To waste or not to waste

Food waste governance in Lund municipality in 2018

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Abstract:

Food waste is a growing global problem. Even in Sweden, being one of the most sustainable countries in the world, the food waste levels are high. Understanding the role of local governance is crucial to tackle the problem of food waste. By using a simplified A-B-C (attitude-behaviour-conditions) framework, I explore Lund municipality prior to the general elections of 2018 and its governance system focused on later stages of the food supply chain - distribution and consumption (where in industrialised countries most of the food waste occurs). Moreover, the thesis sheds light on different strategies focused on food waste prevention and reduction. Additionally, the analysis touches upon the issue of attitudes and behaviour associated with food waste. Apart from semi-structured interviews with public officials that is the main research method, municipal policies, strategies, and plans were used as the source of data for the analysis. The results of the analysis present the overall governance structure and levels of responsibility within the municipality related to the food waste problem. The findings reveal the areas the municipality works on the food waste issue: on the distributional stage, the work focuses on supermarket chains and public procurement, whereas on the consumption stage focus lies primarily on households, restaurants, and municipal kitchens. Therefore, there are many ways the municipality can work on food waste reduction and prevention on the later stages of the food supply chain; however, as was found out the most power to positively influence the issue of food waste lies within public procurement and work organised at the municipal kitchens. Although household food waste proved to be the largest source of food waste, little could be done to influence behaviour of individuals. Attitudes and behaviour related to food waste in the municipality, as was identified by the interviewees, focus on issues of labelling, packaging, lack of knowledge, internal communication, canteen designs, the perception of food. Further research could be necessary to understand how the general election of 2018 affected the work related to food waste in Lund municipality. Additionally, the behaviour and attitude to food waste can be studied in greater depth.

Keywords: food waste, local governance, A-B-C model, sustainability, sustainable consumption, food supply chain

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List of Abbreviations

UN - United Nations

FSC - Food supply chain

FLW - food losses and waste

RQ - research question

UN - United Nations

FAO - Food and Agriculture Organization of the United Nations

SEPA - Swedish Environmental Protection Agency

1 Introduction

1.1 Problem Statement

The United Nations (UN) Sustainable Development Goals that were adopted in 2015 include a specific target that addresses food waste (SDGs, UN, 2015). The Goal 12 – Responsible consumption and production – says "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 losses" (SDGs, UN, 2015). In the report to the UN High Level Political Forum 2017 on Sustainable Development, Sweden admits that the country faces significant challenges related to this goal (Government of Sweden, 2017).

The UN estimates population to rise to 9.8 billion people in 2050 compared to 7.6 billion in 2017 (UN, 2017), the major increase in population is expected to happen in developing countries (Porter, Reay, Higgins & Bomberg, 2016). More people to feed and transition to more emission intensive diets is an additional challenge for a sustainable food supply system (Porter, Reay, Higgins & Bomberg, 2016). The Food and Agriculture Organization of the United Nations (FAO) in 2013 concluded that considering current estimations of food losses and waste (FLW), the lost food equals the amount that would be necessary to meet 2050 demand (FAO, 2013).

''Estimates of European food waste levels'' report assesses food waste data availability in Sweden as fairly good (Stenmarck et al., 2016). Indeed, there is a number of reports prepared by Naturdvårdsverket (Swedish Environmental Protection Agency, SEPA) regarding food waste in Sweden. SEPA's 2016 report estimates total food waste in 2014 to be 1,3 million tons of food waste with overall 134 kilograms per person (Naturdvårdsverket, 2016). Another report says that if food waste was reduced by 20% in the year 2012 that would recover somewhat from 10 to 14 billions SEK (Naturdvårdsverket, 2015).

In 2017, the Swedish government presented a budget bill where a strategy for sustainable consumption was mentioned (Government of Sweden, 2017). The strategy indicates that one of the first steps to achieve the goals of sustainable consumption is collaboration with other actors, such as municipalities. Furthermore, Livsmedelverket (National Food Agency) and Jordbruksverket (Swedish Board of Agriculture) have received a task from the government to develop an action plan during 2017-2019 to reduce food waste in Sweden in the long run (Livsmedelverket, 2018). This also

includes measures to reduce food waste in all stages of the food supply chain, from production to consumption (Livsmedelverket, 2018).

A number of municipalities have their own environmental strategies that are developed to guide and coordinate the environmental work in the municipality. Lund municipality has, among other normative documents that regulate municipal work with food waste, a programme on sustainable development 2014-2020 with focus on the environment (Lunds kommunfullmäktige, 2017). Lund is a municipality that aspires to achieve their environmental goals, one of which is to reduce household food waste by 2% yearly from 2013 to 2020 (Lunds kommunfullmäktige, 2017).

1.2 Research aim and objectives

My primary aim of the research is to look to the problem of food waste with governance in focus. As it proved to be, there is abundant research regarding the problem of food waste in Sweden. It includes governmental reports, national and local strategies, scientific articles; however, understanding of the role of the governance with regard to the problem remains minimally covered.
It is unclear how efficient local governance could tackle the problem of food waste, how actors are cooperating, what are hindrances that prevent the work related to food waste to be improved.

My primary interest is to understand how Lund municipality's governance system tackles the problem of food waste. An additional interest is to find out how much power a municipality has and where are the boundaries of its power to limit food waste. To fill the gap in the knowledge and to cover those uncertainties, I set a number of research questions:

RQ 1: What is the governance structure of Lund municipality that focuses on the problem of food waste?

RQ 2: What are the efforts of the local governance system in Lund municipality to limit food waste within the municipality's borders on later stages of the food supply chain prior to general elections in 2018?

> **RQ 2.1**: What are attitudes and behaviour to food waste in Lund municipality perceived by decision-makers and civil servants?

1.3. Contribution to sustainability science

My research contributes to the underlying principles of sustainability science since the thesis is "focused on the character of nature-society interactions, on our ability to guide those interactions along sustainable trajectories, and on ways of promoting the social learning that will be necessary to navigate the transition to sustainability" (Kates et al., 2001, p. 642). Focusing on Lund municipality prior to general elections 2018 and its governance system, I follow the definition of sustainability according to Miller et al. (2013, p. 284), which is "defined through participatory or democratic process contingent on place and time". By interviewing public officials and civil servants to understand the actors involved and strategies to tackle the problem of food waste on a municipal level, I also adopt the process-oriented approach to sustainability science described by Miller et al. (2013, p. 288) as "a process in which various forms of credible knowledge, perspectives and values can come together to define sustainability".

1.4 Thesis structure

The next chapter covers important background information that sets the context for this research, namely food waste quantification and trends; it presents the main stages of food supply chain (FSC) and exemplifies how food waste occurs; it gives an overview of the strategies to tackle food waste on different stages; it provides information on how the problem is addressed in European Union and Sweden.

In Chapter 3 I elaborate on methodology, clarify the research methods and explain step-by-step qualitative data analysis process. Further on I go into details on ethical considerations and limitations of the research. I also include the description and justify the choice of A-B-C framework.

In Chapter 4 I present the results of the research using adapted A-B-C (attitude-behaviour-conditions) theoretical framework. I start with describing the "conditions" where I group the topics that occurred during the interviews to a number of sections that describe the governance system of Lund municipality, the actors that are involved in work concerning food waste, the regulatory documents that those actors use in their work and that guide them in the process. Further on I describe how the work with food waste is organised on two later stages of the food supply chain within the municipality, in particular on distribution and consumption stages. The chapter also contains the two other aspects of the A-B-C model that is behaviour and attitudes, where the relationship to external conditions is described.

Finally, I proceed to the discussion section where I share the difficulties I faced during the writing process of this thesis and share my ideas on how this research can be continued.

2 Background

2.1 Food waste: EU, Sweden, Lund

Food waste is a global problem that requires a centralised action. European Union takes food waste into focus – in 2016 European Commission adopted a Food waste prevention plan as a part of Circular Economy Action Plan (European Commission, 2016) the aim of which is to reach Sustainable Development Goal 12. Council of the European Union has adopted a number of new targets; for example, by 2030 to reach 60% and 70% of material recovery in municipal waste and packaging waste respectively (Council of the European Union, 2018). Additionally, according to the EU waste hierarchy, the highest priority of the work with food waste is prevention (Eriksson, Strid & Hansson, 2015).

In the report to UN High Level Political Forum 2017 on Sustainable Development (Government of Sweden, 2017a) it says that Sweden has adopted a number of strategies and plans to promote sustainable production and consumption; for example, 2017's Strategy for sustainable consumption that has a main objective to create a competitive food supply chain that aims to "contribute to sustainable development throughout the country" (Government of Sweden, 2017b, p. 10). Nevertheless, government officials admit that Sweden faces significant challenges to achieve sustainable production and consumption (Government of Sweden, 2017a). Considering that estimations of food waste levels in Sweden are quite high (Naturdvårdsverket, 2016), it can be suggested that even if Sweden might look like a forerunner compared to other EU countries, there is still space for improvement on various stages of the food supply chain, later ones in particular.

This research focuses on Lund municipality that has a long history of work for sustainable development. United Nations Agenda 21 was used as the basis for the environmental work in the municipality. The first version was adopted in 1997 and was called Lund Agenda 21 (Lunds kommunfullmäktige, 1997). The document mentioned prioritised work areas within three aspects of sustainability: environmental, economical and social (Lunds kommunfullmäktige, 1997). Moreover, Lund city has been a Fair Trade city since 2007 which means that city authorities together with a number of NGOs and stores make effort to purchase Fair Trade certified products (Lunds

kommunfullmäktige, 2017). Currently, Lund municipality has a programme on sustainable development 2014-2020 that is called LundaEko II (Lunds kommunfullmäktige, 2017).

As seen from the provided examples, Lund municipality prioritises environmental work and strives to achieve sustainable goals outlined in the programme. Provided that there is an interest from the municipality to further develop in this area and my interest as a researcher overlap, I have chosen this study area to conduct the research.

2.2 *Food waste: quantification and global trends*

There are several studies that aimed to quantify food losses and waste; however, their numbers differ considering certain difficulties and constraints in methodology. For example, Gustavsson, Cederberg, Sonesson and Emanuelsson (2013) estimate food losses and waste (FLW) in the food supply chain to be one-third of the overall amount. Lundqvist, de Fraiture and Molden (2008) in their turn provide a higher estimations claiming FLW to be "as much as half ... before and after it reaches the consumer" (p. 36).

Lundqvist, de Fraiture and Molden (2008) identify a number of global trends related to food waste. According to their study, consumers become more aware and concerned about food safety; thus increasing demand for high quality fresh products. It leads to an increased amount of food wasted before being sold, although still edible (Lundqvist, de Fraiture & Molden, 2008). Another trend is that people tend to move to the urban areas from rural ones; therefore the food supply chains become longer and more complex (Lundqvist, de Fraiture & Molden, 2008). Finally, the demand for perishable foods is increasing; thus increasing risk of food waste generation (Lundqvist, de Fraiture & Molden, 2008). Parfitt, Barthel and Macnaughton (2010) notice that factors such as increased consumer choice and decreased proportion of money spent on food tend to promote wasteful behaviour.

2.3 Food waste and food supply chain (FSC)

Van Der Vorst, Da Silva and Trienekens (2007) identify food supply chain as "a sequence of (decision-making and execution) processes and (material, information and money) flows that aim to meet final customer requirements, that take place within and between different stages along a continuum, from production to final consumption" (p. 7). Food waste occurs on all levels of food supply chain (Parfitt, Barthel & Macnaughton, 2010), but called differently on the first stages, namely

"food loss" in food production, post-harvest and processing (Rezaei & Liu, 2017; Parfitt, Barthel & Macnaughton, 2010). This can happen for a number of reasons, due to inadequate storage, packaging, infrastructure, etc (Rezaei & Liu, 2017). On later stages food waste occurs, mostly related to human consumption, wholesaling and retailers (Rezaei & Liu, 2017; Lundqvist, de Fraiture & Molden, 2008); for example, when food is spoiled or expired due to neglect. Lundqvist, de Fraiture and Molden (2008) describe food waste as deliberate discrading of food even if it is still edible.

Lundqvist, de Fraiture and Molden (2008) admit that FLW is a bigger problem to developed rather than to developing countries. In developing economies food losses and waste occur in the earlier stages, whereas in the developed economies wholesaling, retailing and consumption where food waste is generated. Moreover, in industrialized countries food waste occurs when production exceeds demand (FAO, 2011).

FAO in the "Global food losses and food waste" report (2011) identifies main stages of the food supply chain and types of food waste that occur. Parfitt, Barthel and Macnaughton (2010) provide a very detailed description of food waste that occurs on different stages of food supply chain. Figure 1 illustrates simplified food supply chain and examples of food waste derived from the study.

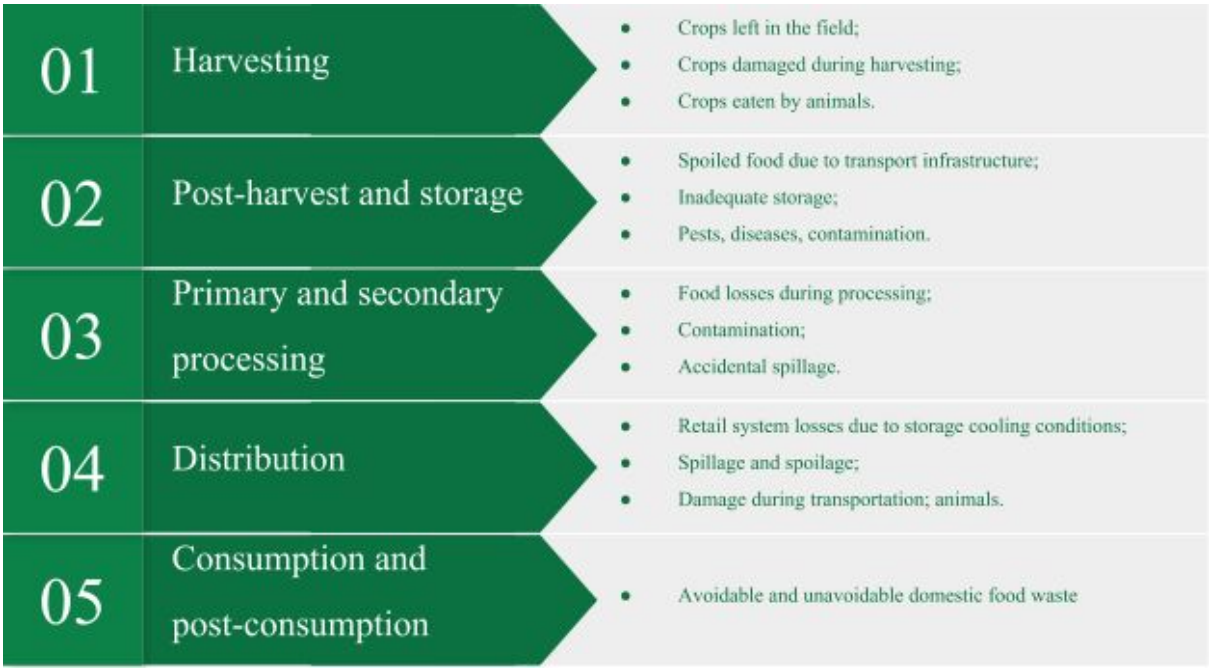

Figure 1. Main stages of food supply chain and examples of food waste (Parfitt, Barthel & Macnaughton, 2010)

As shown on the Figure 1, there can be various reasons for food waste generation that differ from stage to stage. Considering that Sweden is a country with a developed economy, the following

section presents the aspects of food waste related to industrialised countries – food waste generation on later stages of the food supply chain.

Stage 4, distribution, concerns both supermarkets chains and public procurement for municipal needs. As Stuart points out (2009) supermarkets tend to have standards for quality, appearance, shape, colour, size, etc. Thus, large amounts of food are rejected and used for other purposes. Additionally, food losses may occur in industrialized countries due to certain appearance standards. Stuart (2009) provides an example of the standards for carrots that supermarket chain Asda in the United Kingdom impose on suppliers. If a carrot had a slight bend or the colour of it did not match the standard, those carrots were used as animal feed. In total, that supplier had to throw away 25-30% of carrots produced on the farm. Additionally, supermarkets can use reclamations, e.g. when delivered food is rejected and sent back to, in this case costs are reclaimed (Eriksson, Ghosh, Mattson & Ismatov, 2017). Brancoli, Rousta and Bolton (2017) found out that bread and fresh fruits and vegetables are the largest shares of food waste in supermarkets in Sweden by mass.

Food waste at stage 5, consumption, includes food waste that occurs on domestic (household) level (Parfitt, Barthel & Macnaughton, 2010). Domestic food waste can be described with two terms: avoidable and unavoidable food waste (Naturvårdsverket, 2014). Avoidable food waste defined as "food thrown away because it is no longer wanted or has been allowed to go past its best" (Papargyropoulou, Lozano, Steinberger, Wright & bin Ujang, 2014, p. 112). Unavoidable food waste is defined as "waste arising from food that is not, and has not been, edible under normal circumstances" (Papargyropoulou; Lozano, Steinberger, Wright & bin Ujang, 2014, p. 112). It can include, for example, peels, tea bags, brewed coffee. Interestingly, food that was intended to be produced for human consumption but for various reasons was left out of the food supply chain and was used for, for example, bioenergy production or animal feed is still identified as food losses or waste (FAO, 2011). Sweden characterised as a country doing relatively good, with less than 1% of household waste ending up on landfills. Although, avoidable food waste at households in Sweden is still high and estimated to be 45 kg/person (Naturvårdsverket, 2016).

According to FAO (2011), food waste and losses in industrialised countries don't appear solely on later stages of the food supply chain. It also occurs on the harvesting stage (stage 1) when production exceeds demand. Farmers to ensure that their business is economically sustainable produce larger amounts of food than required; therefore some food that was intended to be sold for human consumption ends up being sold as feedstock or for energy production purposes (FAO, 2011). Although it is acknowledged that food waste occurs on all the stages; it is also pointed out that in

industrialised high-income countries more food waste occurs on later stages (namely on the consumption stage) compared to the earlier stages (FAO, 2011). Therefore, in this thesis I focus on later stages of the food supply chain because it represents the biggest amount of generated food waste in Sweden. During the research process, it was found out that Lund municipality made an effort to address food waste on other stages (e.g. stage 1); however, this was out of the scope of this thesis.

3 Methodology

3.1 Methods

Methods for this research are tailored to answer specific qualitative research questions. Semi-structured qualitative interviews were chosen as a method to answer the RQ1, RQ2 and RQ2.1.

3.1.1 Semi-structured qualitative interview

Semi-structured qualitative interviews were chosen because this method provides certain benefits over structured and quantitative interviews. Bryman (2016) lists a number of reasons to consider this method. Firstly, there is an emphasis on interviewee experience, rather than a number of research goals that need to be addressed. Secondly, there is no need to follow the interview guide strictly, the order of questions may vary and questions can be asked differently from the way they are formulated. Thirdly, detailed answers are encouraged and there is always space for follow-up questions; therefore making the research process more flexible. Fourthly, semi-structured interviews provide some comparability, if more than one person is planned to be interviewed.

To have a whole picture of the governance system and approaches to tackle the problem of food waste in Lund municipality, different organizations and officials were contacted to conduct semi-structured qualitative interviews; the interviewees were both politicians and civil servants. All the interviews but two were conducted face-to-face, this form was chosen because it has a number of strengths, namely, an opportunity to ask follow-up questions, an advantage of non-verbal communication (Driscoll, 2011).

The interviews were divided into two phases. The first phase included two preliminary interviews to investigate the current governance systems in the municipalities of Lund and Malmö. The main purpose of it was to assess whether it was possible or not to gather necessary data to conduct the

research for this master's thesis. The second phase included 10 interviews with experts from organisations that represent different parts of governance systems and/or have knowledge and power to influence the situation (see Appendix 1). A literature review was carried out between the stages to formulate the question for the interviews. A number of recommendations were used from Bryman (2016) to develop an interview guide and to prepare for the interview process, e.g. the interview questions were not formulated in a very specific way in order to give space for the interviewees to present their point of view; a number of pilot interviews were conducted to test the interview guide to grasp the idea where the research might go and identify potential obstacles that may occur during the process; double-barrelled question and unfamiliar terms were avoided. If the terms were new for the interviews, a short description was provided.

3.2 Qualitative data analysis

All of the interviews except for the two preliminary ones (see Appendix 1) were transcribed and coded with the use of Excel. The codes were designed to answer the research questions with a consideration of the A-B-C framework. Preliminary interviews were not recorded because the sole purpose of them was to provide some background and highlight the areas of interest for the research. All the interviews were mostly transcribed word-to-word, utterances like "like", "ehm", "well", "you know" were omitted; basic grammar mistakes were corrected. After the transcription, the interviews were coded. Codes were formed by using a combination of the research questions and the A-B-C framework. The framework was mostly used to shed light on the relationship between external conditions in the municipality and attitudes, and behaviour where the data was available. For example, code "C" would relate to conditions, code "B" to behaviour, code "A" to attitudes, code "COOP" to cooperation, etc. More on the A-B-C framework can be found under section 3.5.

Interviewees were chosen based on their position in Lund municipality, competence and experience that concerns food waste problem. It was important to choose interviews that work on different levels with different aspects of food waste. Overall 10 interviews were conducted in the period from 10/04-2018 to 30/05-2018. 7 interviewees hold positions of civil servants, three interviewees represent a political party (Miljöpartiet and Centerpartiet[1]). The questions were adjusted according to the roles of the interviewees. 8 interviews were conducted in the English language, two interviews were conducted in the Swedish language. All the translations were done by the researcher. Interviews lasted from 15 to 51 minutes. Example of an interview can be found in Appendix 2, the list of interviewees in Appendix 1.

[1] Green party and Center party

Additionally, the municipal governance structure, local environmental strategies and guidelines, municipal pilot projects, and local policies were studied to gain an insight of the work regarding food waste within Lund municipality. The information derived from those documents was used to complement the findings from the interviews.

3.3 Ethical considerations

Considering that semi-structured interviews were the main research method used in this master thesis, I acknowledged ethical aspects by following the guide proposed by Bryman (2012). The interviewees were given the full information about the research prior to the interview to ensure that the participation is voluntary. Sensitive questions were asked carefully, in case it was observed that interviewees become uneasy or give an evasive answer, questions were reformulated or omitted. Informed consents were used in face-to-face interviews (see Appendix 3), in phone interviews verbal consent was given instead. Verbal consents were recorded.

3.4 Limitations

There are a number of limitations in the conducted research.

Firstly, party affiliation may affect the opinion of interviewees. Only members of two parties were interviewed that does not necessarily illustrate the whole picture of how the problem of food waste is perceived in the municipality. There can be other members of political parties that have different views. It remains unknown how that would affect the results of the research. Additionally, personal opinion of a party member can, of course, differ from the party's standpoint; however, as was found out from the interviews, when it comes to a vote, a simple majority wins. Therefore, a party member would have to agree with the results of the vote and represent it even if their personal opinion differs. There can be exceptions, as was indicated by one of the interviewees, only in case if a party member helds a personal position on a certain issue for many years and it contradicts the party's decision, then it is allowed for them not to follow the party's line.

Secondly, as was stated above, three interviews out of 10 were conducted with the party members. This thesis focuses on the situation in the municipality prior to the general elections of 2018; therefore it is not clear and left out of scope of this thesis what political party or parties have formed the Municipal Assembly (kommunfullmäktige) and Municipal Board (kommunstyrelsen) and how their rule affects the municipal work within sustainable development and food waste in particular.

3.5 Theoretical framework

The A-B-C model stands for Attitude, Behaviour and Conditions respectively. It has a long history of use in the research, in particular with relation to environmental issues. The idea of external conditions influencing attitude-behaviour relationship is not new and has been well studied (Guagnano, Stern & Dietz, 1995). Guagnano, Stern and Dietz (1995) developed the A-B-C model to be used in the field of environmental psychology. The model suggests that certain behaviour is associated with attitudes (Guagnano, Stern & Dietz, 1995). The attitudes can vary quite a lot, from something that a person would do only by enforcement, to something that a person would do with no enforcement (Guagnano, Stern & Dietz, 1995). The definition of conditions is quite broad, it can include physical, legal, social or financial that either promote or discourage certain behaviour (Guagnano, Stern & Dietz, 1995). The model proposes that in any given population there is a distribution of attitudes and conditions that affect behaviour of individuals (Guagnano, Stern & Dietz, 1995). Behaviour that is effortful results in a rare action, whereas effortless behaviour leads to actions that are very common (Guagnano, Stern & Dietz, 1995). To summarise, the A-B-C model focuses on behaviour and how it is influenced by attitudes and external conditions (Guagnano, Stern & Dietz, 1995).

Olander and Thogersen (2005) used this model in their research on domestic food waste and behaviour in Denmark and proved that attitudes and behaviours to kitchen waste were determined to a high extent by external conditions. I see food waste prevention as a consumer environmental-friendly and pro-social behaviour and hypothesize that it is influenced to a high extent by external conditions as well; therefore it is interesting for me as a researcher to investigate and understand what are these external conditions, how are they formed, who can influence them, who are the main actors, etc; therefore, as seen from the research questions, I intend to focus on external conditions in this thesis. I touch upon behaviour and attitude issues; however, do not go into detail. Behavioural and attitude aspects could be complemented in the future research which I go into more detail under “Discussion” chapter.

Provided that the framework has been already used to study the problem of food waste and proved to be useful, and it has a general applicability (Olander & Thogersen, 2005), I simplify it and use it to systematise and organise the data I have gathered during the research process. By simplifying it I mean that I do not intend to complete the A-B-C model since the main focus of the model is on behaviour; whereas I, as stated before, is interested in external conditions; however, I do touch upon attitudes and behaviour, and their relationship to conditions in the analysis. The aim of this research,

as it states in the RQ1, RQ2 is to investigate efforts (prior to the general elections of 2018) of the governance system in Lund municipality to address the problem of food waste and find out how the governance system within the municipality deals with the issue on later stages of food supply chain. I systematise data into three groups under "Analysis and Results" chapter, namely "Conditions", "Attitudes-conditions relationship" and "Behaviour-conditions relationship" as proposed by the A-B-C model.

In its turn, RQ2.1 aims to find out what are the perceived attitudes and behaviour to food waste in Lund municipality; however, it is limited to only perceptions of decision-makers and civil servants interviewed and do not cover all possible attitudes and behaviour related to the food waste problem which should be considered as a limitation to this research.

I acknowledge that certain environmental *values* that people have can affect their attitudes and behaviours; however, I do not specifically focus on values in this research and leave if out of this thesis. Terms "external conditions", "external factors" and "structural conditions" are used interchangeably in this thesis.

4 Analysis and results: the A-B-C of Lund municipality

This chapter includes summarised findings. The first three sections, namely "Conditions: Governance structure of Lund municipality", "Conditions: Cooperation" and "Conditions: Regulatory documents" answers RQ1 – what is the governance structure of Lund municipality in relation to the issue of food waste.

The governance structure represents the "C" – "Conditions" of the A-B-C framework. This is also the largest part of the issues brought up by the interviewees. In order to present the results in a logical and comprehensive way, I start the analysis with Conditions to share the findings on the governance structure and municipal work with regard to food waste. The section 4.1, 4.1.1 and 4.1.2 provide the foundations of how the work in the municipality is organised, with the focus on the food waste issue. The information on governance structure is derived mainly from the interviews and complemented with the literature. Only organizations that work with the food waste are described. The following section starts with describing the main bodies that are the backbone of the municipal organisation.

4.1 Conditions: Governance structure of Lund municipality

Two main government organs in Lund municipality consist of **kommunstyrelsen** (Municipal Board) that represents the executive branch and **kommunfullmäktige** (Municipal Assembly) (Interview 4). Municipal Assembly is the highest decision-making organ in the municipality (Interview 4). Municipal Assembly assigns and outlines responsibility of different Boards that are called "*nämnd*" which work on specific issues (Interview 5).

Lund municipality has 65 "*ledamöter*" (Municipal Assembly representatives) that are elected every four years (Interview 5). Municipal Board prepares drafts of the municipal documents that are passed to the Municipal Assembly which in its turn votes for or against it. If a draft does not fulfill the requirements, it can be sent back to the Municipal Board to be revised (Interview 3). A Board consists of politicians that belong to various political parties. Members of each Board are appointed by a political party depending on how many votes a party has gotten after the elections (Interview 3). Each Board has a "*förvaltning*" (an administration) that consists of civil servants that are following the decisions of the respective Board (Interview 5). Municipal Assembly representatives do not tend to vote on their own. Before a vote on an issue a party has an internal vote. The results of this vote will determine the position of the party on any issue (Interview 3).

The following subdivisions are the key when it comes to food and food waste: **Barn- and skolnämnden** (Schools Board) is responsible for schools and education (Interview 3). **Servicenämnden** (Service Board) is responsible for the municipal kitchens (Interview 3). Municipal kitchens include units at pre-schools, kindergartens, gymnasiums and retiring homes (Interview 3). **Serviceförvaltningen** (Service Board Administration) is part of the Service Board organisation. The Service Board works on a strategic level (Interview 5). The Service Board is responsible for producing and selling food to the Schools Board and **Utbildningsnämnden** (Education Board) as well as **Vård- och omsorgsnämnden** (Health and Care Board) (Interview 5).

Most of the municipal schools are part of the Service Board Administration; although some schools belong to the Schools Board. The schools from grade 9 and onwards belong to the Education Board (Interview 5). **Måltidsservice** is part of Service Board Administration. Meal Service's responsibility is to acquire and deliver food to the municipal kitchens and to the activities organised within Service Board Administration (Interview 5). One of their prioritised activities is to reduce food waste in the municipal kitchens (Interview 5). **Miljöförvaltningen** (Environmental Board Administration) have

municipal inspectors that main responsibility is to conduct inspections to control food safety and waste management in the restaurants within the municipality (Interview 8).

Although the responsibilities are divided between departments quite well; there is a number of governance system flaws that were mentioned during the interviews.

Firstly, some of the kindergartens and schools are not part of the system which means that they purchase food outside of control of the municipal bodies (Interview 5). Besides, some of the municipal kitchens are part of the Schools Board, some are part of the Service board which only adds to desynchronisation especially considering that the Municipal Assembly has made a decision that all municipal units are supposed to purchase food from the Service Board:

> *"I think it would be easier and we are looking into that if we can make all food production and kitchens a part of the same organization." (Interview 3)*

Secondly, economic development can be prioritised over environmental questions like food waste. One of the interviewees mentioned that it is a hard work to balance between the financial resources and environmental goals that municipality sets:

> *"In my opinion, it is very important that we are working towards our goals, but it is always a complex question, the budget and the policies are not always possible to fulfill, and sometimes we are not fully in charge of everything." (Interview 4)*

Thirdly, political affiliation may influence positively or negatively the municipal work with food waste. Most civil servants tend to remain in their positions after the elections, but all the politicians that work at Boards are changed every four years. As it was said:

> *We are changing political structure all the time, and sometimes it is the left-wing and rules and sometimes the right-wing, and, for example, Liberal party they are very against that you should tell people what they should do, for example, if we wanted to start a campaign about sustainable consumption, or food waste, or anything else, it depends on which majority it is, how we can do that, how much can we say. (Interview 1)*

and

> *I think it is good that we are in Sweden and have so many parties that we do, that it is not just two parties and I think in the end it will be more creative solutions, but, of course, it is tricky to make sure that we have one target. (Interview 4)*

In other words, there are conflicting interests within the municipality. From one hand, there are civil servants that follow the decisions made in the municipality; and from another hand, there are politicians that make decisions and whose judgement could be affected by the upcoming elections. Their interests are not always aligned which can lead to an unsystematic approach to tackle food waste problem.

Nevertheless, Lund municipality aspires to achieve better results with food waste prevention and reduction. It has a number of plans and future projects that are expected to decrease the amount of food waste within the municipality. One of the potential projects is the so-called "waste coach", an expert that will work in the municipality to guide different departments and systematise their work related to the issue (Interview 4). The idea originally comes from Gothenburg city where this project achieved good results (Interview 4). This project is marked as potential for a reason. After the elections, the Municipal Assembly will vote on this project and as it was mentioned it is likely that it will be ruled out if Alliance[2] will form the government.

> "Our vision is zero waste. But then again, of course, it is difficult to reach that vision, totally, but I think, for example, with food waste or waste decreasing coach that we are planning, I think the organization can reach closer to the goals. And that's what I want in the future, I want us to really be able to take care of all the food and make sure that the waste is not waste." *(Interview 4)*

4.1.1 Conditions: Cooperation

Lund municipality cooperates with several organisations that work with waste. **Lundrenhållningsverk** is an organisation that manages waste within the municipality (Interview 2). Apart from that the organisation is responsible for communication with the households when it comes to food waste (Interview 2).

Sysav is a company that manages waste in the Skåne region. Sysav is jointly owned by 14 municipalities in Skåne region (Sysav, 2017), Lund municipality owns 15.38% of the company (Sysav, 2017). Each municipality has a representative that together with the other work on a joint Avfallsplan (Waste Plan) and connected activities (Interview 6). The main role of Sysav in this regard is to coordinate the work, to promote common goals related to waste that are left for the municipalities to achieve. Sysav has a daughter company that is called Sysav Utveckling. Sysav Utveckling works with the projects that aim to increase recycling (Interview 7).

[2] Alliance is a center-right coalition of parties that consists of Moderaterna, Liberalerna, Kristdemokraterna and Centerpartiet (Alliansen, n.d.)

The municipality can also support local bottom-up initiatives that target food waste generation. For example, there was a group of people that wanted to make a map of all fruit trees in Lund that are located in public areas. The municipality allocated some financial resources for the project implementation that proved to be a success. (Interview 1)

4.1.2 Conditions: Regulatory documents

The municipality has various documents that guide the work that concerns food waste to different extent. **LundaEko II** is a programme for the environmental dimension of sustainable development that concerns the period from 2014 to 2020 (Lunds kommunfullmäktige, 2017). The programme has an overall goal to promote sustainable consumption, food waste is mentioned just briefly – it is stated that it is important to work to reduce food waste, although there are no quantitative goals set. Another goal that is part of LundaEko II (goal 2.5) in the municipality that concerns food but not specifically food waste, is to have 100% organic food by 2020% in all municipal kitchens, although as it mentioned in Miljöredovisning (Environmental audit) (Miljöredovisning, 2017), it is improbable that municipality will reach the goal, as one interviewee points out:

> *"I am not sure if we will reach it a 100%, but I think it is very important we keep this goal because it made organizations work a bit harder, to actually see how we can actually change the meals and and I think it pressures the organization to have a little bit more vegetarian food, because it is, of course, cheaper than meat." (Interview 4)*

It was emphasised by two interviewees that Lund municipality works towards achieving national sustainability goals; although, the national goals do not include food waste reduction specifically (Naturvårdsverket, 2012).

Each municipality in Sweden is obliged to have a Waste plan (Interview 2). The Waste plan differs from municipality to municipality, stating that every municipality can decide local goals that concern waste (Interview 2). Lund municipality adopted the new **Waste plan** in 2016 (Avfallsplan, 2016). According to it, the municipality has a goal to reduce the total amount of waste by 2% per year from 2013 by 2020 (Avfallsplan, 2016). The Plan points out to the importance of increasing the amount of food waste that is recycled and at the same time decreasing the amount of food waste in general (Avfallsplan, 2016). In 2014, only 51% of food waste was recycled in the municipality (Avfallsplan, 2016). Lundsrenhållningsverk is responsible for Waste Plan; however, it was pointed out that it has constant problems with implementing it:

"It is the responsibility of the whole municipality to maintain the goals and work to reach them, but it is very abstract and now Renhållningsverket is struggling with getting each department in the municipality to follow what is written in the Avfallsplan. When we working with the plan, we try to involve all departments in the municipality, but it is very hard to get some, they do not want to be engaged and feel that it concerns them" (Interview 8)

Kostpolicy is another regulatory document in the municipality – a guidelines that concern food and meals (Kostpolicy, 2014). Kostpolicy is updated every mandate period (4 years) and all municipal Boards that work with food are responsible to follow and implement it (Kostpolicy, 2014). The guidelines do not contain any qualitative or quantitative indicators; all indicators are listed in LundaEko II (Kostpolicy, 2014). It is the responsibility of all school headmasters to make sure that students have enough time to finish their meals, to make sure that food is produced in safe conditions and made from sustainable ingredients to the highest extent possible (Interview 10).

To sum up, the key actors in Lund municipality when it comes to food waste are Schools Board (schools and education), Service Board (strategic management), Service Board Administration (food production and logistics; municipal kitchens), Måltidservice (municipal kitchens). The municipality cooperates with several organisations on the food waste issue: Lundrenhållningsverk (waste management on a municipal level), SYSAV (waste management on a regional level; Waste Plan) and SYSAV Utveckling (increase of recycling). Lund municipality has the following regulatory documents that guide work on food waste: Lunda Eko II (environmental strategy), Waste Plan (waste management goals), Kostpolicy (a food and meals guidelines).

4.4 Conditions: Food supply chain (distribution)

The following part of the chapter focuses on the RQ2 and describes the current efforts of the local governance system to limit the food waste in Lund municipality on later stages of the food supply chain.

As was identified earlier, distribution is the fourth stage of the food supply chain. Lund municipality focuses on several areas that belong to this stage: municipal procurement and supermarkets.

There were a number of reasons brought up why it is important to work with the food waste on municipal level and improve public procurement; for example, environmental and ethical considerations, but also economical. Every year the municipality purchases food for approximately

60 million SEK and produces 18 thousand portions per day that are further distributed between municipal kitchens (Interview 5). It was mentioned that the total amount of food waste at those kitchens is around 20% (Interview 5). Simply put, in the municipality 12 million SEK per year and 3.6 thousand portions per day are wasted (Interview 5). The Service Board Administration employee said:

> *"It is absolutely horrendous, really. I am aware that it will be some waste that can be no waste free, probably, but I want to decrease food waste as much as possible. " (Interview 5)*

The Service Board can demand suppliers to deliver food products with certain characteristics to limit food waste (Interview 5). One example was named, when the Meals Service ordered smaller potatoes for the municipal kitchens (Interview 5). With this order, the municipality saved money because smaller potatoes are sold at lower prices, but also prevented food waste as farmers tend to throw small potatoes away as they do not fulfill appearance standards set by supermarket chains (Interview 5).

As a municipality, Lund has little to do with the supermarkets regarding food waste. It was pointed out that the municipality can help the supermarkets with the knowledge and support them in spreading the information about their internal projects, but it has no legal power to make a supermarket follow some rules or regulations that would limit food waste (Interview 1). As it was mentioned, most of the work with food waste prevention comes with supermarkets' own initiative. For instance, ICA supermarket at Sparta[3] in Lund makes lunches from the food that is about to expire and sells them (Interview 1). In this case, the supermarket prevents the potential losses that would occur if the food ends up thrown away. One of the interviewees pointed out:

> *I think it is an extremely creative way of handling food waste and also because it is in the student areas and students are generally more likely to buy prepared food. So it is a win-win, basically. (Interview 3)*

Another aspect that was discussed was a law that exists in France and the potential of this law to be passed in Sweden. The law obliges supermarkets bigger than 400 sq. meters to give away food that is about to expire to charities and food banks (Chrisafis, 2016). The interviewee questioned the safety of the food when it is out of the supermarkets:

> *"I know about the French law that forbids supermarkets to throw away waste which somehow pushes them to work with donations and the problem there is, I think, that the result is too small. Many NGOs*

[3] A student neighborhood in Lund

or charities that receive the food lack the logistics, they lack the ability to store food properly, a huge amount of food...they don't know how to deal with it and we can't risk food poisoning." (Interview 7)

Another interviewee shares the scepticism about the law that would regulate food in supermarkets that is about to expire:

"But who is the one who is going to stand there and say you broke the law? A law that is not practical should never exist." (Interview 2)

One more issue that was mentioned is dumpster-diving[4] (also known as foraging). Dumpster-diving is illegal in Sweden (Interview 1). According to the regulations, the food that is thrown away belongs to the supermarket, thus dumpster-diving is considered a theft (Interview 1). Dumpster-divers were mentioned in one of the interviews as a bottom-up reaction to food waste:

"I also think it is strange that you have people, for example, who are dumpstering outside supermarkets and they get arrested for that, it is not stealing if it is thrown away." (Interview 3)

4.5 Conditions: Food supply chain (consumption)

Consumption is the fifth identified stage of the food supply chain. I divided the occuring topics from the interviews into three subsections, consumption in the restaurants, consumption at the households and consumption in the municipal kitchens. The power of the municipality to address food waste on those levels differs, with a higher extent at the municipal kitchens with a number of exceptions, to a lower extent at the restaurants and households.

4.5.1 Food waste in the restaurants in Lund municipality

The municipality has a number of employees that work at Environmental Board Administration. They visit restaurants on a regular basis to conduct the inspections. The main reasons for those inspections is to discuss necessary kitchen equipment and available space to install it, to see if the restaurants follow the regulations on food safety (Interview 8). The restaurants are obliged to have recycling bins where they sort the waste. Restaurants are free to decide what waste company to work with, they can have a contract to deal with food waste with municipal company - Lundsrenhållningsverk or with a private company (Interview 8). The interviewee believes that it is the

[4] Dumpster-diving is the practice of rescuing food or other items that were discarded to the trash bins.

municipality that should collect waste, not the private companies, because if the waste is managed by a private company, the municipality cannot control if the waste goes through the right treatment (Interview 8). The municipality has a Waste Plan where the goals are listed; however, private companies are not obliged to implement it and follow those goals (Interview 8). As was emphasised, private companies can be a threat to the municipal waste system (Interview 8). One civil servant that works with the issue mentioned that it is often cheaper to treat the waste at a private company because they tend to have only one bin, and the installation costs are lower for them than for the municipality that have from five to ten different bins for all sorts of waste.

> *"I think it is easier with municipal kitchens and elderly houses, they don't obstruct, they follow Avfallsplan and regulations, so it is private businesses that are worst. It is always about the money." (Interview 8)*

Food waste reduction is not a responsibility of Environmental Board Administration; however, it could be, considering that there is no strategies within the municipality to target food waste that occurs in the restaurants:

> *"If I was responsible for that type of control, I would care about it, but my colleagues who work with food control, they don't think it is their business, that's maybe a problem that they are very interested in what is going on in the kitchens but not outside." (Interview 8)*

4.5.2 Food waste in the households in Lund municipality

The municipality has little power when it comes to household food waste (Interview 2). The ways the municipality can influence inhabitants and promote food waste reduction is raising the awareness and organising informational campaigns (Interview 2). It is Lundsrenhållningsverk that communicates with the inhabitants through leaflets and brochures that are sent to the households.

> *"I think it is very important that we start working with the food from households, it is easier with school kitchens, for example, households is a more difficult project, but because, most of the food waste comes from the households, it is also important that we find a success in that kind of work, but it is a challenge. On another hand, at the moment it is very, food waste is very on the spot. You see in different areas from TV programmes, you see in newspapers, it is not just municipality works with food waste. I think that can be important to reduce food waste from different directions." (Interview 6)*

One problematic issue was indicated at this level, though it is not directly related to food waste reduction, but it is worth mentioning. It was said that some inhabitants want to install at their kitchens a food waste crusher that grinds all the food that ends up in the sink (Interview 8). It was pointed out that it does not seem like a good idea because if food waste goes through the sewage system, it absorbs a lot of poisonous components, thus making it impossible to make any use of it (Interview 8). Therefore, the municipality encourages inhabitants to sort food waste out in order to make biogas that is used to fuel local public transport. The remains of food that are left after the process are put out on the fields (Interview 8).

4.5.3 Food waste in the municipal kitchens

Food waste that is generated in public kitchens can be divided into two groups, "*köksvinn*" (kitchen food waste) that includes food waste from cooking process and the food products that were not consumed, and "*tallriksvinn*" (plate food waste) that includes everything that students or the elderly have taken but have not consumed, plus all the food that was served but was not taken (Interview 5).

The municipal kitchens are divided into two big groups, "*tillagningskök*" (production kitchen) and "*mottagningskök*" (receiving kitchen) (Interview 3). Production kitchens receive food that is acquired through the municipal procurement system and prepare it to the students or the elderly (Interview 5). Receiving kitchens are supplied with ready-to-serve meals (Interview 5). Around 30% of all municipal kitchens are receiving kitchens (Interview 3). Due to health and hygiene regulations, food at the receiving kitchens cannot be stored to be consumed later (Interview 5). The portions to the receiving kitchens are ordered in advance (Interview 5). If, for various reasons, for example, some students did not come to school or the amount of ordered portions exceeds the amount of the present students, those portions cannot be stored and are thrown away (Interview 5). On the other hand, the production kitchens **can** store the food that was not consumed and make a new meal the next day. Thus, there is less food waste in the production kitchens (Interview 5). For those reasons, it has been decided that every new school in the municipality will have a production kitchen (Interview 3). Although it depends on a project, but the municipality tries to promote those types of kitchens and includes them in the construction plans, even though they are more expensive to build as well as prices per portion produced at those kitchens are higher than average (Interview 3).

At some of the schools in the municipality 98% of food is certified organic which tends to be more expensive than non-certified food (Interview 1). Those schools are more careful with the food

because they need to stay within the budget, therefore they tend to throw away less food (Interview 1).

Two times per year, in spring and in autumn, under two weeks period the Service Board Administration measures food waste in all municipal kitchens to compare the kitchens between each other and to prepare a plan to limit food waste until the next measurement.

> *"We are trying to find a balance in this, so it is good for health, for the environment, but also for the economy, we are looking at the whole picture." (Interview 9)*

The Meals Service works with the kitchen menus, all the menus are rotated every 7 weeks (Interview 9). The Meals Service tries to include recipes that are appreciated by students and comply with KostPolicy:

> *"If you ask students what they want to eat, they will say pizza, chicken, that is not really what we are trying to advocate. Menus should also be nutritious and good for health." (Interview 9)*

There are a number of ongoing projects in the municipal kitchens that are in direct or indirect ways focused on food waste reduction. Firstly, so-called "inspiration workshops" are organised, where personnel working in the kitchens meet a person who works full-time in the restaurant industry (Interview 9). That creates space to share knowledge and experience, to come up with new solutions and action plans because, as it was pointed out, schools have different conditions, some of them are big and cook food for other schools, some of them are small, and there is no single solution that will fit them all. Secondly, the schools have student-driven groups that are called "*matråd*" (food council). The food council is consulted on what dishes students would like to have, how the recipes should be adjusted (Interview 5).

As was mentioned earlier, a number of schools and kindergartens are out of the municipal food system (Interview 5). They do not belong to the Service Board and are responsible to cook food on their own. Therefore, there is no way for the municipality to measure food waste in those kitchens. Currently, the municipality conducts a preliminary research to find out possibilities to unite all schools and kindergartens into one system (Interview 5).

To sum up, on the distribution stage of the food supply chain Lund municipality works on several areas: procurement and supermarkets. It appeared to be that the municipality has most power to influence the suppliers through the procurement. On the consumption stage of the food supply

chain, the municipality works on food waste in the restaurants, at households and in the municipal kitchens. Even though there are many organisations involved when it comes to food and food waste in the municipal kitchens which can lead to desynchronisation, the municipality is most successful on this level.

4.7 Attitudes-conditions relationship

As the A-B-C framework proposes, external conditions influence and to high extent determine attitudes and behaviour. In the following section I will describe attitudes to food waste in Lund municipality perceived by politicians and civil servants. Attitudes described with a relation to external conditions that can influence them; it is important to point out that some of the attitudes are relevant also on the national level. The following part of the analysis focuses on RQ 2.1 and sheds light on perceived behaviour and attitudes associated with food waste in Lund municipality.

One of the attitudes that were described during the interviews that is influenced by the external conditions is the labelling – it can be a source of the confusion and lead to even more food waste (Interview 1). Manufacturers in Sweden decide on their own what label they put on the package, either "use by" or "best-before" (Nordic Council of Ministers, 2014). "Use by" is related to the product quality and safety, whereas "best-before" only to the product quality. "Best before" labelled products are allowed to be sold after the indicated date; however, the responsibility for its quality lies entirely on the seller and not the manufacturer. Additionally, the research pointed out that Swedish manufacturers tend to use "best-before" labelling more often than other Nordic countries (Nordic Council of Ministers, 2014). FAO (2011) points out that there is a combination of factors in medium and high income countries that leads to a huge amount of food waste on a consumer level. Firstly, it is the attitude of those consumers who can simply afford to waste food. Secondly, it is "best-before" dates' labelling that complicates the food purchasing and planning as it also was expressed in the interview:

> *"It is quite difficult for people that it is said "best-before", then it is not bad after that date, and I mean lots of people here they are more like OK, it is old, and it is also education about how we treat food and how do we compare how we did before in the old days."* *(Interview 1)*

Lack of knowledge was also named as one of the reasons that promotes attitudes that cause wasteful behaviour on a household level:

"Of course, that's a fact, that people throw away very much food that is quite good to eat, you shouldn't look too carefully to "best-before" date you could drink milk several days after and so we often say you should smell and taste and if it doesn't smell and taste bad, you can eat it." (Interview 8)

The packaging of food in supermarkets was named as another issue that affects attitudes of the consumers:

"I believe that packages should be removed from very much food. And they would also give people a different sense of what food is. And I also think that it is very bad that people don't see where the food comes from, they don't see the work, they don't see if it is being an animal, they don't see how much petrol or whatever it is in the process to make this food, they are just going to the shop and just take it out." (Interview 2)

In the municipal kitchens there were a few recurring topics mentioned related to students' attitude to food and its connection to food waste generation.

"I think, concerning the food waste, the primary issue, actually, is the attitude of the pupils or kids eating because there is an attitude that the food served in schools, you are not supposed to like it, it is something given to them for free and they don't quite appreciate that. We are actually making a lot of efforts to make it more, to make the school canteens to be more of a restaurants." (Interview 5)

"I think it takes a generation change before it starts bringing the results that youngsters that are now in middle or high school, and with their children will see as the result of our work with climate-friendly meals, food waste, and respect of the resources." (Interview 10)

"I think information should come from these directions, it is something you have to, in a way, to appreciate food, you have to be careful about food, you have to understand that you just cannot waste." *(Interview 6)*

To sum-up, politicians and civil servants indicate a number of ways how external conditions influence attitudes to food. It is not only a labelling problem that is not clear to some consumers when the product expires, but also the packaging, the perception of schools' kitchens and canteens, and lack of education and efforts to raise awareness.

4.8 Behaviour-conditions relationship

Lund municipality works on different areas that can influence behaviour related to food waste, the communication with citizens is one if it which is also emphasised to be of high importance to achieve better results:

"When you start to talk about what kind of food you should have, you also start to talk about food waste, and where you buy it, and that you should have different food in different seasons of the year, I mean we shouldn't have tomatoes in December in Lund!" (Interview 1)

Lundsrenhållnigsverk primarily communicates with the inhabitants of Lund municipality about food waste (Interview 2). As it was mentioned by an employee, they provide the reasons why people should think about food waste and share statistics on the issue (Interview 2). Although, they have printed leaflets that concern only food waste, they admit that communication should be more complex:

"And in that moment you had to tackle the problem about communication of why we should do that, to the public, but today we don't discuss food waste specifically, today we discuss with our customers and whoever lives here sustainable consumption. That is something that is more interesting to people, what is their behaviour totally, what impact has their behaviour on the environment. There is food waste in this behaviour, but it could also be that they are throwing away clothes, should they recycle, should they not, we give the bigger picture to people." (Interview 2)

Moreover, in 2016 Lunds Renhållningsverk (2016) carried out a research on consumption patterns in Lund municipality. 76% of participants believe that it is important to change behavioural patterns to be more sustainable consumers. However, only 26% agreed to change their behaviour, whereas 60% said that they are ready to change their habits partly. This survey illustrates the core of the problem: people are unwilling to sacrifice their comfort even if their level of awareness is high.

Another level that municipality is working one and that proved to be effective is in schools. One of the measures to address students behaviour is to visualise food waste and what impact it has on the environment (Interview 9). Every day food waste is counted, the result is presented on an information board. Those boards also include information on food waste from the previous week and the food waste reduction goals of the current week (Interview 9). If too much of a certain type of food is wasted, it becomes a signal to the kitchen to adjust the recipe. The municipality has a food waste app, where the food waste amount is noted (Interview 9). The app is used to store the food waste data in order to plan food production in the kitchens, but also to produce graphs to visualise food waste to present to students, headmasters and kitchen staff (Interview 9). From autumn semester 2018 all schools obliged to register their food waste in the app. From 2019, not only plate food waste, but also served food that is wasted is measured.

The interviewees mentioned one of the factors that can reinforce students' wasteful behaviour – the food is free for students, and it is not appreciated to full extent. The Meals Service works to change this perception, considering that this food is free for students, but the money that are directed for food acquisition/production are taken from the taxes, so there is someone who pays for it, therefore the Meals Service needs to communicate it in a better and more persuasive way:

> *"But it is also a behavioral change, you need to communicate why we are doing those changes in order for them to be accepted." (Interview 10)*

Another issue that was mentioned that can hinder behavioural change in schools is the perception of importance of the food waste problem compared to other issues that students experience:

> *"Especially in schools, you have to worry about your studies, your grades, your education, maybe, I think you need to have something that is very easy and very clear to make people understand quickly. You have to make it easy for people to do the right thing because maybe not everyone thinks about that all the time." (Interview 3)*

The last issue that was recurring in the interviews is organisation of meal times and factors such as the canteen environment and stress that affect students' behaviour:

> *"Teachers let students in, so many of them come at the same time. This is stressful, noisy, it is difficult to find a place, staff is stressed as well, they do not have time to serve the food the right way, and that affects the students' behaviour. They are also stressed, take too much food, and don't have enough time to finish it. Or they do not come back to take more because of the long queues, so they take more from the beginning." (Interview 9)*

The interviewees believe that school has a lot of responsibility when it comes to raising the awareness and education about food waste.

To sum up, the interviewees highlight that the municipality does most of the work on food waste reduction and prevention in the municipal schools. The interviewees identified a number of reasons that affect the students behaviour at schools, namely imperfect communication between the local authorities and the general public, students' perception of food at school, limited students' awareness of the problem, the canteen stressful environment.

5 Discussion

This section reflects upon the research process and shares some difficulties that occured on the way. It is organised in paragraphs where I share my reflections and observations of the thesis process and identify directions that future research might take. Furthermore, I touch upon a few crucial moments in local and national relationships that (can) affect the work related to the food waste problem as a whole.

Firstly, this research is almost entirely focused on one municipality and its internal work. The national-local relationship can play a role in the environmental work in the whole country. I acknowledge that there could be new regulations and laws related to food waste introduced on the national level that to some extent would regulate the local work on the issue; however, it is unclear to what extent that might be the case. These regulations might take years to come into force, while the problem of food waste, as it was shown in Swedish Environmental Protection Agency's report, is escalating. In this situation, the local governance system has to respond, as Lund municipality has chosen. Although it was not discussed in the thesis, there is a clear potential for stronger cooperation between municipalities, for exchange of best practices and experience to achieve a common goal of food waste reduction and prevention, and a better recycling system. That creates a possibility to further work on strengthening cooperation between the municipalities to achieve common goals to reduce food waste in the municipal kitchens, restaurants and households.

Secondly, as the results have shown, the true power of Lund municipality to address food waste within its borders is quite limited to municipal kitchens, whereas household food waste, that so far has the biggest share of total food waste, remains almost unaddressed. The food waste on household level requires another approach and more complex cooperation between private and public actors. I see a huge potential in the research that would address behavioral aspects of food waste, new innovative ways to target it, and potential tools that can be used by municipalities to prevent and reduce food waste.

Thirdly, I am aware that there is a number of other responses to change the status quo and deal with the problem of food waste in Lund municipality. However, the main focus of this research is how the governance system within the municipality responds to the problem. I focused on understanding this system and identification of the key actors leaving out other, independent projects, NGOs, businesses and individuals that make their contribution to address the problem. That also creates the possibility to continue the research and investigate how the joint effort of the municipal actions,

private companies, individuals, NGOs can deal with the problem of food waste within the municipality.

Fourthly, as I mentioned before, the A-B-C framework could have been extended. The framework includes conditions, attitude and behaviour, but leaves out the values. Values can play an important role in understanding where the attitudes come from and how attitudes affect the behaviour. The relations between those components was not discussed in this thesis in detail, thus creating a possibility for further research.

Furthermore, this research was done from a sustainability science perspective where the main focus was on the external conditions that exist within the system (by "conditions" I understand the governance structure, the work and the projects that are being organised within the municipality to manage the problem of food waste) that is proposed by the theoretical framework that was adopted to the needs of this research. "Behaviour" and "attitudes" of the framework play an important role in this research, although they were not the main focus for a number of reasons. One reason is that my knowledge and expertise as a scientist in behavioural sciences is limited to a certain extent and I did not see a possibility to go further to investigate the interconnectedness and causality between attitudes and behaviour, therefore it creates a new possibility for further research.

6 Conclusion

This thesis sets out to examine the governance structure of Lund municipality and bodies that work closely with food waste issue prior to the general elections of 2018. The main focus of the thesis is on governance structure, especially on later stages of the food supply chain - distribution and consumption - where in industrialised countries most of the food waste occurs. One of the main findings is a systematised description of actors in the municipality that work directly or indirectly on the issue of food waste and the interplay between decision-makers, civil servants and external actors. The structure appeared to be quite complex with responsibility shared between various organisations and subdivisions which in its turn leads to some friction and affects the work related to food waste.

The findings reveal the following areas the municipality works on the food waste issue: on the distributional stage, the work focuses on supermarket chains and public procurement, whereas on the consumption stage focus lies primarily on households, restaurants, and municipal kitchens.

It was found out that the main area where Lund municipality is most successful with its work on food waste is municipal kitchens (pre-schools, kindergartens, gymnasiums and retiring homes). Only in the municipal kitchens the municipality loses 12 million SEK per year and 3.6 thousand portions per day which makes food waste an important issue. Although the responsibilities are divided quite well between different actors, the system is far from perfect: some municipal kitchens are not the part of the system making it impossible to control and monitor food waste. Besides, the municipal kitchens are divided between two different organisations - Schools Board and Service Board - which complicates the overall management and leads to desynchronisation. Political affiliation also might influence the view on food waste as a problem - politicians at the municipal Boards change every four years which threatens the long-term sustainability of municipal efforts to tackle the problem of food waste.

The municipality works also on household and restaurant food waste; however, the power to influence a positive change is quite limited. Although the most significant part of food waste occurs on the household level, the municipality's work is restricted to communication only. Even less could be done in the restaurants - food waste is not responsibility of the municipality and normally not brought up during the inspections.

Finally, this thesis describes perceived attitudes to food waste and behaviour associated with the issue. The attitudes to food waste are associated with the topics of labelling, packaging, the perception of food, lack of education. The behavioural aspects discovered touch upon the issues of imperfect communication, students' perception of food, limited awareness of food waste as a problem and stressful environment.

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8 Appendices

Appendix I: Interviews

No.	Name	Organization	Position	Date	Duration	Nature
A	Kristina Fontell	Lund municipality	Environmental strategist	29/01-2018	-	Face-to-face
B	Gunilla Andersson	Miljöförvaltningen in Malmö	Project manager	5/02-2018	-	Face-to-face
1	Kristina Fontell	Lund municipality	Environmental strategist	10/04-2018	51 min	Face-to-face
2	Lena Wallin	Lundsrenhållningsverk	Communication officer	17/04-2018	31 min	Face-to-face
3	Mattias Horrdin	Barn- och skolnämnden/ Kommunfullmäktige	Municipal councillor (Centerpartiet)	20/04-2018	32 min	Face-to-face
4	Emma Berginger	Kommunstyrelsen	Deputy mayor (Miljöpartiet)	26/04-2018	36 min	Face-to-face
5	Johan Lambreus Mattson	Servicenämnden	Chairman (Miljöpartiet)	03/05-2018	40 min	Face-to-face
6	Ann Thoren	SYSAV	Project leader	14/05-2018	24 min	Phone
7	Xue Yang Kullenius	SYSAV Utveckling	Project leader	14/05-2018	21 min	Phone
8	Stefan Andersson	Miljöförvaltningen	Environmental officer	21/05-2018	29 min	Face-to-face
9	Justina Smakowski	Serviceförvaltningen	Quality development leader	30/05-2018	32 min	Face-to-face
10	Linda Sandgren	Måltidsservice	Development coordinator	30/05-2018	15 min	Face-to-face

Appendix II: Example of an interview

Theme	Questions
Facesheet information	What is your name? What is your background? What role do you play with regard to sustainability issues in Lund municipality?
Introducing questions	Why are you personally interested in the food waste problem?
Status quo	What are the current efforts to tackle the problem of food waste? Are there any improvements that can be traced through years? How can the current efforts be improved? What obstacles do you see that hinder the solutions to be passed?
Stages of FSC	What in your opinion are stages of FSC where food waste occurs in Lund municipality?
Strategies	What are the main strategies that can be applied in the municipality to address the food waste problem you foresee?
Future development	What is your vision on how the problem should be dealt with?
Local vs. national	What is the potential for the local governance system to limit food waste? Do you believe that responses on the local level can be more efficient than national responses? Do you know any responses being prepared on the national level that might affect the municipal work regarding food waste?
Governance	What is the decision-making process in the municipality? Are there any additional details on top of Kommunallag regulations? Do you know how party affiliation influences the decision-making process in general and with regard to the issue in particular?

Appendix III: Informed consent form

Lund University Centre for Sustainability Studies

Informed Consent Form

Researcher: Dzmitry Vaskovich

I am a Master's students of Environmental Studies and Sustainability Science(LUMES) at Lund University.

For my master thesis, I am conducting semi-structured interviews of around 40 - 60 minutes.

At any point of the interview, you can ask questions or decide against taking part in the interview. Furthermore, you can demand that certain statements are not published.

By signing this form, you agree to participate in the interview. Your anonymity will be ensured during the entire research process if wished for.

Do you agree to being recorded?

☐ Yes ☐ No

Do you as an individual want to remain anonymous?

☐ Yes ☐ No

The results of my research can be shared with you if you are interested.

Thank you very much for your time!

Date _____

Name _____

Signature _____