiced in this study, since the collected data were taken into discussion with previous research on food waste and food waste reduction. In addition to this, the trustworthiness of research was enhanced by providing information on the decisions made

along the research process and how the main research question was developed and refined during the research process.

The author paid attention to the selection of interviewees in order to enhance the validity of the study. All interviewees had personal experience and expertise on food waste reduction. The validity of study is also linked to concepts that are used in interviews and how they reflect the phenomenon that is being studied (Hirsjärvi & Hurme, 2008). Interviewees were asked to define the key concepts of the study, including food waste, circular economy, sustainability and sustainable business activities from their personal and their organisation's perspective. This was conducted to make sure that the author and interviewees shared a similar understanding of the key concepts that are used in interviews.

5.4 Suggestions for further research

This study serves as a first attempt to apply the FSSD to the context of food waste reduction, but hopefully, it does not remain as the last. This thesis acknowledges that the system where food waste is generated is more complex than presented in this study. The system-level of food waste reduction activities should therefore be further examined in further research to form a thorough understanding about the system where food waste is generated.

Previous research on the FSSD has stated that all levels of the five-level model are needed, since they represent interrelated levels of strategic planning (Robèrt, 2000, 252). However, this thesis focuses mainly on three levels of the model: system, strategic guidelines and tools. The success-level is examined only briefly in the synthesis of the findings. Therefore, the author encourages future studies to focus on how the vision of success is defined in the context of strategic food waste reduction activities. This should be conducted through addressing the basic sustainability principles of the FSSD in the context of food waste reduction. The vision of success should be framed by using these principles, since they serve as boundary conditions within which society can still continue to function (Broman & Robèrt, 2017, 23). Further research is encouraged to continue developing the framework for strategic food waste reduction activities, presented in this thesis. The framework should be tested in practice and developed based on received feedback.

The thesis identifies logistics as one of the key resources for food waste reduction activities. It is addressed that managing logistics may be considered difficult as it requires financial resources that non-profit organizations may lack. On the other hand, the thesis expresses a thought that donating food waste to charity may even be a more cost-effective option to stores than bio waste management. This is why further research should focus on the cost structure of food waste logistics and variety of solutions to efficiently manage logistics in food waste reduction activities. Further research could also examine the financial resources of food waste reduction activities and how impact investors are building the growth of food waste reduction activities.

The thesis identifies a link between biodiversity, food waste reduction and eating habits. It is acknowledged that people should eat more seasonal, local and diverse to enhance biodiversity. However, it is also pointed out that this would require changes along the entire food chain. Further research should examine how the food system could be developed to be more diverse in order to support the growth of biodiversity. Furthermore, further research could assess how the biodiversity value of food waste reduction activities could be measured and communicated to stakeholders, since the topic is only briefly discussed in this thesis. Biodiversity value could help expand the perceived value of food waste reduction activities.

There is still a need for further research on the environmental impact of food waste. This study addresses that there is a lack of awareness of the environmental impact of food waste, which has already been stated in the previous research (BIOIS, 2010, 10). Scholars have made attempts to measure the environmental impact in terms of the climate impact (e.g. Katajajuuri et al., 2014). However, when used separately, indicators such as carbon footprint are not able to capture the full complexity of sustainable development (Galli, Wiedmann, Ercin, Knoblauch, Ewing & Giljum, 2012). In further research, aforementioned point should be taken into consideration, and the use of different indicators should be combined to track the impact of food waste on our planet.

This thesis addresses some aspects of food waste regulation in Finland. Food waste professionals do not see regulation as a burden but as a flexible framework that can create new business opportunities for them in the future. Regulation is also seen as a shield that protects food waste reduction activities from inappropriate food donations and misconduct. However, the study still leaves stones unturned for further research on the subject. In order to develop

food waste reduction activities strategically, it is important to have an overview on their regulatory environment.

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APPENDICES

The interview frames were constructed based on the literature review and research questions. The questions were modified based on the interviewee's background, and all questions were not presented to all interviewees. Interview frames were designed to nourish the discussion around food waste reduction activities. Questions have been translated from Finnish to English.

APPENDIX 1: Semi-structured interview frame, round 1 (2019)

Background, key concepts
1. Would you like to tell us briefly about yourself and your background?
2. Would you tell us about your organization: what do you do and why?
3. What do you think responsibility means?
4. How does responsibility relate to sustainability?
5. What are issues related to sustainable business and sustainable development?
6. What do you think the circular economy means?
7. Is the circular economy somehow defined in your organization? What do you pay particular attention to in it and why?
8. What is meant by food waste in your organization?

Activities
9. What kind of sustainable business goals have you defined? Are they divided into sub-goals, such as customer-specific goals?
10. Is your business a circular economy business, or would you prefer to talk about sustainable business?
11. How do the circular economy / sustainable business manifest itself in your processes and decision-making?
12. How has your business developed? What indicators have you used to monitor the results of sustainable business?
13. How has the accumulation of expertise through practice affected operations?

Communication
14. How do you communicate internally about sustainability and its realization?
15. How have you communicated sustainability to your external stakeholders?
16. What does your external communication involve and in what forums is it done?

Challenges and opportunities
17. What things in the circular economy / sustainable business motivate you? What about others?
18. What challenges have you encountered in operating by the principles of sustainable business?
19. What new opportunities can food waste reduction bring to an organization? What about investing more in sustainability?

Stakeholders
20. What are the other boundary conditions in your operations than sustainability and responsibility, for example, through stakeholders?
21. What benefits does the customer feel they will receive from your service?

22. How have people's attitudes towards food waste changed?
23. How do you think sustainability and responsibility are taken into account in the decision-making of customers or companies?
24. Is there any emphasis on decision-making: environmental, social, economic? Is there a contradiction between these?

Sharing expertise
25. What does expertise, i.e. knowledge, expertise, experience related to food waste mean?
26. How can the expertise be shared?
27. How have you yourself shared expertise like your expertise?
28. How do you share expertise, what kind of practices does it have?
29. Are there any challenges or threats to sharing expertise?
30. What are the opportunities for sharing expertise?
31. How do you feel the importance of your expertise to the organization?
32. What do you think you have learned from other experts in your organization?
33. What do you think about the value of the economy and the environment in today's business?
34. How can you use the experience gained from different projects in later projects?

Finally
35. What has been the greatest / worst thing about circular economy?
36. Is there anything where you have been particularly successful?
37. How do you see the future development of your activities and the industry?

APPENDIX 2: Semi-structured interview frame, round 2 (2020)

Background, key concepts
1. Would you like to tell us briefly about yourself and your background?
2. Would you tell us about your organization (or department where you are): what you do and why?
3. What do you think responsibility means?
4. How does responsibility relate to sustainability?
5. What do you think the circular economy means?
6. Is the circular economy somehow defined in your organization? What do you pay particular attention to in it and why?
7. What does food waste mean to you?

Challenges and opportunities
8. What challenges have you encountered in implementing sustainable (business) activities?

Stakeholders
9. What kind of stakeholders do you collaborate with?
10. How do you consider stakeholders in your activities?
11. What benefits do stakeholders get from your actions?
12. How do you think sustainability and responsibility are taken into account in stakeholder decision-making?
13. Is there an emphasis on stakeholder decision-making: environmental, social, economic? Is there a contradiction between these?

The value of food waste
14. Is there worthless food waste? / What is the value of food waste?
15. Why should food be saved?
16. What role do new product launches play in the generation of food waste?
17. How is the power balance in the Finnish food system?
18. How do you see the social impact of your activities?
19. What is the relationship between food security and food waste?
20. What is the link between food waste and biodiversity?
21. Will there be food waste in 20 years?
22. How is the value of food waste determined in your operations?
23. By what indicators should food waste be viewed? Which approach would be most effective in food waste communication?
24. Why these indicators?
25. What is / could be the environmental value of food waste from the point of view of your activities?
26. What economic value does / could food waste have in terms of your activities?
27. What social value does / could food waste have from the point of view of your activities?

Finally
28. What has been the greatest thing about the circular economy?
29. Is there anything you still want to complete or refine?