Inhibiting Household Practices for Preventing and Sorting Food Waste

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Synopsis:

The amount of food that is wasted is a growing issue, which causes unnecessary use of resources and emissions damaging the climate. Recovering the food waste for recycling is also an important aspect, as it can combat the issue of the lack of important nutritional substances in the agricultural sector. These issues start with the households. This master thesis, therefore, examines the practices that inhibit the households in preventing food waste and sorting the food waste correctly and is a collaboration with Econet. Theory of socio-technical systems and practice theory have been used to understand further how technology and the human actors are interacting with the waste handling system as well as understand how the daily life affect the households' waste handling within the home. To further examine the issues, interviews have been conducted with five households. The results show how the households experience challenges through multiple types of practices - from meal planning to either saving the food as leftovers or waste sorting it.

Resumé

Dette speciale i Environmental Management and Sustainability Science på Aalborg Universitet undersøger, hvilke barrierer husholdninger møder, når de skal forebygge madaffald eller sortere det fra. For at undersøge disse problemstillinger fokusere dette speciale på de sociale praksisser og infrastrukturer, der finder sted når madaffaldet smides ud eller sorteres. Dette speciale er et samarbejde med konsulentvirksomheden Econet, som har bidraget med undersøgelsesemnet samt kvantitative data om affaldssammensætningen fra et boligområde i Sorø.

For at opnå en bedre forståelse af problemstillingerne er der anvendt to teorier; teorien socio-tekniske systemer og praksis teori. Socio-tekniske systemer giver en bedre forståelse af hvordan de tre dimensioner teknologi, regler og menneskelige aktører påvirker hinanden i samfundet. Her redegøres der yderligere for hvordan affaldshåndteringssystemet er placeret i samfundet, hvor der tages udgangspunkt i de tre dimensioner. For bedre at forstå de menneskelige aktører, herunder husholdningerne, anvendes praksis teori. En praksis er opbygget af flere elementer som kan inddeles i fire kategorier; integreret adfærd, ekstern påvirkning, personlige værdier og materielle genstande. Opbyggelsen af en praksis ligger grundlaget for den analytiske ramme.

For at undersøge hvordan husholdningernes praksisser forhindre dem i at forebygge madaffald eller frasortere det, er der afhold interviews med fem husholdninger. Disse husholdninger er udvalgt efter hvor meget madaffald de har smidt ud, hvor meget madaffald de har sorteret som restaffald og størrelsen på husholdningen. Det vil sige, der undersøges for de husholdninger, der har sværest ved at forebygge og sortere deres madaffald samt husholdninger, der har tre eller flere medlemmer.

Ud fra interviewene er det blevet mere klart hvilke barrierer husholdninger oplever. Disse barrierer ses helt fra når husholdningerne skal planlægge deres måltider til

når deres måltider enten bliver til rester eller skal smides ud. Her påvirker husholdningernes vaner, viden om datomærkning og madspild, motiverende faktorer og infrastrukturen inde og uden for hjemmet. Ved at sammenligne de kvantitative data med udtalelserne fra husholdninger, er det muligt at se hvorfor husholdningernes mængder af madaffald og fejlsorteringer ser ud som de gør.

Preface

This master thesis was developed in the period between February 1st and June 7th 2019 as a master thesis on Environmental Management and Sustainability Science, Aalborg University. The master thesis has been part of a collaboration with Econet and AffaldPlus. The purpose of this master thesis is to examine why households are inhibited to prevent food waste and properly sort their food waste. The examination is based on a quantitative waste composition analysis of general and food waste by Econet. The examination takes place within case area in Sorø Municipality where five households have been interviewed.

The author of this master thesis would like to give thanks to supervisor Ole Busck for continuous guidance, feedback and support. The author would also like to give thanks to Claus Petersen and his team at Econet for their hospitality, support and making this thesis possible. Also, the author would like to thank the households in Sorø for participating in interviews, contributing to their thoughts and opinions.

Contents

CHAPTER 1

Introduction

The world is changing. Along with it, food consumption patterns have changed as well (Filho and Kovaleva, 2015). These changes have led to more food waste than ever before. It has been shown that about 30% of the food produced globally is either lost or wasted along the supply chain - from agricultural production to household consumption. The loss means that a significant amount of resources needed in food production have been used in vain. It also means that the emissions and greenhouse gasses caused by food production are unnecessarily polluting Earth. Food waste does not only impact the environment, but the economy, food security, and livelihoods as well (Gustavsson et al., 2011). These issues indicate the global and societal importance of combating food waste and bring down climate changes, hunger, and poverty. The issues of food waste have been recognised globally, as reducing food waste is part of the UN Sustainable Development Goals (United Nations, 2015):

> *"By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest"*
>
> (United Nations, 2015, p. 25)

In Denmark, initiatives are already taken place to reduce food waste. We see a lot more attention to reducing food waste through different mediums. There are organisations such as 'Stop Spild af Mad'[1], development of food waste reducing apps and eliminating deals where products are bought in bulk. Even though these type initiatives spread awareness about food waste, it is still an issue nonetheless. According to a study published by Miljøstyrelsen (2010), almost half of the waste from households is food waste where most of it could be avoided, see table 1.1.

[1] 'Stop wastage of food', translated.

Table 1.1: Overview of how much total food, avoidable and non-avoidable food is thrown out for a single family home (Miljøstyrelsen, 2010, p. 7).

Total waste per single family home per year		
Food waste	197 kg	48%
Other waste fractions	211 kg	52%
Distribution of food waste per single family home per year		
Avoidable food waste	104 kg	53%
Non-avoidable food waste	93 kg	47%

As the table shows, 52% of the food could have been avoided. Therefore, it is relevant to look into why households are not preventing avoidable food waste.
As table 1.1 also shows, 47% of the food waste are non-avoidable. Disposing of non-avoidable food is also an important issue to address. By recycling food waste instead of incineration the nutrients in the food waste such as phosphor, nitrogen, and calcium return to the soil. These nutrients are especially important to return to the exhausted soil (Miljøstyrelsen, 2015) that are caused by hundreds of years of agriculture. According to new policies and strategies, every municipality in Denmark have to start collecting organic waste for recycling - which also includes food waste from the households (Europa Parlamentet, 2018b). Many municipalities have already included food waste as a waste fraction in their waste schemes (Miljøstyrelsen, 2019). Through multiple studies, it also shows that the households are willing to sort their waste in general (Refsgaard and Magnussen, 2009; Henriksson et al., 2004; Ekvall and Malmheden, 2012; Østergaard and Pawlak, 2013), but the households seem to be challenged on this front. The challenges are caused by different factors that inhibit households from sorting their waste. These factors could, for example, be not having time sort the waste, not trusting that the waste gets recycled, and lack of knowledge about how waste should be sorted among others (Petersen and Kristiansen, 2017). These factors show that a lot is going on within the home when not just food waste but waste in general needs to sorted.
Food waste as an essential resource has gotten more intention in the last couple of years, which can be seen in the development of international policies, strategies and objectives. Food waste, however, is still an issue when taking a look at the households. In this chapter, two food waste issues with a focus on households have been highlighted; preventing food waste and sort the food waste as a waste fraction. These issues lead to the focus in this master thesis, which is to examine households practices according to preventing and sorting waste.

CHAPTER 2

Focus of the master thesis

As mentioned in the previous chapter, this master thesis will take a closer look at why households are having trouble preventing food waste and sorting it correctly. To be able to work with these issues, a research question has been formulated. As this thesis is a collaboration with an external company, who is the point of departure for this thesis, it is appropriate to describe the conditions of the collaboration first.

2.1 Collaboration with Econet

This master thesis is a collaboration with the consultancy firm Econet located in Copenhagen. Econet offers counselling especially within the field of waste, and completes tasks for public authorities, organisations as well as private companies.
Econet has received a task from the waste management company AffaldPlus to make a quantitative waste composition analysis of AffaldPlus' six municipalities. Part of this analysis takes place Sorø, a city in Sorø Municipality. For this part of the analysis, Econet had to examine the waste composition for the individual households within a designated area. The waste composition only examines for residual waste and food waste. The waste composition allows a further examination of why the waste composition looks like the way it does. As a supplement to the quantitative analysis, this thesis takes a qualitative approach to get a better understanding of what happens within the home when the households handle their waste. To be able to examine this issue, the thesis had access to the data from the quantitative analysis, and the author was allowed to sit and write the thesis at the office of Econet.

2.2 Research question

As the examination by Econet was only between the residual waste and food waste, this thesis will look at the relationship between these two waste fractions, where the bigger will be on food waste. Therefore the issues concerning preventing and sorting food waste will be examined further in this master thesis with a research question which is formulated as followed:

> *What social practices and infrastructures within the households seem inhibitory for preventing food waste as well as sorting food waste appropriately?*

'Sorting food waste appropriately' means that food waste should be sorted as food waste. Therefore, if there are any food waste in the residual waste fraction, this is classified as a sorting error. To answer the research question, the thesis is structured as depicted in figure 2.1.

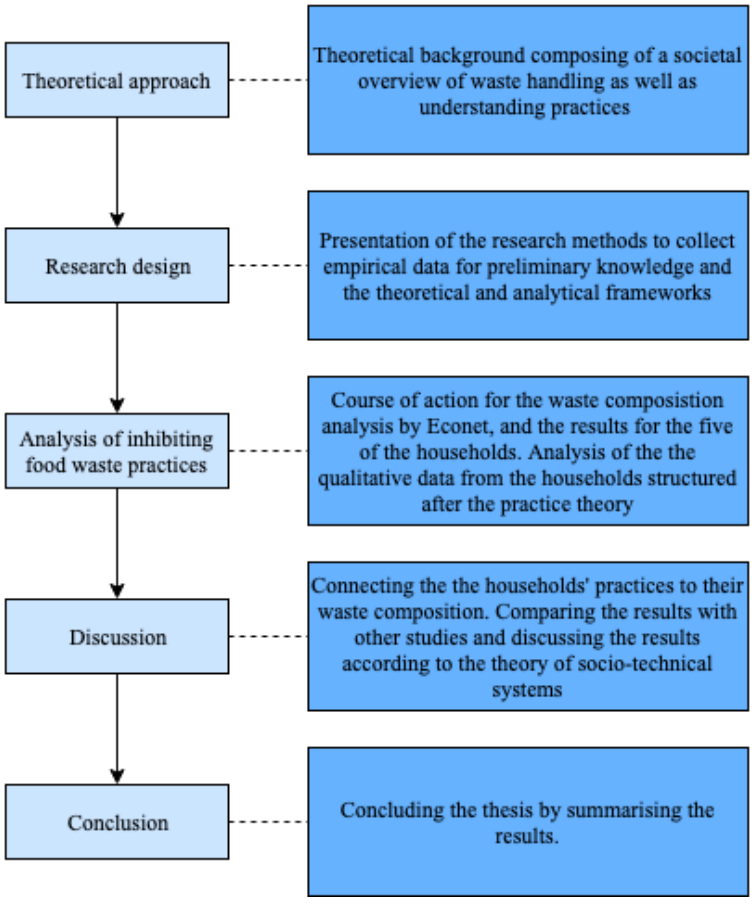

Figure 2.1: Overview of the structure of the thesis.

CHAPTER 3

Theoretical framework

As described in the previous chapter, this master thesis will be focusing on households and their food waste practices. This chapter will describe the two theories used in this thesis; *socio-technical systems* and *practice theory*. These theories are used to gain knowledge about the issues at hand as well as a template for designing the interview guide in appendix A and the analytical framework.
To further look into the households, it is relevant to map out how the households are connected on a larger societal scale. The theory of socio-technical systems has been chosen for this task. As this thesis is working with the issues of waste, the theory of socio-technical systems will also be described with a waste handling approach. By doing so, it will give a better understanding of how the households contribute to the waste handling system within society. Where the socio-technical system explains the role of the household in a bigger picture, practice theory takes a look at the household on a micro scale. Practice theory will give a better understanding of the households' daily life and how it is shaped through technology, norms, and the interactions between the household members.

3.1 Theory of socio-technical systems

To explain the theory of socio-technical systems, the article *'From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory'* by Geels (2004) will be used. In this article, Geels makes four contributions to the new 'sectoral systems of innovation' approach within innovation studies. This approach sees the scope widened from artefacts to systems - from individual organisations to networks of organisations. In one of Geels' contributions, the user side is incorporated. The sectoral systems of innovation approach focus more on *developing* knowledge and technology and pay lesser attention

to the *use* of technology and societal transformations. By including the user side, the approach broadens from being sectoral systems of innovation to be socio-technical systems. Therefore, the focus will no longer be on innovations but also functionality and usage (Geels, 2004). This addition is important to be able to examine how the households as users connect within the system.
Broadening the scope from sectoral systems to socio-technical systems means that the achievement of societal functions, such as transport, supply and housing, becomes central. The definition of socio-technical systems is, therefore, the linkage between elements that are necessary to fulfil the societal functions. In the modern society, technology is an important element to be able to complete these functions, which is why *production*, *use of technologies* and *distribution* are separated as sub-functions. To achieve the sub-functions, the elements, which also define as resources, are necessary. Socio-technical systems, therefore, consist of resources such as capital, knowledge, labour and cultural meaning (Geels, 2004). These sub-functions are depicted in figure 3.1.

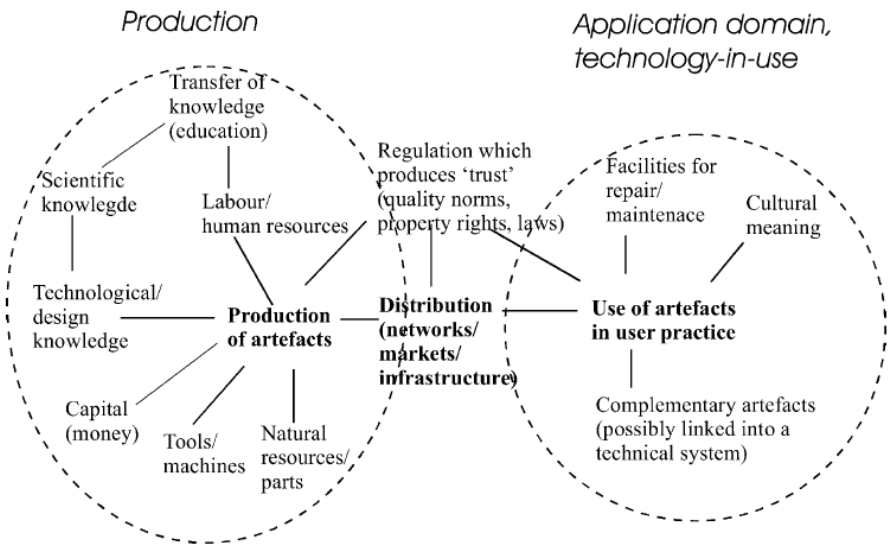

Figure 3.1: The basic elements and the resources in a socio-technical system (Geels, 2004, s. 900).

To clarify, a socio-technical system is a system that makes the connection between different elements that then achieve a societal function. The socio-technical system is made up of three sub-functions, and to achieve these sub-functions, creating resources are necessary.
Fulfilling the sub-functions with the resources are not achieved on its own, as socio-technical systems do not function independently. They are the result of activities created by human actors. These actors are embedded in different social groups, which share specific characteristics. In modern society, many of these social groups relate to the resources and sub-functions, which figure 3.2 depicts. This depiction focuses on the social infrastructure, which is necessary to advance, commercialise and use

the technology. The figure can be even more complex by zooming in on individuals within the social groups or the linkages between the social groups. Within the groups, they speak the same language and share the same norms, and therefore coordinate within the individual groups. The social groups also interact with each other and create networks (Geels, 2004).

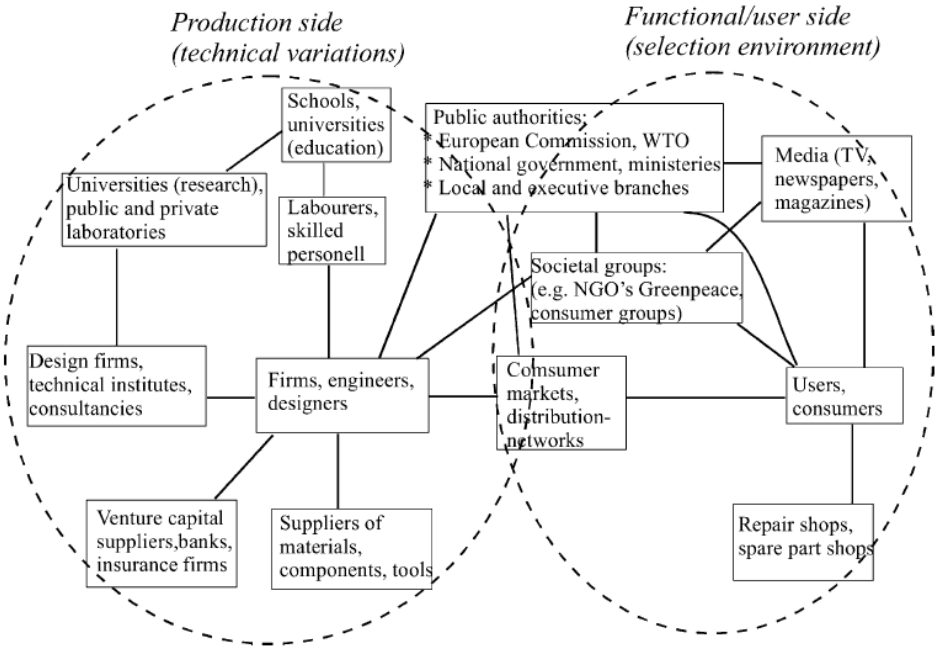

Figure 3.2: The social groups which create the socio-technical systems (Geels, 2004, s. 901).

The relationship between the sub-functions and resources and the social groups is dynamic, which is clear when looking through history. When taking a look at the Middle Ages, production and consumption were positioned together. As an example, a blacksmith was the same producer of knowledge, capital and labour. Fast forward to today where production and consumption have increasingly separated from each other. The separation increased the social groups and more specialised groups. The increase is shown through the two dimensions; socio-technical systems and human actors, as it shows the co-evolution of technology and society (Geels, 2004).
The importance of human actors have become more apparent, but they are not completely free to act how they want. This leads to a third dimension of the society called *rules and institutions*, where the regulations control the actions of the human actors (Geels, 2004). This dimension helps tie the whole system together. The six kinds of interaction in figure 3.3 explain the relations between the three dimensions.

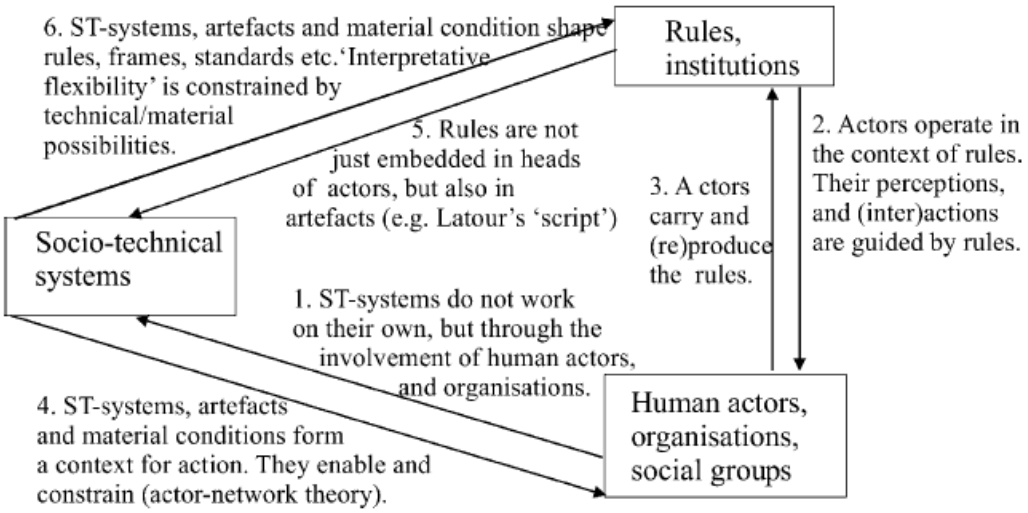

Figure 3.3: The three dimensions that a society consists of and their relations in between (Geels, 2004, s. 903).

With the understanding of these three dimensions it is now possible to look at a waste handling as a system.

3.1.1 The waste handling system

Waste handling affects multiple sectors and actors in society, and can, therefore, be seen as a societal function. As we learned in the previous section, socio-technical systems are necessary to fulfil a societal function, but human actors and rules are equally important. Figure 3.4 shows an illustration of how society is enclosing the waste handling system. Within this system there are three dimensions inspired by the theory of socio-technical systems; *technology, rules* and *human actors*.

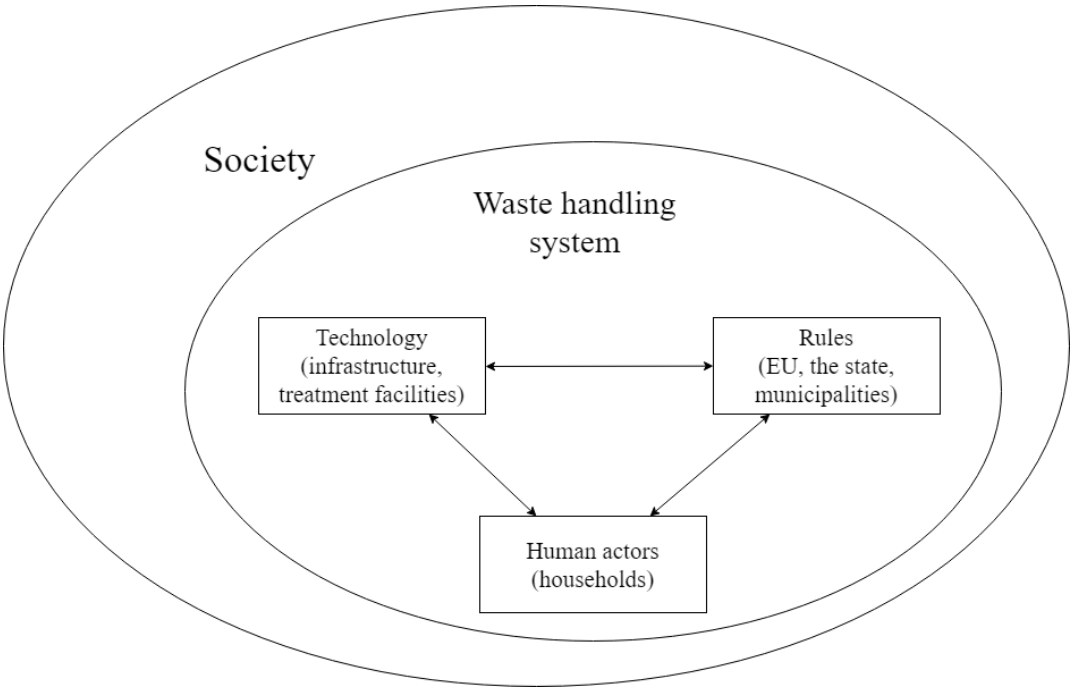

Figure 3.4: The waste handling system as a societal function with three dimensions. Inspired by (Refsgaard and Magnussen, 2009, p. 762).

In the waste handling system, *technology* can also be seen as physical and material infrastructures. The infrastructures include waste containers, collection routes, collection schemes, sorting systems and treatment facilities. *Rules* consist of rules and laws that, for example, decide what type of treatment waste should receive and who is responsible for monitoring, communication, and changing systems. The *human actors* consist of norms, which are shared by local communities. The norms include daily routines within the home, distribution of housework as well as attitudes towards waste (Refsgaard and Magnussen, 2009). In the next few sections, these dimensions will be elaborated.

Technology

The structures for how the waste needs to be sorted and disposed of effects the households ability and motivation to handle their waste in the most responsible way. Collection schemes and sorting systems in the home can in this context be used as examples.
When implementing a collection scheme, there are generally two collection methods; a curb-side scheme and the usage of a bring site. With a curb-side scheme, the households collect their waste in waste containers which are placed at each house or apartment building that are later picked up by a garbage truck. With the other collection method, which is also called a bring scheme, the households have to carry

their waste to a nearby bring site with collective waste containers. Figure 3.5 shows examples of the infrastructure of a curb-side scheme and a bring scheme.

Figure 3.5: Pictures of the two types of collection schemes. The left pictures show waste cubes where it is possible to deliver plastic, metal, glass packaging and batteries. The picture on the right shows the curb-side scheme where the household sorts in cardboard/paper and residual waste.

Robinson and Read (2005) made an examination that showed the usage of a curb-side scheme and a bring scheme in case area in central London. With the curb-side scheme the households are asked to separate their waste in two fractions; recyclable waste[1] and residual waste. The bring scheme provides waste containers for mixed paper, cans, plastic and bottles and jars. The examination covered two large-scale surveys in 2000 and 2004, respectively. In the first survey, 7,500 households participated, and in the second 3,250 households participated. Based on these surveys, it showed that over 80% of the asked households used the curb-side scheme over the bring scheme. One of the reasons why is that the curb-side scheme is the method that requires the least effort for the households when sorting their waste. The bring scheme was also downsized as the household had a lack of information about where the bring sites were located (Robinson and Read, 2005). Another examination made by Hernández et al. (1999) also studies the effectiveness of the curb-side scheme when it comes to waste sorting. The examination looks into a pilot collection scheme in Quito. The municipality in charge of the new collection scheme introduced a new curb-side scheme to a neighbourhood where the household had to sort their waste in three fractions which are residual waste, food waste and recyclable waste. The new scheme

[1]Glass bottles and jars, mixed paper, cardboard, plastic bottles, textiles, juice and milk cartons (Robinson and Read, 2005).

made the household sort their waste more than before. After the first year of the implementation of the new waste curb-side scheme, some of the households started to sort less waste than the scheme required. The decrease in waste sorting is partly caused by a lack of information about how to sort the waste correctly and what kind of benefits the sorting gives. Therefore, the responsible municipality should teach the household how to sort their waste as well as give continuing encouragement to sort their waste (Hernández et al., 1999). These examinations both have in common a lack of information from the responsible authorities which have led to less usage of the two different collection methods. This issue can be a hindrance for the households to appropriately handle their waste.

Collection schemes are infrastructures that take place on the road, where sorting systems are structures that take place within the home. A sorting system in the home is also a structure that offers possibilities and limitations for the households waste handling. A sorting system that is easy and convenient can motivate the households to sort their waste correctly (Fjeldberg et al., 2015). Having room for a sorting system in the home can be a challenge. A lack of space is especially true in apartments where the space for the sorting system is typically smaller than a single family home (Sønderborg Kommune, 2015). It is therefore important to adapt the sorting system to the space available where the waste is produced[2]. The responsible authority should offer information and inspiration to a sorting system that is flexible to the space in question (Fjeldberg et al., 2015). As an example, a homemade sorting system can be seen in figure 3.6.

[2]Such as the kitchen, bathroom and laundry room (Fjeldberg et al., 2015).

Figure 3.6: An example of the use of space in the kitchen for a sorting system.

The system of outdoor waste containers also needs to be effective to be able to motivate correct sorting behaviour (Ordenez et al., 2015). This was not the case with the previously mentioned studies as there was a lack of information. Information is not the only one to blame as the structure itself can lead to disagreements between the technological system and the households own practices. When households have to sort their waste in multiple fractions, it is important there is room for the waste in the respective waste containers (Ordenez et al., 2015). If there is not enough room in one container, the incorrect waste might end up in another container or on the ground. If there is not a correlation between how the household naturally sort their waste and the guidelines for waste sorting, incorrect sorting can likewise occur (Ordenez et al., 2015).

These described infrastructures happen in the beginning when the households have to handle their waste. The waste is later distributed between incineration facilities, recycling and landfill, which is also a part of the technological dimension. As the households have no direct influence on these technologies, they are therefore not within the scope of this thesis, and will not be further explained.

Rules

The rules in the waste handling system are represented as institutions in a tier system. The tiers for waste handling is illustrated in figure 3.7. At each tier, there are presented three examples of a set of rules for waste handling.

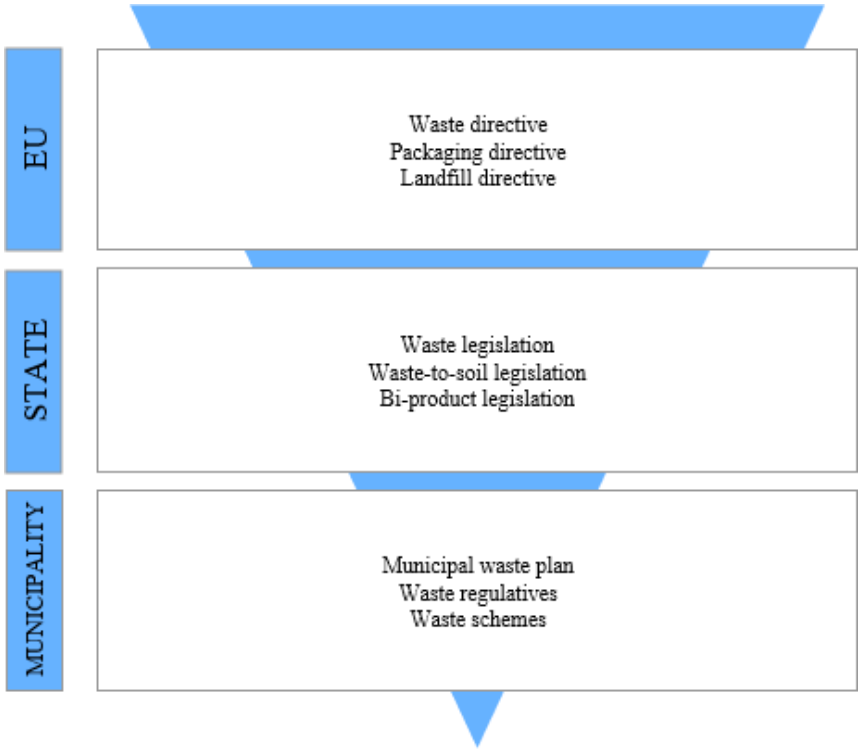

Figure 3.7: The institutions as shown in a plan tier system

In the upper tier lies EU, which adopts decisions about waste handling that the member states have to enrol in their national laws. The waste directive is the directive the European waste legislation builds upon. The directive creates the base for how waste in the EU should be treated and requires that the member states shall develop waste handling and prevention plans. This directive was adopted in 2008 and revised in 2018 with new goals for increasing the recycling of household waste; 55% i 2025, 60% in 2030 and 65% in 2035 (Europa Parlamentet, 2008, 2018b). Besides the waste directive, the packaging directive was also revised in 2018. This directive sets goals and requirements for prevention, recycling and collection of packaging waste that the member states have to meet. Furthermore, the member states have to reduce the waste and volume of the packaging as much as possible, reduce hazardous chemicals as well as designing packaging that is better suited for reuse and recycling. The new revised goals are for example that 65% of all packaging shall be recycled in 2025 and 70% in 2030 (Europa Parlamentet, 1994, 2018a). The landfill directive is primarily about preventing and reducing negative consequences for the environment

that origins from landfills (Europa Parlamentet, 1999).
In the middle tier lies the state. This tier is, for example, where the EU member states enrol the described legislation in the directive in their national laws. In Denmark, the general legislation for waste handling is described in the waste legislation. This is, for example, rules about the municipalities' collection and handling of waste. For example, the legislation sets requirements for the municipalities' waste regulations and waste schemes. A priority system for waste handling is likewise mentioned in this legislation. The priority system is called the 'waste hierarchy' and provides the priority for how the municipal waste should be treated (Miljø- og Fødevareministeriet, 2019). The waste hierarchy is depicted in figure 3.8, though with the definition from the EU, as this includes 'prevention' as the 1st priority (Europa Parlamentet, 2008).

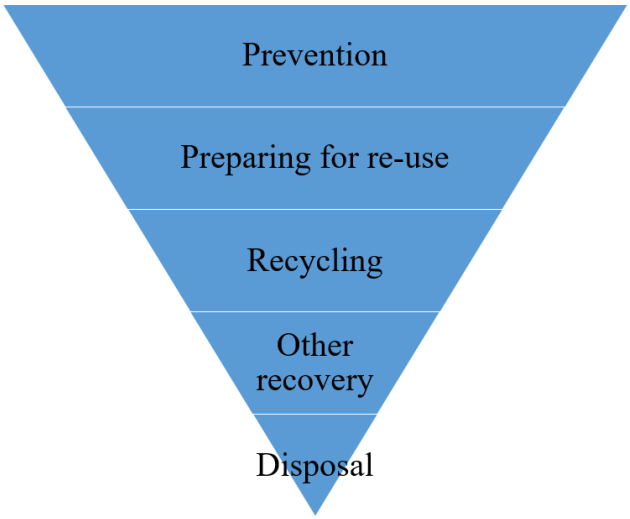

Figure 3.8: The waste hierarchy as defined in the waste directive from the EU. The figure reads as that prevention should be prioritised before preparing for re-use before recycling etc. (Europa Parlamentet, 2008, p. 10).

The waste-to-soil legislation sets requirements for the usage of waste for agricultural purposes. A purpose could, for example, be to use treated organic waste as fertiliser on farmland. This legislation protects the environment and health by partly setting limits for heavy metals, hazardous substances and physical impurities[3] that are polluting the environment (Miljø- og Fødevareministeriet, 2018). The bi-product legislation sets rules for the usage of dirt and bi-products for building and construction work. The purpose is to furthermore set rules for the usage of polluted building and construction waste so that the amount of waste being incinerated or sent to landfill reduces (Miljø- og Fødevareministeriet, 2015).

[3]Small pieces of plastic, glass and metal (Miljø- og Fødevareministeriet, 2018).

The lowest tier is the municipalities. The municipalities are required to compile a municipal plan for waste handling. This plan lasts for 12 years and has to be revised every six years. The municipal plan shall consist of three parts:

- *Mapping:* description of status quo for the waste area.
- *Objective:* description of the municipality's general objectives within the waste area.
- *Planning:* give an estimate over future waste volumes, treatment facilities that will receive waste from the municipality, assessment of new waste schemes, landfill- and incineration capacity, the waste plans economic consequences for municipality's budget, future investments as well as an assessment of how the plans comply with the waste hierarchy.

As it is described in the waste legislation, it is the municipalities duty to formulate waste regulations and waste schemes. The municipality is required to conduct three waste regulations; one aimed at corporations, one aimed at households and one aimed at dirt. The regulations establish the collection schemes and set guidelines for access paths, the usage of the waste containers and waste sorting, among others. It is the municipalities responsibility to establish waste collection schemes for households and corporation in the respective municipality. In the regulations, the municipality can, for example, formulate the waste collection schemes as either a curb-side scheme or a bring scheme. However, the municipality has to establish a curb-side scheme for the residual waste at the households. Furthermore, the municipalities have to establish some form of collection scheme for the following fractions: paper, carton, PVC, wood, hazardous waste, metal- and plastic packaging (Miljø- og Fødevareministeriet, 2019).

Human actors

Within the municipality's limits lie the human actors. These are the households and the practices that occur around the waste handling in the home. It is the daily life that forms these practices. The daily life culture is created by the home, the family and community, among others (Scott, 2009). In an examination by Evans (2012), it is shown how the family dynamic and the family meal can result in food being wasted. In one of the participating households, it is the wife that is in charge of the cooking and shopping for groceries. She is concerned with her family eating healthy, which is a perspective her husband and children do not share with her. Her husband sometimes eats out if she tries out some new diverse dishes or if there is too much 'rabbit food' in the house. Her husband and children prefer a roast, gravy, boiled potatoes and vegetables, which they deem as healthy. This family-dynamic with conflicting habits and opinions of what is healthy results in that the family buy too many groceries. The family can't consume it all, and therefore the excess groceries ends as waste(Evans, 2012).

Another example is with a household with only one person who has a more fluent daily life. She is gone a lot, but when she is home for a couple of days, she cooks some

food. Since she lives alone, she ends up with a lot of leftovers from the ingredients she used. These leftovers tend to go bad before she gets a chance to use them, and therefore have to throw them out. With her fluent, daily life, she does not have time to use her leftovers for new dishes and instead chooses to eat out or order take-away (Evans, 2012). These are examples of how daily life affects what becomes waste and what does not.
Now knowing how the households interact with the waste handling system, it is time to take a deeper look at how the households' waste handling is affected by social practices. The next section will define what a practice is and how it is constructed, which will further be explained with a waste handling perspective.

3.2 Practice theory

To understand practice theory, it is first important to know what a practice is. A practice is a nexus of activities causing multiple different actions. The actions involved are a composing of doings and sayings. This means that nexus of activities, actions, sayings and doings are all linked together. The linkage between these components is called elements (Reckwitz, 2002). Multiple authors have made their contribution to defining these elements. For this thesis there will be taking a closer look at what elements Schatzki (2002), Warde (2005), Shove and Pantzer (2005) and Gram-Hanssen (2011) find relevant for composing practices. Shatzki argues for four different elements; practical understandings, rules, teleo-affective structures, and general understandings as well. Practical understanding is about having abilities that relate to the actions that compose a practice. These abilities are knowing how to do a thing, how to identify the thing and how to respond to the thing. Rules have a purpose of leading people to do specific actions and determine the course of activity. Rules can be in the form of instructions, formulations and principles, among others. Teleo-affective structures are goal-orienting and include emotions and beliefs, and give a purpose to a practice. General understandings are about what is commonly understood between different people (Schatzki, 2002). General understandings could be religious beliefs or environmental awareness that can influence people's consumer behaviour (Gram-Hanssen, 2011).
Both Warde and Shove and Pantzer are inspired by Shatzki's elements. Warde uses different names for the elements, but the definition is almost the same. However, Warde also adds items of consumption as an element. Consumption is not a practice on its own, but rather a moment in a practice. Therefore, items of consumption are intertwined as an element in a practice (Warde, 2005). Shove, and Pantzer offers a more simple approach with only three elements, which are competences, meanings and products. These elements are highlighted through a case of how the practice of Nordic walking came to be. In this case, products, walking sticks play a central role in building this type of practice. Products, however, can not stand alone. It takes skills and competencies to utilise the sticks properly and get the most effective exercise. Using the sticks created multiple meanings and purposes such as health

and fitness or as motivation to go outside (Shove and Pantzer, 2005).
Gram-Hanssen (2011) has made an overview of these interpretations of the elements that compose practices. With a point of departure in these interpretations, Gram-Hanssen has her interpretation with four different elements; know-how and embodied habits institutionalised knowledge and explicit rules, engagements and technologies. The embodied habits are how people say and appreciate things through their upbringing, and how that have unconsciously become part bodily habits. Knowledge is about how knowing about a subject can influence embodied habits. For example, knowing that airing out can help with allergies, then airing out will become part of daily life. However, having obtained knowledge about a subject does not necessarily mean that it will be part of a practice, but it can be the element engagement. Knowing about how to be energy efficient as well as having an interest in saving money shows engagement in saving energy. Lastly, Gram-Hanssen introduces technology by revealing how domesticating technology can change the linkage between the components of a practice. By doing, so rules transform into routinised behaviours and know-how, as well as influencing the engagement in the practice (Gram-Hanssen, 2011). From these different authors' interpretation of the elements, there are some similarities between them. In table 3.1, there is an overview of the elements sorted into four different categories.

Table 3.1: The elements that build practices distributed between four categories. Inspired by (Gram-Hanssen, 2011, s. 64).

Ingrained behaviour	**External influence**	**Personal values**	**Material artefacts**
Practical understandings (Schatzki, 2002)	Rules (Schatzki, 2002)	Teleo-affective structures, general understandings (Schatzki, 2002)	Items of consumption (Warde, 2005)
Competences (Shove and Pantzer, 2005)	Institutionalised knowledge, explicit rules (Gram-Hanssen, 2011)	Engagements (Gram-Hanssen, 2011)	Products (Shove and Pantzer, 2005)
Know-how and embodied habits (Gram-Hanssen, 2011)		Meanings (Shove and Pantzer, 2005)	Technologies (Gram-Hanssen, 2011)

Ingrained behaviour is the element that explains the unconscious actions taken by the households. This is, for example, habits that automatically happen as they are performed multiple times throughout their daily life. *External influence* is understood as those elements outside of the home that influence the actions of the household.

The elements are, for example, knowledge about the environmental consequences of food waste or rules in the form of sorting guides. *Personal values* can be what the households feel is the right thing to do. If it believes sorting food waste is the right thing to do, their personal values can affect their actions. The last category *material artefacts* is about the physical objects that can for example aid or inhibit the households ability to sort their food waste.
To be able to understand the categories and elements better, they will be associated with practical examples from existing examinations. Evans (2012) examined the throw-away society focusing on household food waste and practices concerning this issue. The analysis takes a look at how food ends as waste by partly interviewing multiple households. One of the participating households mentions why it throws out so much food. This is particularly because of their grocery shopping habit. The household routinely goes grocery shopping every ten days where it buys the same ingredients - even if it already has those ingredients available at home. This routine does not fit to their more fluent daily life, where it does not plan their meals and once in a while, go out to eat for lunch. The leftovers from the day before which could have been consumed during lunch are therefore being thrown out. Another obstacle is the household's cooking competences. The household claims that it does not have the competencies and skills to improvise and use the leftover ingredients in a new dish. The lack of this competence results in a half bouquet of broccoli or a half glass of pasta sauce being thrown out (Evans, 2012). These practices highlight the elements of embodied habits and competencies from the category 'ingrained behaviour'. It shows that the lack of competences and ill-fitting habits result in food waste that could have been avoided.
Knowledge plays a big role when it comes to disposal of food. In the examination by (Farr-Whampton et al., 2014), they identify different factors that promote food waste behaviour through different methods. Throughout the examination, it was observed that fresh groceries were not always stored in the fridge and therefore went bad after only two days. When the household got confronted with this issue, the household said it does not have the correct knowledge about how to store groceries. Furthermore, other households had received incorrect information about how long groceries last and that it does not trust their judgement of when food had expired (Farr-Whampton et al., 2014). The last mentioned obstacle can also be viewed as competence. Also, rules are generally shown to be an important factor for correct waste sorting. Østergaard and Pawlak (2013) examined the influencing factors for waste sorting. One of these factors were established rules. Here it is shown that "doing their duty" is an important motive for households to waste sorting. Therefore, are there missing requirements and rules the household won't sort their waste, as there are no duties to fulfil (Østergaard and Pawlak, 2013). These examples highlight how the role of knowledge and rules plays in food waste practices. Lack of both knowledge and rules can lead to uncertainties of what to with food leftovers.
Environmental awareness can likewise affect households' food waste practices. In an examination by Metcalfe et al. (2012), the purpose of the study was to explore how

the presence of the food waste caddies affected waste practices. This was done by interviewing households. When the food caddy was introduced into one participating household food practices, it became more aware of separating their food waste from the residual waste (Metcalfe et al., 2012). An example of how this food caddy could look like is shown in figure 3.9.

Figure 3.9: Food caddy to use as storage for food waste only. The caddy is lined with a biodegradable plastic bag.

Even though it was difficult to change behaviour from throwing out the food waste as residual waste, guilt started to emerge if the food waste was not thrown in the food caddy. The guilt also created a general realisation that the household didn't do much else to act environmentally friendly. Therefore, it was even more careful, making sure that the food waste didn't end up with the residual waste. However, different opinions about waste sorting can have a negative impact. In the same examination, another household of three people, one worked as an environmental consultant. This household member is aware of the environmental issues in society and would like to sort the food waste from the residual waste. However, one of the other members were against using the food caddy as it was 'icky' to handle and would start to smell. As the environmental consultant went away a lot for work, the household has decided not to use the food caddy and therefore not sort the food waste (Metcalfe et al., 2012). This shows that even though the household knows the issues of food waste, there was not enough engagement to sort the waste properly. This example also includes the technology element. As described, the food caddy as a material artefact invites the households to sort their food waste from the residual

waste and become more aware of this in their daily life. This type of technology has, in this one case, changed the food practice, by changing the engagement of sorting waste.

3.3 Summary

By looking at socio-technical systems with a waste handling perspective, we now understand better how waste handling is integrated into society. We also have a better understanding of how households handle their waste internally by taking a look at practice theory. Through these theories, it shows that technology plays a big role as it is represented in both. Human actors should not be taken for granted either as they are the ones that utilise the technologies as well as produce waste handling practices. Therefore, these dimensions are equally important when looking at how the households handle their food waste.
These theories give a better understanding of how waste handling is dealt with in society, but they also serve as a base for the analytical framework. The four categories in table 3.1 also serves as the structure for the interview guide in appendix A and chapter 5.2. The theory of socio-technical systems also gives a more societal perspective when reflecting on the results in the results in section 6.2.

CHAPTER 4

Research design

This chapter presents the research design of this master thesis. The purpose of the research design is to ensure the research question will be answered through the analysis in chapter 5.2, and is build upon the theoretical approach in chapter 3 and research methods which are literature research and interviews. Where literature research has primarily been used to acquire knowledge about the issues at hand and build the theoretical framework, the interviews have been used to collect data for the analysis. The interviews are structured after the practice theory in section 3.2 using an interview guide. These methods will be elaborated further in this chapter. The data from the interviews will be analysed alongside the data from the waste composition analysis by Econet. To discuss and conclude on the results, the theory of socio-technical systems will be used to get a more societal perspective. Figure 4.1 shows an overview of the described research design.

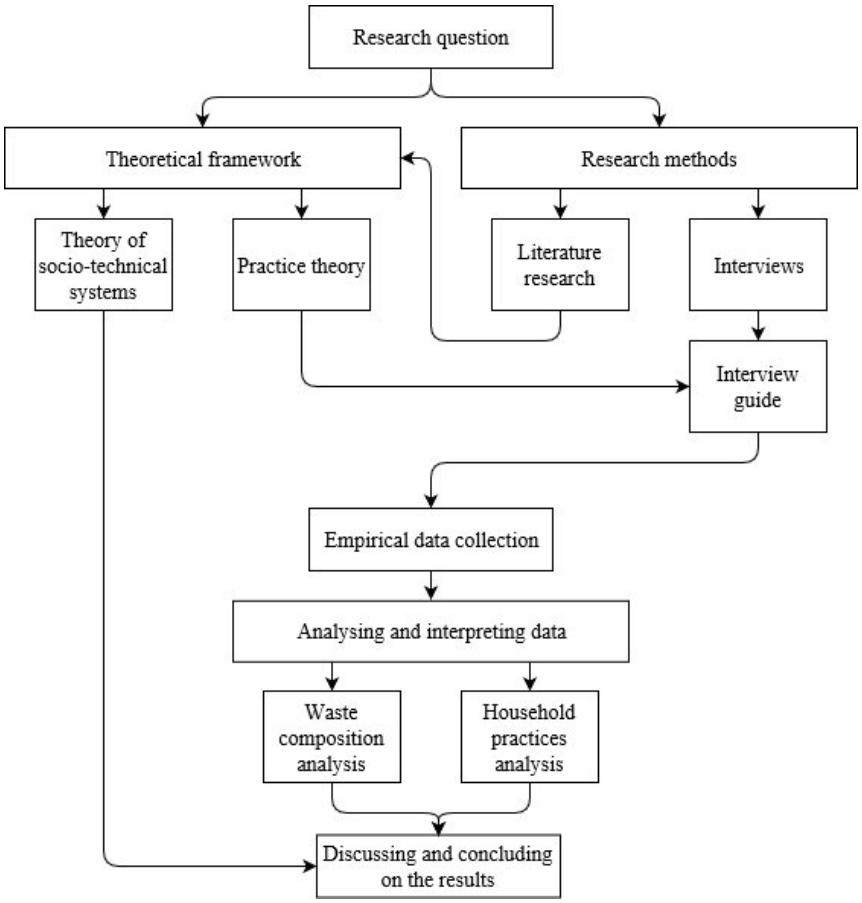

Figure 4.1: Illustrative overview of the research design.

The waste composition analysis is a bigger examination for AffaldPlus' six municipalities, where one part of this examination takes place in a residential area in Sorø Municipality. In this area, see figure 4.3, 93 households participated in this part of the waste composition examination. The distribution of the household sizes in the area can be seen in figure 4.2.

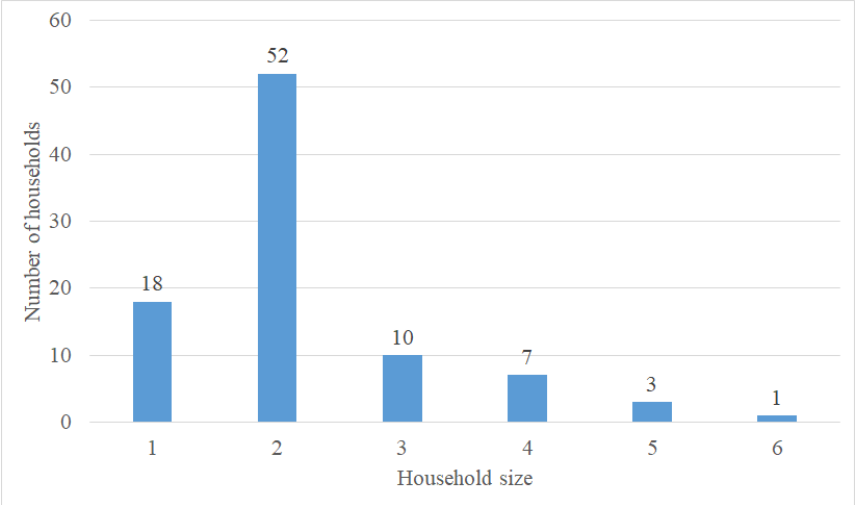

Figure 4.2: Distribution of the 93 households by size.

April 30th 2018 Sorø Municipality implemented a new waste scheme for the households. The old waste scheme consisted of a waste bin for residual waste and a dual space waste container for glass and paper. The new waste scheme consists of two dual space containers; one for residual waste and food waste and one for paper/carton and plastic/glass/metal (AffaldPlus, 2018). In the analysis by Econet, the waste composition examines only the residual waste and food waste. Therefore, the analysis in this thesis will focus on these fractions as well, with a closer look at food waste.

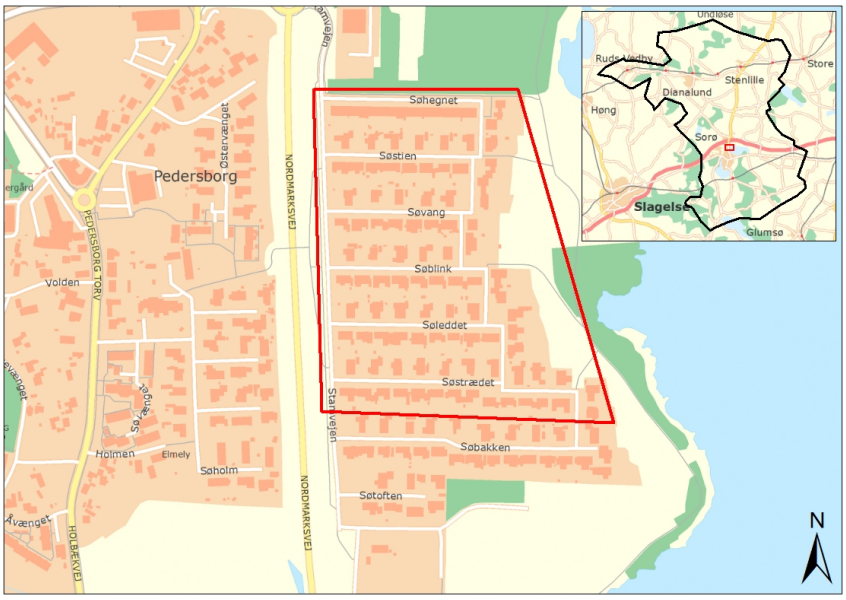

Figure 4.3: Map showing where the residential area is located in Sorø Municipality.

4.1 Research methods

This section elaborates how the chosen methods for collecting data have been used. The methods apply to this thesis' literary empirical data and data for the qualitative analysis. The course of action for the waste composition analysis is not part of this research design as Econet performed it. The course of action for this analysis will, on the other hand, be described in chapter 5.1.

4.1.1 Literature research

Literature has been used as the base of the conceptual framework for the issues examined in this thesis. The literature has been gathered using literature research as a method. Literature has been used as the theoretical framework in chapter 3 as well. To explain the procedure of the literature research three headlines will be used; *what*, *where* and *how*. These are inspired by (Rasmussen et al., 2017).

What to search
'What to search' covers the different types of literature used in the thesis (Rasmussen et al., 2017). For this thesis, scientific articles have primarily been used. Furthermore, reports, books, legislation, newspaper articles and websites have been used to a lesser degree.

Where to search
To find the needed literature, there have been used multiple search engines. To find scientific articles and books, Primo and Google Scholar have been primarily used. Google has also been used to find legislation and reports. To make the searches in the search engines more narrow and focused, there has been a use of different keywords. For example, when searching for how households handle their waste keywords such as 'waste', 'food' and 'household' have been used.

How to search
The searching for literature started by finding and reading articles that were about waste handling behaviour. From this more broad approach, a structure for the conceptual framework started to take shape. When the structure was set, the literature research was more focused on the structure at hand.
During the literature research, there was a use of chain searching as well. Even though some of the arguments in the articles found weren't relevant to the issues being examined, it was still possible to look through the bibliography to keep searching within the same area. The article by Farr-Whampton et al. (2014) in an example of chain searching as this was found through the bibliography from another article that couldn't be used. By only looking at the bibliography, the retro chain searching has only been used (Rasmussen et al., 2017).

4.1.2 Household interviews

Interviews have been chosen as the method to gain data about the households food waste practices. Five households from the case area have participated in the interviews. The waste composition analysis has been used to choose these five households through a prioritising system. As the research question focuses on inhibiting practices, the households are chosen based on how little they prevent food waste and how much they sort food waste as residual waste. Therefore, the prioritising system consists of three criteria:

- *Total amount of food waste:* the more food waste is generated, the higher the household are prioritised. The amount of food waste produced shows that if a household generates a lot of food waste, then it does not prevent much or any food waste. The total amount of food waste equals to the amount of food waste sorted as food waste and the food waste sorted as residual waste added together.
- *Food waste in the residual waste:* the more food waste sorted as residual waste, the higher the household are prioritised. By sorting the food waste as residual waste, it shows the degree of incorrect food sorting within a household.
- *Household size:* if a household consists of three or more household member, the household is prioritised higher. In this thesis, three or more members of a household are defined as a family. It is assumed that a family have more inhibiting practices and is, therefore, more relevant to examine further. Therefore, a household consisting of two members will be prioritised lower no matter what.

The two prioritising numbers are first given to the families, then to households that consists of two members and lastly to households consisting of one member. The numbers are added together and then divided by two to get the true prioritising number. The prioritising system can be seen in table 4.1. To recruit the households for interviews, the author travelled to the case area and knocked on the households' door, starting at the top of the prioritising list. If the household were not interested in participating or were not home, the author would move to the next household on the list.

Table 4.1: Prioritising system for the five participating households. The numbers in the last three columns show the number of prioritising.

	Household size	**Amount of food waste**	**Food waste in residual waste**	**True prioritising**
Household A	4 members	2	3	2,5
Household B	5 members	6	1	3,5
Household C	4 members	11	4	7,5
Household D	5 members	5	12	8,5
Household E	3 members	16	6	11,0

In preparation for the interviews, an interview guide has been conducted. This interview guide consists of topics and interview questions that correlate to the four categories in table 3.1. To keep the empirical data consistent, the same interview guide has been used for all five participating interviews. The guide with the interview questions can be seen in appendix A. This appendix is in Danish as the interviews were spoken and written in Danish.

CHAPTER 5

Analysis of inhibiting food waste practices

This analysis of the inhibiting practices concerning generating food waste and sorting it is divided into two parts. The first part describes the waste composition analysis by Econet further as well as the individual results from the five households. As this master thesis focuses on food waste practices, only the results concerned with this type of waste will be described. This part also includes the method for how the waste was collected and how it was prepared for analysing.
In the second part of this chapter, a qualitative approach is used to examine the households food waste and sorting practices. By dissecting the interviews, it is possible to learn more about why the households are hindered in preventing food waste and sorting it correctly. In chapter 6 there will be a comparison of the results from the waste composition and the statements from the individual households, tying the two analyses together.

5.1 Waste composition analysis

This section shows how the average of the total amount of food waste and the percentage of food waste found in the residual waste in the residential area. This makes it possible to give the households' results in some context before the further examination of their statements in section 5.2.

5.1.1 Course of action

On March 4th a crew from Econet travelled to the residential area to insert liners in the households' waste bins. This process can be seen in figure 5.1, where the liners are clear trash bags. After two weeks the crew from Econet travelled to the area again and collected the liners. The liners were transported to a sorting facility in

Amager where the waste was sorted and weighed out. The sorting crew took one address at the time and looked through the residual waste and food waste. The crew sorted the waste in different categories such as batteries, pizza boxes and diapers and weighed the different categories. The weighing was documented in a spreadsheet.
After the waste had been sorted and weighed, the food waste was sent to a pre-treatment facility, and the rest was being incinerated at an incineration facility. Some of this waste is recyclable fractions, such as metal and glass, but as it had been contaminated by the residual waste, it was no longer recyclable.

Figure 5.1: In the process of inserting liners in the households' waste bins.

Sources of error

Throughout the process of collecting the data for the waste composition, some sources of error can have altered the result. Before the crew from Econet inserted liners, the households received a letter from AffaldPlus to let them know this examination would occur. This letter, along with the visible liners, might have made the households more aware of their waste sorting than normally.
If the households have been throwing food waste out as residual waste, the residual waste will get wet and therefore weigh more. It can also be tricky to separate every piece of trash. For example, if some food is stuck to some plastic, it can give a wrong weighing. Furthermore, if there were some food still left in its packaging, it would not be separated into their respective categories.
Lastly, only the waste fractions food waste and residual waste was part of the examination and not the paper/carton and plastic/glass/metal fractions. Therefore,

some food waste could have been thrown away like these waste fractions as well, and disturb the total image of how much food was thrown out. These sources of error are, however small and are being seen as insignificant.

5.1.2 Waste composition results

In this section, the waste composition of the five households will be presented. The results will be interpreted by comparing them with each other and with how the preventing of waste and waste sorting generally was found to be in the residential area. Therefore, table 5.1 shows the average of the following data; how much food waste was produced, how much food waste was sorted as residual waste and the household size for the families in the residential area. These headlines correlate to how the households were prioritised for recruitment for interviews in table 4.1. As mentioned in section 4.1.2 The total amount of food waste equals to the amount of food waste sorted as food waste and the food waste sorted as residual waste added together. As it is shown in figure 4.2 there are 21 families in the area, where most of the households have a size of two or less. As the conducted interviews were with households of a size of three or more, the average is only shown for the households also with a household size of three or more. This is to give a more true average of the amount of food waste, food waste sorted as general and the household size.

Table 5.1: Average of the results from the families in the residential area.

	Total amount of food waste	**Percentage of food waste in residual waste**	**Household size**
Average	14,8 kg	14,8%	3,8

Figure 5.2 shows the results of the waste composition related to the amount of food waste collected separately and food waste sorted as residual waste, as well as the household composition for the five households. The first column shows the total amount of food waste produced in two weeks. The second column shows the percentage of food waste sorted as residual waste. Lastly, the last column gives a more precise description of the household size with their gender and age.

Table 5.2: Waste composition of the five households concerning food waste.

	Total amount of food waste	**Percentage of food waste in residual waste**	**Household composition**
Household A	28,2 kg	30%	Mother, 37 Father, 41 Daughter, 5 Son, 3
Household B	17,4 kg	55%	Mother, 38 Father, 41 Son, 14 Son, 11 Daughter, 6
Household C	13,1 kg	29%	Mother, 36 Father, 36 Daughter, 8 Son, 2
Household D	20,6 kg	11%	Mother, 30 Father, 38 Daughter, 9 Daughter, 5 Daughter, 2
Household E	9 kg	20%	Mother, 34 Father, 36 Daughter, 2

Comparing the five households results with the average from the residential area, only household A and household D sticks out when it comes to the amount of food waste discarded. The situation with household D can be explained when looking at the household size, where it seems that household A produced a lot of food waste compared to their size. When looking at the percentage of food waste in the residual waste, only household D is under the average, and household A and household B are significantly over the average. By only looking at the numbers there is no conclusive reason to why that is, but this will be further examined with the qualitative analysis. The size of the five households is rather similar, also when looking at the age of the parents and their children. Household A and household C have the most similar household composition with the same number of children and almost the same age. They also have a similar percentage of food waste sorted as residual waste with 30% and 29% respectively. Although they are similar in those aspects, they are very different when looking at how much food waste they produce. Household A produced around 15 kg more than household C. This shows that even though the household size is quite similar, it does not mean their daily life will look the same.

5.2 Household practices analysis

Food waste can occur in multiple stages and types of practices. Therefore, this part of the analysis maps out when and why food waste occurs - from grocery shopping to saving leftovers. But, as mentioned before, this section will first be sectioned after the categories in table 3.1. Following these parameters allows the understanding and the mapping of the factors that affect the households' behaviour in a more timeline matter.

5.2.1 Integrated behaviour

This section takes a look at the households' habits and competencies with food, grocery shopping and leftovers. It will give a better understanding of what the households perceive as natural as well as how their habits influence the amount of food waste they produce.

Grocery shopping

Household A goes grocery shopping three times a week and sometimes every other day. It makes sure to see what grocery items it is missing, and then it makes a shopping list covering those items. It tries to follow the list, but items not on the list sometimes end in the shopping cart as well. It depends on what else is tempting at the moment. It also usually buys meat in bulk to last for several days, but it does not have a meal plan that it shops for. All it wants is that when making dinner, it should be easy and fast, as the whole family is tired after a long day. It should also be a "child-friendly" meal, as the children are a bit picky.
Household B only goes grocery shopping twice a week, where one of the trips is when it buys everything it needs for the week. The other trip is for smaller items it might have run out of during the week. Before going grocery shopping, it makes a grocery list based on what it is missing for the week. The household also follows a meal plan. Whenever it goes grocery shopping, it also makes an active choice to go for the food items with the longest expiration date.
Household C tries only to go grocery shopping once a week, although it has trouble keeping this habit up and usually end up shopping three times a week. Like the other households, it also has a shopping list, although this is a new habit that the parents have required after the parents had children. Just like Household C, household D also tries only to go grocery shopping once a week, which is Friday after dinner. It makes a grocery list and a meal plan, but it does not always follow the meal plan.
The last household, household E, stood out from the rest when it came to their habits of grocery shopping. It does their grocery shopping almost every day, and it rarely uses a grocery list, but it makes their shopping decisions in the store. It does try to think about what ingredients it already has at home and incorporate those in their

planning of the meal. Besides going grocery shopping, it also receives a meal box three times a week that contains enough ingredients for one meal. It does experience some disadvantages with the food box when it comes to food waste. If the recipe in the meal box requires half of an onion, it will still receive one whole onion. This means that it has half of an unused onion it eventually throws out. Besides this disadvantage, it feels like the meal box helps them prevent food waste.
By first checking what you already have, making a grocery list and a meal plan seems to give the households a better overview of what food items it needs. All the households widely use these tools, but there still seems to be some hindrance for the households to use these tools most effectively. Even though it plans only going once a week, it might end up going three times a week, which will lead to temptation and buying food not originally on their grocery list. By doing this, it becomes cloudier what is coming into the house and risks being thrown out, leading to food waste.

Eating habits

Household A usually eats together, but the children get something different than the parents. This is because the children are a bit picky about food, as mentioned earlier. This is not only the case when it comes to dinner but also for their packed lunches. The children and parents have different preferences when it comes to rye bread. The children do not like the types of rye bread that contain a lot of grain. Therefore, the children get one type a rye bread and the parents get another type. The household admits that this routine can cause them to throw more food out than necessary, as the amount of rye bread will go bad before it gets a chance to eat it.
Household B, on the other hand, eats 4-5 times a week, but all the households members get the same thing. The reason for this is the after school, and work activities both the parents and children are enrolled in. The two eldest sons come home after dinner, where the youngest of the two will have oatmeal for dinner, and the oldest will eat the leftovers from what the rest of the family had that day. These different eating habits between the sons are based on preferences, as the youngest son prefer eating oatmeal after coming home.
Household D has a more fluent daily life, which impacts the way the households' members eat. They claim that they eat together most of the time. The household also mentioned that sometimes the parents are out with friends, where the children are taken care of by their grandparents. During these days they do not eat at home during dinner. Both the parents and the children have a lot of activities after work and school, which also disrupts their normal eating habits. The household furthermore mentioned that during the weekend it often eat at friends' houses. These types of interruption in their daily life make them throw out food. It mentioned, for example, that it had some fish that it had planned to eat for dinner. It got unexpectedly invited to dinner by one of the household's friends, which meant it had to throw out the fish.
Some of these eating habits create food waste, as there are different food preferences when it comes to each family member. As in the case with household A, it does not

get a chance to eat everything it buys, before it needs to be thrown out. Having an imbalance in the households' eating habits create food waste as well. It makes it more difficult for the households to plan their meals and preventing food waste.

The leftovers

After household A have had their dinner, any leftovers will be packed and stored for the next day, as it also tries to make enough dinner for two days. However, there are some leftovers it keeps and other it throws out immediately. It saves leftovers such as boiled potatoes and cooked meat - basically food that is cooked. Salads containing fresh vegetables will be thrown out, as it is not appetising the day after. It would much rather make a new salad the next day. Even though it stores the leftovers for another time, the household sometimes forgets how long the leftovers have been in the fridge. This can lead to it being thrown out, as it will not leave anything in there for more than five days.
Household B also store their leftovers if it has made a "proper" meal. The father of the family will take the leftovers for work as lunch the following day. If it is during the weekend where the father does not go to work, it will likely throw the food out immediately or feed some of it to their dog. Whenever it keeps their leftovers, it has different habits compared to household A. Contrary to household A it keeps their vegetables and throws out the boiled potatoes and pasta, though it also keeps the cooked meat.
Household C and household E either freeze their leftovers or eat them the day after, where household E only keep leftovers if there is enough for 1-2 portions. Like household A, household E do not save leftovers from the vegetables and throw those out immediately. Even though it keeps their leftovers, similarly to household A, it does sometimes forget about them in the fridge. Therefore, it does not get a chance to eat them before it throws them out. It does plan to eat their leftovers, but if it is having guests, it will not get the chance. This situation is like the situation with household D. Either having guests or being invited somewhere, disrupt the habits and arrangements the households have already made, causing food waste.
Household D also keeps its leftovers, trying to make an effort of not creating food waste. This is mainly caused by economic incitements. Like the other households, household D also keep some of the leftovers and throw out the rest immediately. It will keep the cooked meat for the next day but throw food items such as pasta out.
Every household usually keeps some of their leftovers, and it does have a plan for them. The leftovers are either consumed the next day as lunch or dinner. However, not everything is kept. Every household mentioned that there are some leftovers it keeps, mostly meat, and some it throws out immediately, mostly vegetables, potatoes and pasta. This could be caused by an economic incitement, as meat is often more expensive than the other food items. There were other smaller indicators causing food waste, such as forgotten leftovers or cases of interruptions in their daily life by guests. The forgotten leftovers could be the result of not planning the meals ahead or not having an overview of what is available to eat in the home.

Judging food items

When household A have to judge if a food item is spoiled, it assesses the smell, the colour of it as well as its date label. If it has an unopened food item that has exceeded the date, it will still open it to see if it is still edible. It has no problem with surpassing the date by a few days and still eats the food. However, it does admit that it can be too quick to throw out food that still may be edible as it wants to be on the safe side. This is truer with certain types of food items such as meat and cold cuts. Household B had a similar approach to making sure the food is either spoiled or safe to eat. It also smells the food and looks at it to assess if it looks "sensible". However, household B also admits that it can be too quick to throw out edible food as it has doubts about how long the food items can last. Household D uses the same methods as household B and also tries to taste it, but it rarely looks at the date label. It generally uses their "common sense". Although it rarely uses the date labelling system, it does not allow fish to pass the expiration date, which does seem like the only exception. In contrast to household D, household E almost exclusively uses the date labelling system. It does try to smell meat items to see if it is still edible, but it generally looks at the date label. If the food item has exceeded the date label, it will throw out the food item. It mentions this is something that has become a habit for them. It does make the exception with candy as it can "last forever".
Within household C, there are some contradicting practical understandings of when food should be thrown out. The father of the family claims that he is from the countryside and is therefore not "squeamish" when it comes to food being too old. He has no problem eating food that has exceeded the date label, where the mother has the opposite view. She has more difficulties letting food pass the date of the date label. She is even prone to throw the food out after three days, even though the date label has not been exceeded. Even though the father is less sensitive, he does draw the line at certain food types. It will not consume food items such as minced meat after the expiration date. Besides this issue, it feels it has a good understanding of when food is spoiled.
These practices address the households' competences in assessing food spoilage. Most of the households use the same methods, such as using their senses and checking the date label. How much they use their senses, and the date label varies. Some barely look at the date label and rely on their senses while others almost exclusively use the date labelling system. No matter what, it is about what the individual household judge as "good enough" which varies, and to some degree leads to unnecessary food waste.

5.2.2 External influence

This section addresses the knowledge of the households and how external influences such as the media and rules are affecting their behaviour when it comes to preventing and sorting food waste.

Date labelling knowledge

Household A, household C and household D believe they have a good understanding of the different types of date labels, see figure 5.2 for examples, although household C and household D do not necessarily follow them or use them as much. Household B has a basic understanding of the date labels, as it knows it is recommended not to pass that date. However, it does not know the difference between the different types of date labels. Neither does household E, even though it uses the date labelling system almost exclusively to assess if food is spoiled.

Figure 5.2: Three types of date labels.

By knowing what the different types of food labelling means, it can help the households to assess better if food is spoiled or not. If a food item has the 'best before' label, but the households read it the same way as the 'date of expiring' label, they might throw out food that is not necessarily spoiled. However, using the date labelling system is only one of the methods the households use to assess their food items, as mentioned in the previous section. Therefore, knowledge about the date labels, or the lack of, does not seem to be a big determining factor for food waste.

Knowledge about food waste

Household A, household B, household C and household D regularly hear about food waste in the media. They hear about it in forms of campaigns, especially by the discount store chain Rema 1000 or when public authorities remind the population about reducing their food waste. However, these campaigns are not something that is changing their perspective on their wastage of food. Besides hearing about food waste in the media, household A also hears about it from their friends. The mother has heard about a food waste app called Too-Good-to-Go from one of her friends. Therefore, household A has gotten some knowledge about tools to reduce food waste in other ways than the media. Household D does barely hear about food waste in the media, but similar to household A, it hears about food waste in other contexts. The mother is part of a Facebook group where the group members can share uneaten food instead of letting it go to waste. The mother, however, does not take an active role in sharing food, but she does feel she gets reminded about the issue of food waste by being part of the group. The mother also mentioned that the household

has a friend who cares about reducing food waste and is, therefore, reminding the household to reduce their food waste as well.
The father in household A also knows what happens to the food waste after the food gets sorted. He knew that it is used for biogas and were also aware of the problem that thin plastic bags create, which is increasing the chance of small pieces of plastic in the treated food waste. This shows great awareness of what happens to food waste and why it is necessary to separate the food waste from the residual waste. On the other hand, household B, household D and household C did not know about what happens to the sorted food waste. It also does not believe that this type of information would affect their waste sorting.
Knowledge and reminders about food waste do not seem to impact the households significantly. Even though they hear about it in the media, from friends and family and social media, it does not change their practices of food waste at home. They mention that they know about the issue of food waste and get reminders, but it does not translate into action. This indicates that knowledge is not enough and that there is missing something between the knowledge and reducing their food waste.

Rules and knowledge about waste sorting

Household A, household B and household C think that they are well informed when it comes to waste sorting. When the new waste scheme was implemented, all the households in the municipality, including in the residential area, received a pamphlet about what waste should be sorted as food waste, residual waste, paper etc. Household A thinks the pamphlet did a nice job of explaining the sorting criteria by making it short and in bullet points. There are also pictures on the waste containers which household A and household C believe helps them to understand further what needs to be sorted as what waste fraction. Household C especially feel that it is an important tool also to communicate correct waste sorting to their children. In contrast to the other households, household E does not feel it has enough information about what needs to be sorted as what waste fraction. It does admit that when it received the pamphlet about the sorting criteria, it did not read it. However, it does feels better equipped sorting their waste after participating in the interview as it has been made aware of the issue. If it received the pamphlet again, it would read it this time. It, therefore, believes that the citizens should be made aware of the issue first, and then receive the information, i.e. the pamphlet, of how to sort their waste.
Household A believes that information about what needs to be sorted is important to make people sort their waste. It also firmly believes that there needs to be an expectation for the citizens to sort their waste, which has been made clear to them. Household E likewise mentioned that it does not have a passion for waste sorting, but as it is expected of them to do so, it will do it. Household C had a similar opinion. It believes as well that the citizens will sort their waste if they are given proper information, but that they also need to be educated. But it is not only the parents that understand what food waste and sorting are. The school is also teaching the children in household A and household B about waste issues. The children take

this knowledge and apply it at home by helping their parents in sorting their waste. However, household B and household D feels that when they struggle with waste sorting, it is because their children have not learned how to sort their waste or forget to do it. The mother in household B mentioned that her older children sometimes forget to sort their waste if they are in a hurry.
Household C mentioned a challenge for waste sorting that does not appear within their home. Whenever the father visits his mother, who lives in another municipality, he has noticed that she have to sort her waste differently. This leads to confusion because the sorting habits household C has developed at home does to apply to their friends and family's sorting criteria if they live in another municipality. This is an example of how different regulations for waste sorting in different municipalities can disrupt the households' knowledge and habits of waste sorting. Household E have also experienced a consequence by not following the rules. One time the household had placed the waste containers the wrong way, which meant that the trash collectors wouldn't empty the waste containers. Therefore, the waste containers were overfilled, and the household had to consciously not sort their waste to make it fit, before the next renovation day.
It seems knowledge and information about waste sorting have a positive impact to get the households to sort their waste. However, the lack of knowledge or awareness with the children can be a challenge in sorting their waste. It also seems that having clear rules about waste sorting will make the households do it. Household E even mentioned that now that they have been told they have to do it; they will do it. This shows that rules have a greater impact than just knowledge.

5.2.3 Personal values

As the previous section stated how external influences affect the households' behaviour, this section addresses how the households' general understanding and own beliefs of food waste will affect their ability to reduce food waste and sort it.

General understanding of food waste

Household A, household B, household C and household E perceive food waste is buying more than you need and therefore throwing more out than necessary. Household D defines food waste as if a food item is spoiled, and it needs to be thrown out. This is in line with buying too much food, where some of the food can't be eaten in time before being spoiled. Household B feels that it is natural to think about the amount of food to buy, to prevent unnecessary amounts of food waste. It also thinks it makes sense to think about what should be bought when grocery shopping, so that it does not have to spend too much time on grocery shopping. This practice can lead to less food waste. Household A also sees food waste as throwing out saved leftovers. You should also be able to judge how much food is needed for the number of people eating together. Misjudging and preparing too much food might, therefore, end as food waste. Household A and household E also believe that to be able to reduce

the amount of food waste; it requires training and creativity in using the leftover ingredients for new meals. This competence could reduce the issue of the having to throw out leftover ingredients as household E mentioned with their food box.
Household E believes that food waste starts in grocery stores. When buying onions, it is not possible to buy a single onion, as onions are more commonly available as a bundle. Therefore, household E must throw out most of the onions as they become spoiled before the household get a chance to use them. Household E thus prefer to buy onions and other vegetables as bulk goods instead of a bundle. Household C recognises the throw-away society we live in and the father admits that it is something he contributed to before he had children. He thinks that food waste occurs when you only plan meals and grocery shopping one day at the time, instead of planning. When planning, food consumption and what is being thrown out becomes more visible, which is not possible if the planning only happens one day at a time.
It shows that the households have similar definitions of what food waste is. Their perception shows that they do have an awareness of food waste and how they possibly contribute to it. Some of the households also identify food waste as a result of other practices. As household E mentioned, it finds it challenging to reduce food waste as the grocery stores do not offer smaller bundles of vegetables. However, this can be solved by being creative and use those leftover ingredients. Household C mentioned how it recognises the lack of meal and grocery planning as a barrier for reducing food waste. Although the households are aware of food waste, the households are challenged when reducing their food waste.

Beliefs and motivational factors

Household A agrees that there should be more waste sorting and that the new waste scheme will endorse this. It believes it is just a matter of "getting used to it". It also firmly believes that sorting their waste will benefit future generations and that it would not mind sorting even more. Household C would also like to sort their waste as much as possible, and household D, as well as household E, understand the importance of reducing and sorting food waste. Although, household A do know it will be more inconvenient to sort more of their waste. Therefore, it needs to be done realistically for it to work. By these statements, it seems that household A, household C and household D have an environmental perception when it comes to sorting waste and reducing food waste. Household B, on the other hand, has a more social and economic perception. As previously mentioned, the food waste reduction campaigns in the media do not work with household B. The mother thinks that showing hunger and poverty in African countries have a bigger impact on reducing food waste. Whenever her children do not want to eat their food, she will show pictures of children in Africa suffering from hunger. This also has an impact on the children, as they will eat their food. The mother, therefore, believes that pictures showing hunger are more powerful. Furthermore, household B are also aware of the financial aspect of throwing food out, and is, therefore, a motivational factor that has a bigger impact than the environmental aspect.

Household A and household E consider that they are good at sorting their waste. Whenever the children in household A come home with a half-eaten lunch, it makes sure to separate the food from the packaging and sort it separately. However, if it is too difficult to separate it will throw it all out as residual waste. Household D also believes that it is good at sorting. It will scrape the food of their plates into the food caddy and make sure the food is separated from the packaging before it is thrown out. Household C believes that it has taken a lot of precaution when it comes to food waste, and it also feels that it has adapted waste sorting well - and not only when it comes to their household waste. It has also become better at visiting the recycling centre with waste that can't be sorted within the home. Even though household A and household E believes that they are good at sorting, they do believe that they can be better at reducing their food waste. As an example household A brought up the case with the different types of rye bread the parents and children consume separately, and household E admits that it does not have an overview of what it buys and that it buys too much food. By these statements, household, A and household E show that they are aware of the issues of reducing food waste and sorting it properly. Household A and household D also shows engagement by making a conscious effort of separating the different waste fractions to sort it correctly. Furthermore, household A admits that it can do more to reduce their food waste and knows how, which also shows awareness of their practices.

Throughout the interviewed household A used the word 'habit' often. It believes that is waste sorting can be made a habit, then the citizens will do it. It should also be made easy - especially when it comes to families with children. Waste sorting requires time and energy, which are resources a family with children does not possess a lot of. This is another argument household A used for why waste sorting should be made into a habit. Household E believes that reducing food waste should be made a priority, where the economy could be an incitement. Otherwise, households won't be making an effort. Household E believes that attention and time are limited, so, therefore, the time spent on the children, work, house and sorting waste should be prioritised to have time for it all. Household E also mention convenience as a motivational factor to waste sorting. With the waste scheme, it has been made easier for the household to sort their waste, which makes it more manageable. Household C likewise believes that inconvenience and time can be barriers for waste sorting. The father in household D even admits that he would prefer not to sort their food waste, as he probably sees it as an inconvenience. When household C moved to the residential area, the new waste scheme was implemented a short time after. Both household B and household C admit that it was difficult at first to sort their waste accordingly, but as time went on, it became part of their daily life.

There are different beliefs of why reducing food waste is important; some households recognise the environmental benefits, while others are more concerned with economic or social aspects. The households also believe that they are doing a good job of sorting their waste, where they are lacking effort in reducing their food waste. This might be because the waste scheme makes waste sorting easier and that it is expected as

citizens. This also correlates to the more significant barriers for reducing and sorting food waste; inconvenience and lack of time. Another aspect that the households kept repeating was 'habit' and 'getting used to it', which seems to be the result of expectations and rules no matter how much inconvenience or time it takes for the households to sort their waste.

5.2.4 Material artefacts

This section examines the infrastructures in and out of the home, which means the sorting systems for residual waste and food waste, including the food caddy, as well as what the households feel about the waste scheme and the waste containers. These material artefacts are especially directed at the households' ability to sort their food waste from the residual waste.

The waste scheme

Household A are generally satisfied with the waste scheme; however, it also has an additional waste container. It kept one of the waste containers from the previous waste scheme, and use it to collect waste that needs to be delivered at a recycling centre. Household B also have an addition to the waste fractions of the waste scheme. It has a bucket for compost in their garden where it sorts out the vegetable part of their food waste. However, it does not use this solution very often and mostly during the summertime. Household C feels that waste containers take up space outside now that it has to sort more of their waste. This might be a negative comment on the waste scheme, but it does not seem to be a barrier for waste sorting. However, household C also mentioned that at the beginning of the new waste scheme, the duel-spaces in the waste containers were placed in a specific way. The household made it a habit of what waste should be placed in what side of the container, see figure 5.1 for reference, without looking at the pictures on the containers. After a while, the containers were changed, so the spaces were now switched. It took some time for the household to reverse their habit and get used to the new ways of how the containers were arranged. Household E, on the other hand, thinks the waste scheme makes it easier to sort their waste. Household E is also an interesting example as it had just moved to the residential area from an apartment in Copenhagen. It feels that by moving out of an apartment on the fifth floor to a one-story house, it made it easier to sort their waste. When it lived in an apartment, the household would only take out the waste if it had other business outside of the apartment. The inconvenience of taking out the waste was also why it hardly sorts their waste. That is not a factor anymore, as their waste containers are just outside the front door. Household B thinks that waste sorting makes sense now, but that is was difficult in the beginning. This relates to a previous statement where it is just a matter of "getting used to it". It feels like that the waste scheme is encouraging them to sort their waste, as otherwise their amount of waste won't fit into one waste container. It is, therefore "forced" to sort their waste, which has helped them making waste sorting a habit.

The waste scheme seemed to be a hassle at the beginning for some of the households, but that it became easier as the households got used to it. This further confirms that waste sorting is a matter of habit and making it part of their daily life. The waste scheme is, however, important as it encourages people to sort their waste. Household E further mentioned that it thinks waste sorting is easy if it does not have to take the initiative. With the example of household E, it also shows what type of home the households live in can affect the effectiveness of the waste scheme.

Sorting systems

Household A and household E have placed their food caddy on top of the kitchen counter. Household A believes that this placement helps them sort their food waste more as it is more accessible. For household E, the food caddy used to be placed under the sink, but it hardly ever sorted their food waste because of the placement. After the household moved it, the members have become better at sorting their food waste. Household B and household C got their food caddy under the sink with the residual waste, where they have a drawer that can be pulled out. Household D got their food caddy standing under the sink, with their residual waste placed on the door.

Household A empties the food caddy daily after dinner, partly because it can only contain a small amount of waste and partly to avoid odour. In the summer it empties the caddy twice a day to avoid the odour problem. Household D and household E also experience odour from the food caddy if it stands too long, which is why they also empty it once a day. Household B also feels the need to empty it once a day, as it is too small to keep more than one day of waste in it.

When there are more waste fractions, it means that the households also have to keep the corresponding waste bins inside. Household C feels that these waste bins take up space, and the bins, therefore, need to be quite small. This can be an issue if there is a lot of waste produced.

It generally seems that the households do not have a problem with the food caddy, other than maybe the size and odour issues as all the households empty it once a day. These, however, seem like insignificant problems when it comes to waste sorting. What can affect is their sorting systems and how they have placed their food caddy. By the statements from household A and household E having the food caddy on the countertop gives a better opportunity for sorting their food waste. Figure 5.3 shows pictures of the different sorting systems for residual waste and food waste by the five households.

Figure 5.3: The five households' waste systems. The left shows the food caddy placed under the sink, the middle shows the food caddy placed on the counter top and the right shows the food waste and residual waste in a drawer under the sink (Fjeldberg et al., 2015, s. 19).

5.2.5 Concluding remarks

As it is shown throughout the chapter, there are a lot of factors that can influence the households' ability to prevent food waste and correctly sort it. To sum up, these factors, figure 5.4 shows the practices concerning food in the order they occur. During *meal planning*, the households make their shopping list, check their storage of what they need, and plan their meals. Through the interviews, it has been made clear that these are tools that can help prevent food waste, as it creates an overview of the food items the households already got in stock and what they need. However, if they fail to follow the shopping list or do not plan their meal, they might end up buying more than they need or lose the overview of what they have already got. This is also what many of the households understand as food waste; buying too much and not planning their meals. The latter argument is also reflected when going *grocery shopping*. If a household needs to go grocery shopping multiple times a week, it shows a lack of planning for the meals and shopping trips. This can also lead to further temptations and buying more than needed. One of the households also mentioned that the selection in the stores forces the households to buy more than they might need, which likewise leads to food waste. This issue can also be recognised as a hindrance when *preparing meals*. When buying food in bulk, it is important to be able to use the leftover ingredients for another meal. This is a skill some of the households do not possess, which then leads to the rest of the ingredients being thrown out. There is also the skill of assessing food spoilage. Even though

the food is fine for consumption, some of the households throw out the food before it is necessary. Some of the households also didn't know the difference between the different types of date labels. As the different types tell something different, the households might mistake a consumable food item for a spoiled one. Having different food preferences means that the household has to buy and prepare different meals. This also means that the households need to buy more ingredients, which increases the chance of it not being used and thrown out. This issue also overlaps with *eating dinner*. Besides having different preferences at the dinner table, going out to eat can also influence food waste. This creates an imbalance in the households daily routines. If they have planned something for that night, the planned meal might end up being thrown out instead of being consumed. As in the example with household D, the fish they were supposed to eat ended up being spoiled and turned to food waste. This can also be the case with *leftovers*. If the households are having guests and they had originally planned to eat their leftovers, the leftovers might end up being thrown out, as most of the households won't have leftover more than two days in the fridge. Another issue is that some leftovers are not worth saving. This might be because the leftovers are not appetising the day after, economic reasons or that there is not enough to save. None the less it still results in food waste. Sometimes the households forget that they have leftovers, and they then surpass the 2-5 allowed days in the fridge. Lastly, *waste sorting* also has some inhibiting factors. When it comes to sorting the food waste, the households think it is time-consuming, especially when they must separate it from other waste fractions such as packaging. This is connected to it being inconvenient. Some of the households have also experienced a sorting challenge when it comes to their children. The children do not quite know how to, might not realise the importance of waste sorting or do not feel the same responsibility as the parents do. Furthermore, some of the households mentioned that after they replaced their food caddy to on top of the counter, it helped them sort their food waste more. Therefore, the placement of the food caddy also plays a role in the ability to sort the food waste correctly.

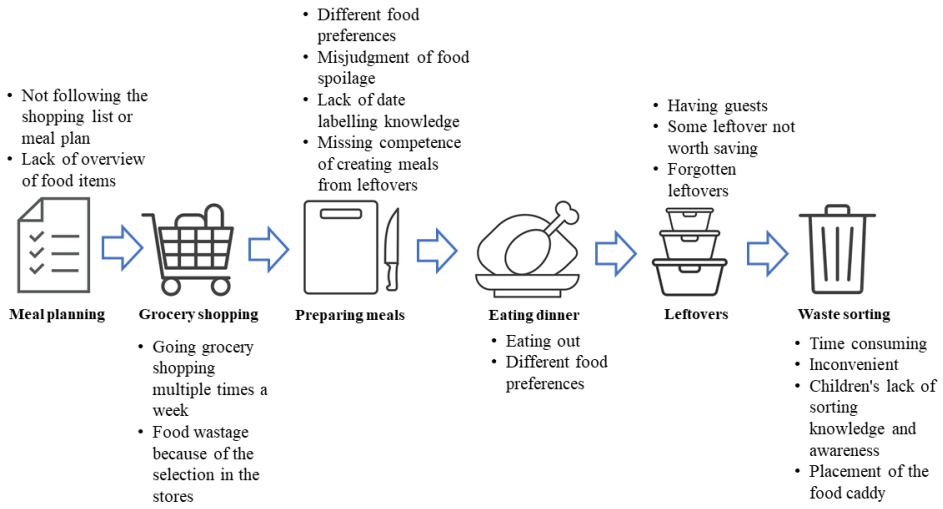

Figure 5.4: Practices related to waste sorting and food waste and how they are inhibiting prevention of food waste and correct waste sorting.

Through this analysis, it has been made clear that preventing food waste is a much more difficult task for the households than to sort their food waste. There are a couple of reasons why. One of the keywords, when the households were talking about waste sorting, was 'habit'. Many of the households mentioned that waste sorting had become a habit for them and part of their daily routines. This is caused by the more positive influences for waste sorting, such as external influences. External influences seem to have a great impact as well as habits. Knowledge about what needs to be sorted as what seems to be helping the households in their waste sorting. They have received this knowledge by a pamphlet which many of the households are praising. This pamphlet and the waste scheme also resemble clear regulations of what needs to be sorted. The regulations are also something that enhances the waste sorting because it is made easier for the households and because they "have to".
The question is, therefore, why preventing food waste is more difficult than waste sorting. Even though knowledge about what needs to be sorted as what works for waste sorting, it does not mean that knowledge will work for preventing food waste. All the households have heard about food waste and the issues caused by it, but this knowledge is not something that has changed their perception of food waste or made them reduce it. Many of the households were also aware of why reducing food waste is important and aware of their food waste practices, but that was neither something that changes their practices into preventing food waste. Seeing that clear rules of waste sorting encourage the households to sort their food waste, there are no similar rules for preventing food waste. Therefore, there are no expectations for them to prevent food waste as opposed to waste sorting. As one of the households

mentioned, they sort their waste because they do not have to take the initiative and it has been made easy for them. There are no similar tools made available for the households when it comes to preventing food waste.

CHAPTER 6

Discussion and reflection

6.1 Discussion of the results

The discussion part of this chapter consists of connecting the quantitative and qualitative analyses as well as comparing the results with other similar studies. The connection between the analyses is to discuss how reflective the statements from the households are regarding their waste composition as well as to discuss how the results could be improved. Comparing the results to other studies will show to what extent the results are in accordance with results from other studies and yet how they are different, and therefore contribute with new knowledge. Furthermore, the research method and process will be discussed to see how it could have been approved and give better results.

6.1.1 Interconnection between the analyses

After analysing the practices that occur within the homes of the households, it has become more clear what barriers and opportunities the households experience when it comes to sorting their food waste and preventing it. Now the question is whether these statements fit with the quantitative analysis of their waste composition in chapter 5.1. The interconnection between the results from the two analysis will be done separately for each household and will start by showing the results from the waste composition analysis.

Household A

Table 6.1: Household A's waste composition results.

	Total amount of food waste	**Percentage of food waste in residual waste**
Household A	28,2 kg	30%

Household A is the household that has generated the most food waste and has the second highest percentage of food waste in the residual waste. When looking at their statements from the interviews, some indicators are explaining the high amount of food waste. It goes grocery shopping between three times a week and every other day, and it does not follow a meal plan. Having this many shopping trips and not following a meal plan can lead to temptations and making them buy more than it needs. In this household, the children also have different food preferences, causing the household to buy different types of the same product. This is an issue the household recognises and admits that it lead to food waste. After eating dinner, it does not save the leftovers from the fresh vegetables and throw them out immediately. When it does save the leftovers, sometimes it forgets how long it has had them, and therefore throws them out and cooks something new. It also admits that it can be too quick to throw out food that is still edible, which is especially the case with meat products. It would rather be "on the safe side". Lastly, it also mentions that to prevent food waste it needs to incorporate their leftovers and leftover ingredients in their cooking, which is a skill it does not possess.
When it comes to waste sorting, it believes it got the right tools and knowledge to accomplish this. It praises the pamphlet it received about waste sorting. It feels this pamphlet helps with their waste sorting along with the pictures on the waste containers. The children in the household also help with waste sorting, as they are learning about this subject in school. The way the household has placed their food caddy also helps them sort out their food waste. However, it does admit that if the food waste is too difficult to separate from other waste materials, it will throw it all out as residual waste. It also thinks that waste sorting takes time and energy, which can lower their effort in sorting their waste.
The statements household A makes does give a good explanation of why it produces so much food waste. It seems to encounter a lot of barriers when it comes to preventing food waste. However, when it comes to sorting their food waste the percentage from the quantitative analysis does match with statements about waste sorting. The household believes it is informed and good at sorting, although their percentage of food waste sorted as residual waste is rather high. The only barriers for their waste sorting seem to be the difficulty of handling food waste and the time and energy it takes.

Household B

Table 6.2: Household B's waste composition results.

	Total amount of food waste	**Percentage of food waste in residual waste**
Household B	17,4 kg	55%

Household B produces a fair amount of food waste compared to the rest of the households and the average of the residential area. However, this household has one of the highest percentages of food waste found in the residual waste. When it comes to waste sorting household B believes that it is well informed of what needs to sorted as what waste fraction. The youngest child also learns about waste sorting in school and helps her parents to sort the waste at home. However, the two older children sometimes forget to sort their waste when they are in a hurry.
When it comes to preventing food waste household B takes some precautions. It only goes grocery shopping twice a week, and it follows a meal plan. When going grocery shopping, it will buy the products it needs that have the longest expiration date, and the household believes that it is natural to think about what to buy beforehand to prevent food waste. There are, however, some practices that still leads to food waste in this household. After eating dinner, it also throws out leftovers such as boiled potatoes and pasta, and it does not save any leftovers during the weekend as the husband usually eat the leftovers as lunch at work. The household also admits that it can be too quick to throw out possible edible food items. This might be linked to their lack of knowledge of the different types of date labels. If it does not know that some food items are still edible after the date has been exceeded, it might feel the need to throw out the food.
Taking their statements into account, there is not much explaining their high level of incorrect waste sorting. Both the parents and the children seem to understand pretty well how food waste should be sorted. Therefore, there must be other explanations of why there is so much food waste in the residual waste. It could have mistaken where to put the sorted food waste in the waste container. It could also have a misconception of their ability to sort the waste or what is seen as food waste. It might throw leftovers out as food waste but throw the peelings from vegetables such as carrots and potatoes as residual waste. However, when looking at their effort of preventing food waste, it takes some precautions during grocery shopping, and the parents also try to encourage their kids to finish their meals. Throwing out leftovers, especially during the weekend, does seem to add to the amount of generated food waste.

Household C

Table 6.3: Household C's waste composition results.

	Total amount of food waste	**Percentage of food waste in residual waste**
Household C	13,1 kg	29%

Household C generally seems positive and understanding when it comes to preventing food waste as well as waste sorting. Their amount of food waste is also on the lower end, where the percentage of food waste in their residual waste is on the higher end. This household goes grocery shopping 1-3 times a week, where it tries only to go once. The household believes that it has a good understanding of the different types of food labels. However, it barely uses them when judging food spoilage. This is, however, the father's opinion. He does not mind exceeding the expiration date, where the mother is more sensitive and will sometimes throw out food items even though it has not passed the date on the date label. Other then that, this household believes it takes a lot of precautions when it comes to food waste.
When it has to sort their waste, the household believes that it is well informed. The pictures on the waste containers especially help the children to place the waste in the right container. It generally believes that it is good at waste sorting and takes pride in visiting the recycling centre to sort their waste further. It does, however, mention that time and inconvenience can be barriers for waste sorting. This household also mentioned that it experiences a challenge when it has to sort their waste when visiting family in other municipalities. As the sorting criteria are different there, it gets confused as that is compliant with their waste sorting habits.
The statements from this household show that it is conscious about food waste in their daily life as it will try only to go grocery shopping once a week. This is related to their perception of food waste, as it believes that to prevent food waste, it is important to plan meals and grocery shopping trips instead of planning one day at a time. However, the disagreement within the home on food spoilage must play a bigger role when it comes to their amount of food waste. It also seems that the household believes that it is good at waste sorting and generally have a positive outlook, but that is not shown through the quantitative analysis. The moderate high percentage might indicate similar issues as with household B; it might have a misconception of their waste sorting ability and what needs to be sorted as what waste fraction.

Household D

Table 6.4: Household D's waste composition results.

	Total amount of food waste	**Percentage of food waste in residual waste**
Household D	20,6 kg	11%

Household D has one of the higher amounts of food waste but has the lowest percentage of food waste in the residual waste out of the five households. This household gives a lot of explanations to why it generates this amount of food waste. This household goes grocery shopping once a week, where it does have a meal plan, but it does not always follow it. When it saves their leftovers, it does it with a conscious mind as to prevent food waste. This statement is, however, contradicting with them throwing out leftover pasta immediately. It feels like it has a good understanding of the different types of date labels, although it does not use them as much when assessing food spoilage - it primarily uses their senses. This can be positive as it is not influenced by the food items exceeding the expiration date. There is one barrier for preventing food waste that stood out the most. This household has a more fluent daily life that results in them not being certain when it is home for dinner. An instance where the household was invited somewhere else resulted in fish being thrown out. IT also admitted that it has been eating more out of the house recently.
When it comes to waste sorting, it believes it is doing a good job of separating the food waste from other types of waste such as packaging. It does, however, feel that their children have not learned how to sort the waste which can, therefore, be a barrier. The father also mentioned that he would prefer not to sort their food waste. This attitude could potentially be a barrier when it comes to putting additional effort into waste sorting.
Household D shows that some of their practices result in food waste, which explains their amount of food waste. The challenges of waste sorting the households identify does not seem to impact them as much, as it is are pretty good at waste sorting.

Household E

Table 6.5: Household E's waste composition results.

	Total amount of food waste	**Percentage of food waste in residual waste**
Household E	9 kg	20%

Household E has the lowest amount of food waste compared to the other four households, and it has a medium percentage of food waste in the residual waste. Household

E goes grocery shopping almost every day where it does not have a grocery list beforehand. It just decides in the store what it needs. It also admits it buys too much food, which can be a result of their grocery shopping habits. After eating dinner, it only keeps the leftovers if there is enough for 1-2 portions, and it does not include the vegetables. It throws out those food items immediately. It does, however, sometimes forget about the leftovers in the fridge. It has experienced that having guests interrupts their plans of eating the leftovers, which leads to them throwing the leftovers out instead. When this household has to assess if their food items are spoiled, it will almost exclusively check the date label. If the food item has exceeded the date, it will throw it out. Even though the household depends on the date labelling system, it does not know the difference between the different types of date labels. It receives a food box three times a week which the household believes help them in reducing food waste, even though it does experience the food box can also be a source of food waste, as it creates leftover ingredients. It feels that it does not have the competence to create new dishes with these leftover ingredients. Therefore, the source of food waste might come from the lack of cooking skills rather than the food box itself.
Household E believes that it is good at sorting their waste even though it also feels it does not have enough information about how to sort their waste. This is because it did not read the pamphlet about waste sorting when it moved in. It also thinks that waste sorting has been made easy for them, which encourage them to sort their waste. The placement of the food caddy has also helped them in separating food waste from the residual waste. It moved the caddy from under the sink to on top of the counter, which it feels helps them sort the food waste more. Other than these motivational factors it does not have a passion for waste sorting.
Even though this household seems to experience a lot of barriers when it comes to preventing food waste, it still only produced 9 kg of food waste in two weeks. This household had just moved in the March 1st where the liners for waste were placed in the waste containers on March 4th. Therefore the household might not have quite settled into their home and getting back to their previous habits. According to their waste sorting, it seems to fit their percentage of food waste in the residual waste. It does not seem to understand what needs to sorted as food waste fully, and it does not want to do more than necessary. It otherwise experiences motivational factors for waste sorting such as the placement of the food caddy and how that is has been made easy.

Summary

When comparing the quantitative results from the waste composition analysis to the households' statements in the analysis of the practices, it raises some questions about the connection between the waste composition numbers and the practices of the households. Some of the households believe that they are good at sorting their waste, but it still shows that they sorted up to 6,8 kg of food waste as residual waste, see appendix B. On the other hand, some households explained a lot of practices that can lead to a high amount of food waste but only produced as little as 9 kg within

two weeks. This shows that the households are not quite conscious about how much or little food they throw out as residual waste or just in general. It also shows that to get a more coherent picture, other research methods should be used, but this will be further explored in section 6.1.3. As the results stand now, it only partly shows the reasons why and not quite explains the quantitative results. The results from the analyses are still valuable, and it will be explained through the comparison of other studies in the next section.

6.1.2 Comparison with other studies

There have been other studies examining the behaviours and practices of food waste and sorting within the households. To get an overview of how the results from this master thesis compare and contribute to the scientific field, some of these studies will be further looked into. There have been chosen two studies by Petersen and Kristiansen (2017) and Stancu and Lähteenmäki (2018) respectively, as these are Danish studies concerned with practices, waste sorting and food waste.
The study by Petersen and Kristiansen (2017) examines waste handling in apartments, where they focus on the norms and practices within the households as well as the janitor's role in waste handling. For this discussion, only the results concerning the households' norms and practices will be accounted for. The study showed that the households accept waste sorting. If the option is there and it is easy to separate the waste, most people will do it. The households also see waste sorting as the norm and recognise that they have responsibility for correct waste sorting. The households' waste sorting also relies on the infrastructure for waste handling, such as easy access to getting rid of the sorted waste. It also seemed that some of the households experience problems with the layout of the waste containers. Designated waste containers for a waste fraction are missing, such as a shed for bulky waste or a locker for hazardous waste. This can lead to overfilling containers, incorrect waste sorting, waste on the ground and odours. Knowledge and competencies are also important factors. Knowledge can be how waste is supposed to be sorted, and competences can be how to wash the glass packaging without using too much water (Petersen and Kristiansen, 2017).
When comparing this study to the results in chapter 5.2, there are some similarities as well as differences. The similarities are shown through the norms, knowledge and competencies. Both the study and the analysis show that the households are all willing to sort their waste because they feel a responsibility. It also shows that knowledge is an important factor, where with the households from the residential area, the knowledge came in the form of a pamphlet. Competencies are something the households share. However, when talking about competences in the study, it is about waste sorting. When talking about competences in the household practices analysis, it is about practices related to preventing food waste. Nonetheless, competencies are part of both the practice of waste sorting as well as the practice of preventing food waste. The biggest difference is the type of home the households live in. This has shown to be a big factor when it comes to waste sorting. The house-

holds living in apartments experience problems such as misuse of the garbage chute, contaminated pizza boxes in the waste container for cardboard, misplaced residual waste in the shed for bulky waste, glass bottles placed beside the waste container for glass and unfolded cardboard boxes taking up space in the container (Petersen and Kristiansen, 2017). These issues are connected to a lack of a functioning infrastructure, which is not necessarily the fault of the households. However, it is something that inhibits the households in proper waste sorting and lowers their ability to so. The households living in one family homes have their waste containers, and therefore do not experience the same problems. In the household practices analysis household E mentioned that is was easier to sort their waste after it moved out of an apartment and into a house, which the study by Petersen and Kristiansen (2017) confirms. This also shows that one of the biggest barriers for waste sorting for the households in apartments is the infrastructure, which is not the case for the households living in one family homes.

The study by Stancu and Lähteenmäki (2018) examines consumer food waste with a focus on practices related to food waste and how consumers perceive food waste. The data is collected using a questionnaire and is divided into different sections such as understanding of food waste and food-related practices[1]. When the participants were asked about their perception of food waste, the most frequent answer was about excessive buying. According to the participants, excessive buying leads to unused food or is thrown away. The second most frequent answer was about throwing away leftover food or ingredients. The majority of the participants were also aware of food waste in general (Stancu and Lähteenmäki, 2018). These answers are rather similar to the answers of the interviewed households in this thesis. They too believe that buying more food than needed and throwing out leftovers are considered food waste. They also often hear about food waste as an issue through the media or friends and family.
In the study, planning the meals and shopping trips are seen as preventing food waste. Most of the participants check their food inventory before going grocery shopping, but not a lot of the participants plan their meals ahead of time (Stancu and Lähteenmäki, 2018). This is rather similar to the households in the households' practices analysis, as all of them consider what food they have storage. However, not all of them make a meal a plan, and some of them have trouble following the meal plan. The majority of the participants in the study also said that in their household, the members eat the same food (Stancu and Lähteenmäki, 2018). For some of the households in this thesis, it is not the case, either because of different food preferences or because of spare time activities. As shown in the analysis these eating habits can cause food waste.
The study further shows the priority of what types of food are either saved or con-

[1]When discussing the results from the study by Stancu and Lähteenmäki (2018) it is referred to as 'the study'. The subjects of this study are further referred to as 'participants' and the households interviewed for the households' practices analysis is referred to as 'the households'.

sumed. Fresh fruit and vegetables are more likely to be thrown out than meat, as meat have a higher value. Therefore, meat is less likely to be thrown out (Stancu and Lähteenmäki, 2018). This tendency is also shown in the households' practices analysis. The households were more likely to throw out vegetables and pasta than meat. However, the majority of participants would save the leftovers from a cooked meal, especially if there were enough for at least one more portion (Stancu and Lähteenmäki, 2018), which is the same case with at least one of the five households interviewed.

The study also examined how the household dynamic and grocery shopping affected the amount of food waste. When not all household members eat at home, it can be harder to estimate how much food is needed to be prepared, which can lead to food waste. The study also showed that fewer shopping trips would lead to a lower amount of food waste (Stancu and Lähteenmäki, 2018). Similar results appeared when interviewing the households. If the households eat out or are having guests, there would be a higher chance of food waste. It also showed that going grocery shopping more often would lead to temptations and buying more than necessary. However, not knowing if all the household members would be home to eat dinner did not seem to be an issue, as this was accounted for whenever the household members had leisure activities.

To assess if some food items were still edible the participants in the study would use their senses such as smell, taste and sight (Stancu and Lähteenmäki, 2018), much like the households in the households' practices analysis, where all the households also used the date labelling system to some degree. Another competency is including leftovers in cooking a meal. From the study, the majority thought that they had sufficient skills in the kitchen Stancu and Lähteenmäki (2018). Some of the households from the households' practices analysis brought up this competence as a mean to avoid food waste. However, these households claimed that their skills were not sufficient, contrary to the participants from the study.

The study also showed the motivational level of reducing food waste was high among the participants. The most important motivational factor is the possibility to save money as well as helping the environment (Stancu and Lähteenmäki, 2018). When analysing the beliefs and motivational factors of the households, they recognise the need for waste sorting and preventing food waste and the economic benefit of reducing food waste. These beliefs, however, do not seem to translate into action as they still do not think they are doing a good job of reducing their food waste. Their motivational factor was neither quite as high as the participants from the study, as some of the households stated that they either did not have a passion for it or would rather not sort the food waste.

Summary

Even though these external studies and this master thesis examines some of the same issues, there are different circumstances of the studies and different results. When looking at the study by Petersen and Kristiansen (2017), the demographics

are different from the households in the analysis. The households in the study live in apartments, which causes them to have different barriers and practices when it comes to waste sorting. Therefore, the analysis in this master thesis offers a different point of view to the practice of waste sorting.
The other study, on the other hand, generally showed similar results to the different practices and aspects related to food waste. This shows that the results from the master thesis can be applied on a bigger scale, as it will in section 6.2. To collect the data for the study by Stancu and Lähteenmäki (2018), a questionnaire has been used, as also mentioned earlier. This can result in self-reported environmental behaviour. The participants rated them self highly when they had to measure their motivational level for preventing food waste. However, as the households mentioned, they are not particularly motivated to do so. Furthermore, this master thesis has a unique take on examining the same issues as the other studies. The analysis in this master thesis also includes a quantitative waste composition showing what and how much waste the households throw out, which give a more representative and unique take on these issues. Therefore, this master thesis contributes to something different to this field of study.

6.1.3 Discussion of the research method

In this section, the choice of the research method and the procedure of the conducted interviews will be discussed. Recruiting the households for interviews by knocking on the door seemed to be an effective method. The households seemed willing to participate in an interview, but some of them were too busy. None the less, this method seemed more effective than, for example, leaving them a letter. This would have been easier to ignore, and the likelihood of getting the households to participate in interviews would have been smaller. By walking around the residential area, it was also possible to be more selective about which households got the chance to participate, which made it easier to interview the households higher on the prioritising list.
Before travelling to the area, the number of interviews was predetermined. It was decided to interview five households, where more interviews might have given a better groundwork for the analysis of the households' practices in chapter 5.2. As the analysis will show, there were not many deviant statements. Therefore, having a couple more interviews would not make a significant change. Furthermore, having five interviews were assessed to be possible within reasonable limits and was also discussed with the staff at Econet. Those households who are interested in participating might also have more positive opinions about waste sorting and their waste handling. Therefore, the households that have an opposite opinion will not be giving their statements. This means that the analysis could have been more varied if those opposite opinions were included.
The results from the analysis in chapter 5 offer unique results, but it is difficult to extract concrete answers. Therefore, as mentioned, other research methods, along with the conducted interviews, could have benefited the outcome of the households'

practices analysis. Other research methods could be observations where it is possible to shadow the households and observe how they act at the moment. These observations could, for example, be following the households when it goes grocery shopping or observing it when it eats dinner. An alternative approach could be an ethnographic study which was also performed by Evans (2012). Evans believed that only interviewing the households would not be sufficient. Evans was also 'hanging out' in the homes of the households, on streets and in areas where the study took place. Evans furthermore conducted follow-up interviews with the households. By following this research design, Evans was able to get in-depth snapshots of how food turns to waste (Evans, 2012). This practical example shows how by creating more close relationships with the households, the results will become more in depth. This is a more passive way of examining the households' practices. Another interesting approach is documenting the households' behaviour before and after it changes its practices. To change the practices, the researcher could, for example, give the households a fixed grocery list or budget to see how these factors will prevent food waste. By adding quantitative data to these types of research, designs will further enhance a more coherent and clear reality of what happens when the households throw away food or sort it incorrectly.

6.2 Reflecting on the results

This section is the reflection part of this chapter. It is about reflecting on the results from the household practices analysis can be seen a more societal context by using the theory of socio-technical systems from chapter 3. This is to show how the households are a cornerstone in waste management and therefore, an important puzzle piece for a better waste management system.

6.2.1 Results in a socio-technical context

Having the results in a more coherent picture makes it possible to reflect on how the households' practices of preventing food waste and waste sorting fit on a larger societal scale. This will be done with figure 3.3 in mind. To refresh, these figures shows how *technology*, *human actors* and *rules* make up the activities present in society, such as the waste handling system.
When referring to the technology in the household practices analysis, it falls under *material artefacts* which is the waste scheme and their food caddy. The households did not seem to have any issues with the waste scheme, other than it was difficult in the beginning. The challenges, in the beginning, changed, however, as the households started to getting used to the new ways of sorting their waste. On the contrary, some of the households claimed that it is easy to use. The households neither had a problem with the food caddy, and it only affected the households' waste sorting depending on where it was placed. This shows how technology in the form of infrastructure can be a driver for more waste sorting.

Another strong driver for waste sorting is the rules of waste sorting. Many of the households mentioned that the pamphlet they received with the sorting criteria helped them to understand better how they are supposed to sort their waste. Some of the households also mentioned that they feel a responsibility and that they "have to do it". This shows how strong rules are as a tool when it comes to household waste management. On the other hand, information from public authorities among others about reducing food waste does not have an impact, further showing how important rules are for the waste management system to work.
Lastly, there are human actors, which in this master thesis is the households. Throughout the analysis, it has become clear how the households are interacting with the technology and the rules and how these dimensions are influencing them, especially when it comes to sorting their food waste. But there are also other factors in play which occur within the household and among the household members. Their daily life, habits and practices play a big role in the outcome of how much food they throw away or how they sort their waste. Knowing now how these dimensions interact with a household practices perspective, it is possible to illustrate it a societal context. This is done in figure 6.1.

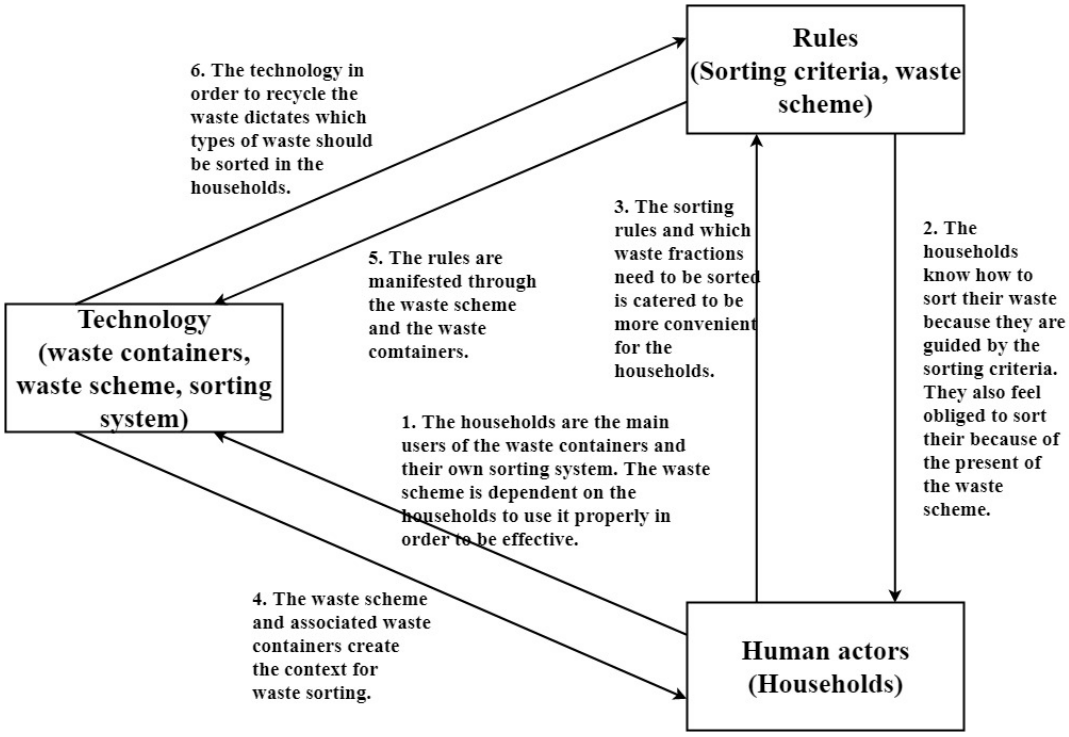

Figure 6.1: The results from the households practices analysis seen in a societal context. Figure inspired by (Geels, 2004, s. 903).

Figure 6.1 shows how the households affect and are affected by the other two dimensions in the waste management system. This, however, is more relevant when it

comes to the issue of waste sorting. Preventing food waste does not fit into the same model. There are no rules for the households to prevent food waste; neither is there any technology that helps them with this task in comparison to the waste containers and waste scheme when it comes to waste sorting. There are other means to help households in preventing food waste, such as apps and informative organisations. However, by learning how the households are motivated and hindered in preventing food waste through their practices and daily life, it is also possible to incorporate these barriers into future waste management and communication about preventing food waste.

CHAPTER 7

Conclusion

The amount of food that is wasted is a growing issue, which causes unnecessary use of resources and emissions damaging the climate. Therefore, food waste should be prevented or at least sorted as its waste fraction. Recovering the food waste for recycling is also an important aspect, as it can combat the issue of the lack of important nutritional substances in the agricultural sector. These issues start with the households. This master thesis, therefore, examines the practices that inhibit the households in preventing food waste and sorting the food waste correctly. The thesis is a collaboration with the consulting firm Econet, who provides the issues of examination and quantitative data from a selected residential area as a point of departure for the qualitative approach of the analysis. The choice of theories and research methods, therefore, reflects the qualitative approach, which made it possible to get a more in-depth understanding of issues at hand from the households. The empirical groundwork for the analysis consists of quantitative data of the households' waste composition by Econet and interviews with five households in resident in Sorø. The analytic framework is structured after how practices are constructed shown in table 3.1. The table shows four categories, each with elements that contribute to creating a practice, which affects how the households behave when it comes to producing food waste and sorting it. With modern society, technology is utilised more and more to achieve the activities that occur in society. To understand how technology, rules and the households influence each other, the theory of socio-technical have been used. To use these theoretical aspects and to examine the issues at hand further, the thesis takes a point of departure in the following research question:

> *What social practices and infrastructures within the households seem inhibitory for preventing food waste as well as sorting food waste appropriately?*

The waste composition for the five households shows how some of the households are not as skilled in preventing food waste or sorting it correctly, especially when comparing it to the residential area with similarly sized households. The waste composition gives a nice point of departure, but it does not tell the whole story of why these numbers look like the way they do. The qualitative analysis of the households' practices will give a better explanation.
The practices contributing to either food waste or waste sorting can lined up as a timeline in the following order; *meal planning*, *grocery shopping*, *preparing meals*, *eating dinner*, *leftovers* and *waste sorting*. For each of the practices, some factors are affecting the households' ability to prevent food waste or sort their food correctly. These factors have been found through the statements from the households. During meal planning, the households make their grocery list and plan their meals for the week. By not following the grocery list or meal plan, the households might lose the overview of they already have in stock and therefore buy more than they need. If the households also go grocery shopping multiple times a week, they might be tempted to buy than what they need. Some grocery stores only offer some food items in bulk, which forces the households to buy more than they need. When buying more than needed, it can lead to food waste, as the households do not have time to consume it all. The last mentioned factor can also lead to food waste in the 'preparing meals' stage if the households are not competent enough to use the leftover ingredients for a new meal. The households also need to be skilled at judged if food is spoiled. If that is not the case, the households will throw out food that might still be edible. This is connected with knowledge about the different date labels on the food item. If the households do not know how to read them, it can lead to food being thrown out too early. A factor overlapping between 'preparing meals' and 'eating dinner' is different food preferences. If households members within a household have different food preferences, the household has to prepare even more food, which can lead to it being thrown out again. Eating out of the home can disrupt the original dinner plans, which likewise leads to food waste. This can also be the case of having guests, where leftovers were supposed to be consumed. However, not all leftovers are saved for another time. Leftovers from vegetables and boiled potatoes and pasta are often thrown out immediately. Some households also forget about the leftovers which end up being thrown out. When the households must sort the food waste from other types of waste, they experience it as time-consuming and an inconvenience. Some of the parents in the households also saw their children's ignorance as being a barrier to waste sorting. Lastly, the placement of the food caddy can affect the households' ability to sort the food waste from the other waste fractions.
Knowing why the households throw out food or do not sort it correctly, it is possible to explain why the numbers of the waste composition. The majority of the households state that they are good at sorting their waste. However, this does not always come across when looking at the high percentages of food waste found in the residual waste. Some households also gave thorough explanations to why they throw out food, but when looking at the numbers, they are on the lower end. This shows

that households have a low awareness of how much food they sort from the rest or how much food they throw out. It also shows that to get a more coherent picture, other research methods should be used, such as observations. By also comparing the results from this thesis to other similar studies, it reveals how this thesis can provide new information to the field. Even though the results are similar to other studies, the thesis still provides a unique point of examination as it is possible to compare the statements from the households with a quantitative approach.
When taking a societal look at the issues at hand, waste sorting is well integrated. There are rules for how the waste should be sorted, and the technology helps the households to follow these rules and sort their waste correctly. However, prevention of food waste is not as streamlined. There are no laws or rules for preventing food waste within the households, and there a no issued technology to help the households in the task. There are however more informative means.

This master thesis has shown why households are struggling with either preventing food waste or sorting food waste as its fraction. The results have shown how important rules and technology are to make the households sort their waste. However, these dimensions are not quite present when it comes to avoiding food waste. Right now, it is the households own knowledge and motivational factors that control their action towards preventing food waste. Therefore, the question is, how should future waste planning take precaution for food waste within the households when informational tools might not be enough.

Bibliography

AffaldPlus (2018). Ny affaldsordning i 2018. Visited 28.03.2018.

Ekvall, T. and Malmheden, S. (2012). Hållbar avfallshantering. Report no. 6523.

Europa Parlamentet (1994). EUROPA-PARLAMENTET OG RAADETS DIREKTIV 94/62/EF af 20. december 1994 om emballage og emballageaffald.

Europa Parlamentet (1999). Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste.

Europa Parlamentet (2008). EUROPA-PARLAMENTETS OG RåDETS DIREKTIV 2008/98/EF af 19. november 2008 om affald og om ophævelse af visse direktiver.

Europa Parlamentet (2018a). EUROPA-PARLAMENTETS OG RÅDETS DIREKTIV (EU) 2018/852 af 30. maj 2018 om ændring af direktiv 94/62/EF om emballage og emballageaffald.

Europa Parlamentet (2018b). EUROPA-PARLAMENTETS OG RåDETS DIREKTIV 2008/98/EF af 19. november 2008 om affald og om ophævelse af visse direktiver.

Evans, D. (2012). Beyond the throwaway society: Ordinary domestic practice and a sociological approach to household food waste. *Sociology*, 46:41–56.

Farr-Whampton, G., Foth, M., and Choi, J. H.-J. (2014). Identifying factors that promote consumer behaviours causing expireddomestic food waste. *Journal of Consumer Behaviour*, 13:393–402.

Filho, W. L. and Kovaleva, M. (2015). *Food Waste and Sustainable Food Waste Management in the Baltic Sea Region*. Springer.

Fjeldberg, B., Uldum, T., and Jensen, M. P. (2015). Affaldsløsninger i og uden for boligen - Inspiration til etablering af inden- og udendørs affaldsløsninger. Miljøprojekt nr. 1651.

Geels, F. W. (2004). From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory. *Research Policy*, 33:897–920.

Gram-Hanssen, K. (2011). Understanding change and continuity in residential energy consumption. *Journal of Consumer Culture*, 11:61–78.

Gustavsson, J., Cederberg, C., Sonesson, U., van Otterdijk, R., and Meybecj, A. (2011). *Global Food Losses and Food Waste - Extent, Causes and Prevention*. Food and Agriculture Organisation of The United Nations.

Henriksson, G., Åkesson, L., and Ewert, S. (2004). Uncertainty regarding waste handling in everyday life. *Sustainability*, 2:2799–2813.

Hernández, O., Rawlins, B., and Schwartz, R. (1999). Voluntary recycling in quito: factors associated with participation in a pilot programme. *Environment & Urbanization*, 11:145–160.

Metcalfe, A., Riley, M., Barr, S., Tudor, T., Robinson, G., and Guilbert, S. (2012). Food waste bins: bridging infrastructures and practices. *The Sociological Review*, 60:135–155.

Miljø- og Fødevareministeriet (2015). Bekendtgørelse om anvendelse af restprodukter og jord til bygge- og anlægsarbejder og om anvendelse af sorteret, uforurenet bygge- og anlægsaffald. Besøgt 13.03.2019.

Miljø- og Fødevareministeriet (2018). Bekendtgørelse om anvendelse af affald til jordbrugsformål. Besøgt 13.03.2019.

Miljø- og Fødevareministeriet (2019). Bekendtgørelse om affald. Besøgt den 13.03.2019.

Miljøstyrelsen (2010). Kortlægning af sammensætningen af dagrenovation og kildesorteret organisk affald fra husholdninger 2017. Undgå affald, stop madspild nr. 17.

Miljøstyrelsen (2015). Der er gode grunde til at genanvende madaffald. Visited 17.04.2018.

Miljøstyrelsen (2019). Kortlægning af kommunale affaldsordninger for husholdningsaffald. Visited 24.04.2018.

Ordenez, I., Harder, R., Nikitas, A., and Rahe, U. (2015). Voluntary recycling in quito: factors associated with participation in a pilot programme. *Journal og Cleaner Production*, 106:669–679.

Petersen, L. K. and Kristiansen, T. N. B. (2017). Kildesortering i etageejendomme. Report no. 220.

Rasmussen, L. T., Remvig, K., and Wien, C. (2017). Litteratur- og informationssøgning til opgaven. In Reinicker, L. and Jørgensen, P. S., editors, *Den Gode Opgave - Håndbog i opgaveskrivning på videregående uddannelser*. Samfundslitteratur, København, 5th edition.

Reckwitz, A. (2002). Toward a theory of social practices. *European Journal of Social Theory*, 5:243–263.

Refsgaard, K. and Magnussen, K. (2009). Household behaviour and attitudes with respect to recycling food waste - experiences from focus groups. *Environmental Management*, 90:760–771.

Robinson, G. M. and Read, A. D. (2005). Recycling behaviour in a london borough: Results from large-scale household surveys. *Resources, Consevation and Recycling*, 45:70–83.

Schatzki, T. R. (2002). *The Site of the Social - A Philosophical Account of the Constitution of Social Life and Change*. Pennsylvania State University Press, University Park.

Scott, S. (2009). *Making Sense of Everyday Life*. Polity Press.

Shove, E. and Pantzer, M. (2005). Consumers, producers and practices. understanding the invention and reinvention of nordic walking. *Journal of Consumer Culture*, 5:43–64.

Stancu, V. and Lähteenmäki, L. (2018). Consumer food waste in Denmark. DCA report no. 118.

Sønderborg Kommune (2015). Nulskrald: Mindre Affald - Mere Liv. *Sønderborg Kommune, Sønderborg Forsyning*.

United Nations (2015). Transforming Our World: The 2030 Agenda for Sustainable Development. A/RES/70/1.

Warde, A. (2005). Consumption and theories of practice. *Journal of Consumer Culture*, 5:131–153.

Østergaard, K. and Pawlak, L. (2013). Danskernes affaldshåndtering, -holdninger og -værdier. DARE2.

APPENDIX A

Interview guide

Briefing	
Hvem er jeg?	Jeg er studerende i miljøplanlægning på Aalborg Universitet, og skriver nu det afsluttende speciale.
Formålet med interviewet	Formålet med dette interview er at få indsigt i hvorfor mad bliver til affald og hvilke praksisser i hjemmet der forårsager dette.
Tidsramme	Interviewet er estimeret til at vare 30-60 minutter.
Optagelse	Med dit samtykke vil jeg gerne optage interviewet. Dette er kun for at kunne behandle interviewet, og selve optagelsen vil ikke blive offentliggjort.
Anonymisering	Jeres husstands navne og adresse vil forblive anonymt i projektet.
Redegørelse	Du er naturligvis velkommen under interviewet at stille opklarende spørgsmål. Da dette er et frivilligt interview kan du altid trække dine udtalelser tilbage eller undlade at besvare spørgsmål.

Emne	**Interviewspørgsmål**
Demografisk sammensætning	Hvor mange bor her i denne husholdning? Hvad er alderen på familiemedlemmerne? Hvad er familiemedlemmernes beskæftigelse?
Familiedynamikken	Hvem står typisk for at handle ind og lave mad? Hvor ofte spiser i sammen som en familie? – Får alle i familien serveret det samme?
Indgraverede adfærd	Hvor ofte handler I ind? – Hvad er proceduren når I handler ind? (indkøbsliste, tjekker lager inden, planlægger måltider mv.) Hvordan påvirker hverdagen jeres madlavning og spisning rutiner? (fritidsinteresser, overarbejde, ferie, gæster) Hvad gør I typisk med det mad der ikke bliver spist efter et måltid? (gemmer resterne, smider resterne ud, fodre resterne til kæledyr, komposterer, sorterer til kommunen) – Hvad gør I typisk hvis resterne ikke bliver spist efterfølgende? Hvordan vurdere I om madvarer er blevet for gamle?
Ekstern påvirkning	Hvor ofte hører I om madspild i medierne? – Påvirker det jer til at producere mindre madaffald? Føler I, I har nok viden om betydningen af datomærkningen på madprodukter? (sidste anvendelsesdato, bedst før) Hvor godt synes I, I er informeret om hvad der skal sorteres som madaffald og restaffald?
Personlige værdier	Hvilken betydning har det for jer, at I skal sortere jeres madaffald? – Hvad motiverer jer til at sortere jeres affald? Hvor stor en indsats mener I selv I gør i forhold til: – at minimere madaffald? – at sortere korrekt? Hvad er jeres forståelse af madaffald/madspild?

Materielle genstande	Hvordan har den nye indsamlingsordning påvirket jeres dagligdag? – Hvad synes I om de nye affaldscontainere? (pladsmangel?) – Hvordan har I indrettet jeres sorteringssystem? Hvad synes I om madspanden? (ulækker, nemmere at sortere, bruger den ikke)
Afslutning	Har I nogle spørgsmål til mig?

APPENDIX B

Complete waste composition data sheets

In this appendix there are five tables - one for each of the interviewed households. The columns are named after the waste fractions, i.e. residual waste and food waste, and shows how much of each of the waste types were found in that waste fraction. The single letters correspond to the code name of the households, e.g. A is household A, B is household B etc.

residual waste (grams)	A	B	C	D	E
Food waste	3130	6840	5220	1590	2540
Paper towels	230	545	380	490	290
Pizza boxes					255
Fallen fruits					
Yard waste	10	45			
Animal excrement					
Dog excrement		80		90	
Dead animals					
Cat litter					
Clean paper	90	40	1275	50	225
Clean cardboard	105	275	335	155	460
Plastic foil	415	825	1190	855	750
Plastic packaging	345	1340	1550	910	440
Other plastic	210		300	35	705
Glass packaging	180	1395	250		
Metal	50	40	30	190	50
Metal packaging	135	145	65	125	20
Mix packaging	460	595	980	655	325
Diapers	4280		5535	7210	585
Other household waste	165	250	165	1720	4855
Other combustible	475	60	775	35	825
Not combustible	65	15			600
Hazardous waste					
Textiles	45		30	30	
Treated wood					
Batteries and electronics					
Sum	10390	12490	18080	14140	

Food waste (grams)	A	B	C	D	E
Food waste	25065	10530	7865	18980	6445
Paper towels			430		
Pizza boxes					
Fallen fruits					
Yard waste				2650	
Animal excrement					
Dog excrement					
Dead animals					
Cat litter					
Clean paper					
Clean cardboard					
Plastic foil			45	30	
Plastic packaging	805				
Other plastic					
Glass packaging					
Metal				15	
Metal packaging					
Mix packaging					
Diapers				595	310
Other household waste				25	95
Other combustible					
Not combustible					
Hazardous waste					
Textiles					
Treated wood					
Batteries and electronics					
Sum	25870	10530	8340	22295	6850