



Why don't you eat your food?

A study about cooperation in the Swedish food value chain to reduce household food waste

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2012

Miljövetenskap

Examensarbete för masterexamen 30 hp

Lunds universitet

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2012-11-17

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Abstract

In a world where more people must survive on fewer resources, food waste has become greatly focused. Waste means that the entire production has been unnecessary. It is an economic loss for a company but also for society at large. Moreover, the food chain causes an environmental impact, not least from a climate perspective. The various actors certainly try to reduce their own losses but because consumer waste means increased sales, it is difficult to find incentives that change directions.

Many researchers and organisations work to identify waste. However, there are communicative deficiencies in the food industry on how to tackle the problem as well as what roles and responsibilities the different actors should have. Through an environmental and resource perspective, this thesis focuses on the unnecessary food waste from Swedish households. Interviews with a selection of food industry stakeholders have resulted in a bright problem picture. Further, it proposes approaches and future solutions.

Because food throwing is optional, knowledge is considered to be one of the key solutions. Educative actions for children and adults should be given priority in different parts of society and the actors have some responsibility to help households towards sustainable actions. The lack of knowledge and distance from food production means that people are unsure of what real food quality is. Therefore, much food becomes unnecessarily discarded. Already implemented campaigns have been targeted at specifically interested consumers. It will never make a big difference. If players work together for creating a common and public message, there are opportunities to have great impact when it reaches to the many people.

Despite informative measures, there are strong arguments showing that political and addressed instruments are the right solutions for achieving long-term results. Lack of adequate incentives prevents the food chain from helping the consumer to reduce its waste. Therefore, governmental organisations should send cooperation invites to the food chain actors for discussing changes in the systematic purchase patterns that exist today. Retail's influence over consumers is large and it may be unclear who creates the demand. If actors start to communicate with each other, there are golden chances to make consumers purchase the right products, which end up in the stomach instead of in the trash.

Key words: food waste, sustainability, consumerism, food industry, household waste, environmentalism, resource management, choice editing

Sammanfattning

I en värld där många fler människor ska leva på allt färre resurser har matavfall hamnat i ett stort fokus. Svinnet innebär att hela produktionen har gått förlorad. Det är ett ekonomiskt bortfall för företag men även för samhället i stort. Dessutom orsakar hela livsmedelskedjan miljöpåverkan, inte minst från ett klimatperspektiv. De olika aktörerna försöker självklart minska sitt eget svinn men eftersom konsumentsvinnet innebär en ökad försäljning så är det idag svårt att hitta incitament för att påverka åt rätt håll.

Många forskare och organisationer arbetar för att kartlägga svinnet. Det finns dock kommunikativa brister i livsmedelsbranschen om hur man ska angripa problematiken samt vilka roller och ansvar de olika aktörerna borde ha. Genom ett miljö- och resursperspektiv fokuserar den här uppsatsen på det onödiga matavfallet från svenska privathushåll. Intervjuer med ett urval från branschens olika aktörer har resulterat i en bra bild av problematiken samt förslag på angreppssätt och framtida lösningar.

Då kastad mat är ett fritt val anses kunskap vara en av de viktigaste lösningarna. Utbildning av både barn och vuxna borde prioriteras i olika delar av samhället och även aktörerna har ett visst ansvar att hjälpa hushållen mot hållbara handlingar. Kunskapsbristen och distansen från matproduktion gör att man är osäker på matens egentliga kvalitet och en stor andel kastas i onödan. De kampanjer som hittills har genomförts är riktade mot speciellt intresserade konsumenter. Det kommer aldrig att göra en stor skillnad. Om aktörer går ihop och skapar ett gemensamt budskap så finns det möjligheter att få stor slagkraft när det når ut till den breda massan.

Trots informativa åtgärder finns det starka argument som visar att politiska och riktade styrmedel är den riktiga lösningen för att nå långsiktiga resultat. Avsaknad av tillräckliga incitament hindrar livsmedelskedjan från att hjälpa konsumenten att minska sitt svinn. Därför borde statliga organisationer bjuda in till samarbete med livsmedelskedjans aktörer för att diskutera förändringar av de systematiska köpmönster som finns idag. Handelns inflytande över konsumenten är stort och det kan anses oklart vem som skapar efterfrågan. Om man istället börjar kommunicera med varandra så finns det goda chanser att konsumenter köper rätt och bra mat som hamnar i magen istället för i soporna.

Nyckelord: matavfall, hållbarhet, konsumerism, livsmedelsindustri, hushållsavfall, miljö, resursförvaltning, choice editing

Acknowledgements

This page is dedicated to everyone who has helped me along the way. I am very grateful to all respondents because your important contribution to the analysis. Thank you Sanna Due, Ulrika Franke and other members of SaMMA for being so friendly since we met for the first time. I want to show appreciation to the ones who have read the texts and given me valuable thoughts along the way, especially CJ, Seb and Bella. Finally, thank you Christina! This thesis would not exist without you.

List of acronyms

AFWH	Avoidable food waste from households
B2B	Business-to-business
BAU	Business as usual
CO₂e	Carbon dioxide equivalents
GHGs	Greenhouse gas emissions
NGOs	Non-governmental organisations
SEK	Swedish Krona

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1 Introduction

1.1 Background

The Swedish consumer throws a large quantity of edible food. This is an unnecessary cost and as well as the time spent on shopping and transportation. There may be several reasons behind this behaviour, but throwing the food is certainly stupid as valuable resources and efforts go to waste. Even if the product becomes biogas, it would be better if the food never had been produced. Food production also affects the nature. Many activities cause environmental impacts by excessive use of fertilisers, water and phosphorus. Climate change is a big issue because it concerns the whole planet.

Paradoxically, more waste results in increasing sales for companies in the food chain. Primary production, wholesale, the packaging industry and others make money because of the waste. It is a difficult dilemma and incitements for helping consumers reducing their waste may be too low. But nowadays companies are under pressure from other actors in society; governments, non-governmental organisations (NGOs) and consumers, forcing them to act sustainably. It is an everyday challenge to satisfy financial goals and at the same time take responsibility for its actions.

From a global perspective, the unequal food distribution is one of the biggest challenges we face in the future. A larger and wealthier population will create an even higher demand on food. Fortunately, the last decades have shown substantial yield increases. Moreover, the industrial revolution followed by a global movement and a rapid technological development has made it possible to organise a complex system of trade where products are quickly transported and sold around the world.¹ It has resulted in lower prices, which means that we are able to buy more food. Because the worldwide trade systems, the food value might be considered too low. Every day people and organisations around the planet unnecessarily throw away a huge amount of edible products. In poorer countries, the food is lost along the chain because of inadequate distribution and different climate circumstances. Aside from higher temperatures and more widespread diseases, their systems cannot simply tackle logistic issues that we solved centuries ago. In the richer world though, products are kept fresh all along the food chain, but are then thrown by consumers. It is a waste of resources for society.

“Addressing climate change and the collapse of ecosystems without threatening the economy, while simultaneously improving the well-being of all people and ensuring social justice and equality, seem to be the largest challenge in the history of mankind. So far, all the efforts to address growing environmental and human problems through technological solutions and policy measures have been largely outpaced by growing population and increasing consumption levels.”²

As the world population increases, there is a lot of pressure to achieve an effective food system that is sustainable enough to secure the need of future generations. Unfortunately, we do not have a long-term solution for the world’s food problems. Agriculture is complex and food systems are fragile.

¹ Anon (2002)

² Mont, O. & K. Power (2010), p. 2232

Business as usual (BAU) might cause hazardous challenges for the future agriculture industry, which, in turn, affect people around the world.³ Climate change impact carries considerable uncertainty about the future effects. United Nations Development Programme (UNDP) estimates a number of additional 600 million people at risk of hunger by 2080 because of the climate change.⁴ Moreover, the Intergovernmental Panel on Climate Change (IPCC) has estimated the agricultural productive capacity to decrease with at least three percent by the 2080s. This is confirmed by other recent research projects. It appears to a serious issue for the future.

“We live in a world in which we produce more food than ever before and in which the hungry have never been as many”⁵

Most of today’s scientists agree that climate change is happening because of anthropogenic activities. Food production is a significant contributor. It is estimated that 14 percent of the global greenhouse gas emissions (GHGs) are caused by agriculture.⁶ In many developed countries, agriculture is the biggest contributor to climate change due to deforestation.⁷ The Swedish Environmental Protection Agency (SEPA) estimates that the activity “eat” causes a fourth of the total 80 million tons of carbon dioxide equivalents (CO₂e) emitted from Swedish private consumption.⁸ It has however been found harder to reduce emissions from agricultural activities. The processes are biological and form the basis for the necessary production of milk, animals and crops. It cannot be completely avoided with the system used today. Moreover, conditions for technical solutions are weaker than in other sectors. Swedish agricultural emissions have the potential to decrease by 30-45 percent to 2050, according to The Swedish National Food Agency (NFA). Better manure management and developed biogas production are considered to be important progresses in the future.⁹

Sweden has adopted a target for GHGs that goes beyond the overall EU objective of an 80-95 percent reduction. SEPA has been ordered to develop an action plan for eliminating the emissions by 2050.¹⁰ The most recent partial report shows an estimation of a possible 80-90 percent reduction by 2050 compared to the Swedish 1990 levels.¹¹

“Environmentalists have been saying for years that if the environmental trends of recent decades continued the world would one day be in trouble. What was not clear was what form the trouble would take and when it would occur. It now seems likely to take the form of tightening food supplies, and within the next few years.”¹²

³ Herren, H. R. (2011)

⁴ UNDP (2007), p. 90

⁵ Schutter De, O. (2011), p. xii

⁶ Hertwich, E. (2010), p. 37

⁷ *ibid*, p. 78

⁸ SEPA (2008), p. 32-34

⁹ SEPA (2012), p. 41; 65 f.

¹⁰ *ibid*, p. 2

¹¹ *ibid*, p. 7

¹² Brown, L. (2005), p. 4

Governments in various countries have in recent years become aware of the food waste problem and there is an ongoing discussion on how to help people to understand the gravitas and how to handle the food. The European Parliament recently showed their commitment by asking the commission to make 2014 the “*European year against Food Waste*”¹³. It is part of a long-term strategy for preventing food waste. **A Report on the Thematic Strategy on waste preventing and recycling** was adopted in January 2011 and contains policies for members of the union and highlights the best practices that will facilitate the practical work.¹⁴ The report was confirmed in September the same year with the release of the **Roadmap on Resource Efficiency**¹⁵, which encourages adoption of appropriate financial instruments. It also extends the concept of “producer responsibility”. One of the sub targets in the report is a reduced food waste of at least 20 percent in 2015 compared to 2010, which also has been suggested in the latest partial report by the All Party Committee on Environmental Objectives (APCEO) in Sweden.¹⁶ The Swedish reductions are estimated to save 12-23 billions Swedish Krona (SEK).¹⁷ NFA has been commissioned to set up a general program for waste minimising, including food, and APCEO has found good potential for food reductions.¹⁸ How it concretely should be managed is however unclear.

A big challenge for improving food consumption behaviours is about communication development. There are many possibilities to make progress within the sector. Developed countries like Sweden possess great potential to change but also to set a good example for other countries. However, it requires a communicative interaction in the food industry. Governmental institutions, businesses and universities are examples of actors that are able to influence consumption patterns. Organisations can profit from their sustainable changes and at the same time make a long-term difference. This thesis will discuss the interaction between actors in the Swedish food chain in order to find solutions that can help households in reducing their unnecessary food waste.

1.2 Purpose

Food access is crucial for future wealth. Uneaten products become a growing concern, both in terms of financial assets and environmental impacts, such as climate change. Earlier research shows considerable efforts to retrieve and compile data within the sector. An inquisitive researcher may however find an obstacle within the communication between private households and the food industry, not least between actors. This gap is remarkably wide and as momentous, if not more than the data itself. The question of on that the responsibility lays does not have a definite answer and a discussion is both inevitable and necessary.

The thesis main purpose is to open up for interaction opportunities between households in Sweden and actors in the food value chain. Focus is on the avoidable food waste in the households. In the previous research an open-minded and cooperative perspective has been found missing. The study

¹³ European Parliament (2011a)

¹⁴ CEC (2005)

¹⁵ European Parliament (2011b)

¹⁶ APCEO (2011), p. 115

¹⁷ SEPA (2011a), p. 33

¹⁸ APCEO (2011), p. 119

can favourably provide great opportunities for innovative solutions that can help to reduce the unnecessary food waste and simultaneously create win-win business strategies.

A simple picture below shows a common life of a product in the food value chain. When the consumer finally purchases it, the food can be eaten, thrown in the household waste or reused for biogas or fertiliser production.

Figure 1.1 The food life cycle



The research will also include responsibility discussions and what the actors' different roles are and should be. Basis of the work is from a resource perspective. It can be applied both on economy and environment. Economy is fundamental in our society and shapes the bulk of our decisions; both individual and collective. Environment is important because it is all around us. It directly or indirectly affects people's everyday life.

This study aims at investigate avoidable food waste from households (AFWH) and the importance for cooperation between actors. It expects to point out some existing communicative obstacles in the food industry and strive for encouraging lucrative waste reduction innovations. These will preferentially lead to more sustainable consumer actions. Altogether it should result in a more precise idea of a potentially communicative behaviour between households and actors in the food industry.

The core question that will be focused in this thesis work is:

RQ 1: Where is greatest potential in the value chain to reduce the avoidable food waste caused by Swedish households?

This issue is split into two more specific research questions:

RQ 2: What are the actors' roles in the food waste issue?

RQ 3: How should actors in the value chain operate and/or collaborate to reduce food waste related to households?

1.3 Focus and demarcations

An interdisciplinary master program opens up for the researcher to decide within which science area he or she wants to explore the chosen research questions. Therefore I have had the advantage of writing a

thesis, which connects different fields of interest. Due to my economics background it was important to use the resource perspective as basis. The research perspective is mostly social scientific even though some conditions will be more of a physical kind. The full scientific background is deliberately not described, as it is not necessary to constitute a sufficient basis for the study. A choice has been made not to write too much about the derivation of the climate change issue since it would not be relevant for the research. Climate change will though be touched frequently along the text.

The analysis is limited to the borders of Sweden (although it is difficult to ignore other parts of the world that directly or indirectly affect decisions made within the country). However, Sweden is in many ways a great example of a country, which has come far in the environmental movement. Successful solutions could therefore be adopted in other parts of the world.

It has been particularly important to create a work that is communicable for various professions. A detailed motivation is described in next paragraph.

1.4 Target group

Possible readers work with issues related to food, waste and packaging, such as people from municipal and governmental organisations. Companies and professionals interested in food development may also find it rewarding as well as environmental and/or climate change scientists working in the food industry.

It is appropriate to remind readers that the thesis is written with an interdisciplinary approach, so it provides an opportunity of a broad discussion for various interest groups in society. The reader is not expected to possess an advanced knowledge on the subject, although it may in this case facilitate the understanding of the analysis and related discussions. Particularly texts about environmental science subjects may be difficult to perceive by all.

1.5 Outline

1. Introduction

This introductory part presents the food waste issue for the reader. A resource perspective is put in focus, both in terms of environmental and economic factors. Further, it gives a quick insight in the food industry chain and how the subject has emerged as a scientific problem. It finally explains the main purpose for the thesis and why households need help from different actors to reduce their food waste.

2. Methodology

Chapter 2 contains essential choices, which has been found relevant for fulfilling a sufficient academic work. At first, some methodological decisions explain the structural disposition. After that, the selection of chosen data is presented as well as motivated. A short critics section is also included.

3. Theory

The theory chapter is divided in two. *Research relevance* untangles some definition issues and presents calculations that show the problem magnitude. Furthermore, found reasons for throwing the food are described. The other part consists of selected secondary data needed to perform a proper analysis.

4. Analysis

Chapter 4 begins with presenting a summarised text with results from the interviews. Thereafter, theories and other views are added. The discussion part critically examines proposals expressed in the empirics.

5. Conclusions

This is where the analysis is connected to the thesis' overall purpose. It all ends up in a list of found solutions for future household food waste reductions.

6. Recommendations

Since there is only a certain space for discussion, many interesting and related discussions have been excluded. This part shortly presents some thoughts that are considered important for future science and more subjective recommendations for stakeholders connected to the food chain.

2 Methodology

In this section methodological considerations will be described, discussed and motivated. An evaluation of available methods has been made in order to identify the right choices. The chosen areas are found necessary as a base for a scientific study. Moreover, a collection of primary and secondary data is discussed and motivated.

2.1 Methodological approach

“A researcher's approach to knowledge and its acquisition is influenced by his or her background and perceptions of reality”¹⁹

2.1.1 Validity and reliability

In order to perform a trustworthy scientific study, the highest *validity* and *reliability* is desired. Full satisfaction is impossible and therefore the goal must be to minimize any obstacles along the way.

Absence of random and unsystematic errors implicates high reliability. A higher mistake level, incorrect measuring methods etc. will increase the risk. This has been taken into consideration during the research period while collecting theories, transcribing and analysing interviews and by the interpretation of different literature sources. The secondary data assortment is carefully chosen to match the main research issue.

The concept of validity may be the most difficult for empirical social science. It questions whether we are investigating what we set out to investigate. Because questions are theoretically

¹⁹ Lindh, H (2009), p. 7

formulated but research is conducted on an operational level, it is problematic. The author's awareness may at least implicate at least some level of objectivity to the research. Because interviews were performed at the end of my master programme and months after the research had begun, a significant validity problem should not occur. The level of knowledge is correlated to validity.

2.2 Empirical approach

A qualitative approach is chosen for the research. It provides favorable conditions for interpreting the various actors to be analysed in the paper. This type also generates knowledge in the meeting between the two persons' views.²⁰ On the other hand, a quantitative survey would most likely inhibit the ability to understand social actions and interactions. The mechanical design of a survey is the reason why it is not chosen as research method. A qualitative research interview provides a tool to produce additional knowledge by monitoring answers based on the first questions. It obviously requires both knowledge and skill of the interviewer. A research interview has a framework without distinct standard, which implicates both possibilities and obstacles. It requires carefully made decisions from the interviewer and also careful intuition through the interview. The main reason why one must be adequately prepared before conducting the interviews is higher quality of produced results. Conditions for processing the collected material will thus be better.²¹

2.2.1 Primary data

Primary as well as secondary data have been used. A research based on different types of data, which verify and support each other, may strengthen the results.²² Primary data provides the researcher with the opportunity to collect desired information. It appeared to suit very well with the thesis objectives, where new data was needed to perform an adequate analysis.

2.2.1.1 Depth interviews

To answer the thesis questions, a number of depth interviews have been performed. Compared to question studies²³, this method is based on an interaction between the researcher and its respondents. The standardisation level is lower and provides the opportunity to follow up the dialogue with additional questions. A primary purpose is often to survey a specific subject and the different points of view. Unexpected answers are registered as well as welcomed. A question study, on the other hand, strives for generalising the results.²⁴

²⁰ Kvale, S. & S. Brinkmann (2009), p. 139

²¹ *ibid*, p. 97 f.; 115

²² Jacobsen, D. I. (2002), p. 153

²³ Translated from Swedish "*frågeundersökningar*"

²⁴ Esaisson, P. *et al* (2007), p. 257 ff.; 284

2.2.1.1.1 Preparations

Before performing the interviews some preparations were necessary. Every interview is different because of the interest, background and knowledge basis of the respondent. An evaluation of current knowledge on the subject worked as a point of reference to identify the gap of knowledge and then formulate a decent questionnaire. According to Peter Esaiasson *et al*, two matters must be considered; the shape should encourage a dynamic situation where respondents are constantly motivated to talk about their experiences, and the content should connect to the research problem.²⁵

Much help was also found in the ethical guidelines written by Steinar Kvale and Svend Brinkmann in *Den kvalitativa forskningsintervjun*. Respondents were carefully informed about the situation with the helpful orientation that can be found in the same book. Thus, respondents were at the time of the interview aware of the conditions.²⁶

2.2.1.1.2 Choice of respondents

It requires some effort to determine how many participants one should include in the study. Too many participants prevent detailed interpretations, but a too small number makes it hard to generalise and compare different groupings. Normally, around 15 persons are needed to conduct an adequate study.²⁷ This study includes a number of 19 interviews.

Before making any contact, a priority list was made. To choose the most appropriate respondents, Peter Esaiasson *et al* suggest the centrality principles of selection. Even though one *a priori* has an idea of possible important persons, a complimentary may be needed. Each respondent was therefore asked for suggestions at the end of the interview.²⁸

The final selection consists of relevant people connected to the food chain. It has been an aim to choose respondents from a very wide point of view and with sufficient knowledge on the subject. *The Cooperation for reducing food waste* (SaMMA) has been helpful for finding interesting people. Interviewed persons work within governmental organisations, packaging, production and wholesale, retail and academia; areas that have been identified to constitute as the most important actors for the research. All respondents are anonymously mentioned in the thesis. It has been important not to favor anyone. More information about the respondents can be found in Appendix 1.

2.2.1.1.3 Interview method

The actual interview is a moment of seriousness and what happens here makes up the basis for an upcoming analysis.²⁹ Kvale and Brinkmann argue that “*active listening is as important as managing the query technique*”.³⁰ Therefore, the questionnaire was central, although further questions appropriate for the context were asked. This is sometimes referred to a semi-structured interview.³¹ Suggestive

²⁵ *ibid*, p. 298

²⁶ Kvale, S. & S. Brinkmann (2009), p. 84 ff., 144, 203 f.

²⁷ *ibid*, p. 129 ff.

²⁸ Esaiasson, P. *et al* (2007), p. 291

²⁹ Kvale, S. & S. Brinkmann (2009), p. 146

³⁰ *ibid*, p. 154 (translated from Swedish)

³¹ Lundahl, U. & P.H. Skärvad (1999), p. 115

interrogations, e.g. leading questions, were avoided.³² The choice of questions was carefully designated and based on the main research purpose. All of them were asked to the respondents, in the same order every time. Every respondent was supplied with the same preparatory material. The interview times varied and so became consequently the text quantity. Respondents had the opportunity to discuss issues that suited their own interest and knowledge area. It can work as a facilitator to collect the most interesting information.

Respondents were situated around the country. Interviews were thus performed in the form of phone calls. The Swedish language was chosen, naturally because respondents are Swedish. No information about the questions was needed prior to the call. A few persons however, asked for an exception, which was found acceptable. The most important part is still the discussion.

The calls were recorded by computer and now, by request, available for any person involved. Transliteration of a vivid social interaction to written down text carries a risk. It is however necessary.³³

2.2.1.1.4 Transcription and interpretation

Traduire trahit - translators are traitors, is a classic hermeneutic phrase.³⁴ It refers to the fact that transcription is about transforming from one form to another, from oral to written language. The interview is a social interaction between two people and may be hard to repeat.³⁵ Because this is not a research of a mental kind, transcription has been made into texts, in which sentences are more formal than in the recordings. The purpose perceives the different perceptions of food waste issues, not analysing the respondents' mood or feelings. Therefore, neither reliability nor validity is considered as a concern.³⁶ Summarised interviews were finally sent to respondents for approval and corrections of eventual errors or mistaken words. It minimises the risk to encounter any ethical conflicts, as mentioned above.³⁷

2.2.2 Secondary data

Secondary data has been collected and analysed by other sources and consequently with different purposes than the research questions in this study.³⁸ It is important to be prepared to act critically to these data, while not being involved in collecting it.³⁹ Much work has been spent on this research and in finding the most relevant sources. Successful choices save time and money.⁴⁰ A lot of research data is acquired from earlier research. This has been found vital to carry out a satisfactory analysis. I have been well aware of the issues that come with secondary data.

³² Kvale, S. & S. Brinkmann (2009), p. 187

³³ *ibid*, p. 193 ff.

³⁴ Kvale, S. (1996), p. 166

³⁵ Kvale, S. & S. Brinkmann (2009), p. 193 ff.

³⁶ *ibid*, p. 200 f.

³⁷ *ibid*, p. 84 ff.; 203 f.

³⁸ Halvorsen, K. (1992), pp. 72-74

³⁹ Lundahl, U. & P.H. Skärvad (1999), p. 132

⁴⁰ Halvorsen, K. (1992), pp. 72-74

In accordance with the thesis' interdisciplinary nature, a wide selection of reference material is used as basis for the groundwork. First of all, much time has been spent to understand the issue and the surrounding debate on food waste. I have penetrated both Swedish and International literature, studies and publications. Reports by governmental organisations e.g. NFA, SEPA, WRAP (Waste & Resources Action Programme in the UK) are widely used. A central book in the study is ***Sustainable Strategies - When Does It Pay To Be Green?*** by Renato Orsato. It has been found interesting because it combines an economic growth perspective with environmental issues and tries to help the reader realise and be inspired to create sustainable solutions.

2.3 Critics

Some possible occurring obstacles have already been explained through the methodology section. Objectivity is one of them and a common dilemma in scientific studies. Thousands choices are to be made along the way, which prevent such a thing as a perfect world with right answers. The questionnaire was created from the great purpose of this paper and it is itself based on other more or less subjective assumptions. Further, even though respondents have been carefully chosen, they are individuals and should not represent a company, neither a whole industry. Moreover, literature choices are probably more or less subjectively chosen. This should not be a considerable problem, as discussed in chapter 2.1.1.

There are several uncertainties used as reference tools in the thesis. Studies and calculations are often merged or based on previous works. Therefore, assumptions are rather indications than accurate results. They should work as an analysis and/or recommendations, not as a data source. Further, the study does not include a description or comparison of different food types. It would go beyond the main purpose.

3 Theory

3.1 Research relevance

The introductory section highlighted the importance of dealing with food waste. Next section explains the underlying reason why the problem has emerged as a scientific approach.

3.1.1 Definitions

In order to conduct the forthcoming analysis, it is first necessary to clarify definitions of the key words that will be used from now on.

3.1.1.1 Food waste

What food waste really means varies for different people, associations and countries. Participants of a Swedish workshop organised by SaMMa agreed that there is a need of a dialogue between relevant stakeholders to avoid confusion.⁴¹ NFA has compiled a list of Swedish, European and US definitions, which clearly shows a great variation⁴². It is not difficult to recognise linguistic complications, why it is extra important to explain some interpretative choices.

The Swedish word “livsmedelssvinn” (short: “svinn”) is defined by NFA as “*food waste that is thrown but could have been consumed if it had been handled differently*”.⁴³ This is called “*Unnecessary food waste*” by Stockholm Consumer Cooperative Society (KfS), the biggest consumer association in Sweden.⁴⁴ “Livsmedelssvinn” means “food waste” in English. This creates a problematic situation since “food waste” could also be translated as “matavfall” in Sweden. “Matavfall” would some people find a broader term, including waste that is unavoidable. Therefore, “avoidable food waste” used by WRAP better expresses “svinn”. WRAP is considered as one of the most reputable organisations in Europe that works with waste.

The definitions are differently used because the reason for discarding. Avoidable waste could have been eaten before it was put in the trash. Examples are vegetables, fruit, bread, pasta etc. What is included in unavoidable food waste emerges at the preparation or cookery of the food, e.g. bones, coffee grounds or potato peels, and is something that normally is unwanted by people for eating.

Figure 3.1 Food waste definitions used in the thesis

Avoidable food waste - *food waste that is thrown but could have been consumed if it had been handled differently*
+ Unavoidable food waste - *those parts of food which is normally not eaten*
= Food waste - *all the biodegradable waste generated in the food handling*

3.1.1.2 Date indications

Packed food has to be labelled with a date indicating the lasting quality. Life expectancy is determined by the responsible for the product, e.g. producer or packer.⁴⁵ Two date indications are used in Sweden today; *best before date*⁴⁶ and *use by date*⁴⁷.

3.1.1.2.1 Best before date

The label shows expectations of the product when unopened, provided it is kept properly. Flavour, colour, crispness, resiliency and mastication should all retain the same quality. Contents of the package

⁴¹ Skjöldebrand, C. *et al* (2012), p. 2

⁴² Appendix 2

⁴³ Modin, R. (2011), p. 3 (translated from Swedish)

⁴⁴ *ibid*, p. 10

⁴⁵ The EU has approved an exemption for eggs with respect to the risk of salmonella. Best before date should be set 28 days after the hen has laid the egg.

⁴⁶ Translated from Swedish “*bäst före-datum*”

⁴⁷ Translated from Swedish “*sista förbrukningsdag*”

can taste equally good after the last date but some characteristics may impair. It is also legal to offer the product for sale if the representative believes it still holds adequate quality.⁴⁸

3.1.1.2.2 Use by date

Products are not to be eaten after the specified date. The food may deteriorate quickly and becomes a health risk. It is illegal to offer the product for sale after the use by date.

3.1.2 Food waste calculations

Several Swedish studies about food waste flows have been fulfilled in recent years. Works have often investigated what is thrown at restaurants, schools and other industrial kitchens. Research of households though, lacks sufficient data. Moreover, they show significantly various results. That is because different methods are used. Of all actors though, households in Sweden collectively throw the biggest share of waste (although a statistically accurate number is difficult to assess).⁴⁹ Further, research is often based on other statistical investigations. The British report *The Food We Waste* was published in 2008 and may be seen as catalyst and groundwork for other European projects.

Statistics in Swedish food waste publications often come from picking assays performed in 2008 by KfS, such as works by NFA, SEPA and the Swedish Board of Agriculture (SBA). In 2005, Swedish Waste Management (SWM) collected data from households in seven municipalities. 4,5 kilos waste per person and week were found, of which 1,9 kilos were food waste.⁵⁰ From these estimations, households cause 910 000 tons of food waste every year.⁵¹ Two recent publications, from Lund University and NFA, have summarised statistics from both Swedish and international studies.⁵² But terminology differences become particularly clear when looking at and comparing studies from other countries. Also statistic qualities differ. There is no international standard and not even a national framework as a guideline. As explained in the previous section, complex definition issues create problems between researchers, scientists etc. According to Tova Andersson from Lund University, who has written and summarised different works, lack of information is a serious issue and obstructs the possibility to reproduce a study.⁵³

Food production is a well-known greenhouse gas emitter. As one of the most alarming environmental issues, lets take a closer look at some relevant GHGs statistics.

3.1.3 Estimates of greenhouse gas emissions from food waste

Statistics of GHGs are in general difficult to estimate. It also applies to impact from food waste. Found material is partly based on studies by WRAP. The organisation has estimated the annual UK emissions

⁴⁸ NFA (2011a); NFA (2012)

⁴⁹ Jensen, C. *et al* (2010), p. 7; SEPA (2011), p. 11

⁵⁰ SWM (2005), p. 3

⁵¹ SWM (2008), p. 7

⁵² Appendix 3 & 4

⁵³ Andersson, T. (2012), p. 13

associated with avoidable food and drink waste to 20 million tons of CO₂e, which corresponds with 2,4 percent of the aggregated consumption impact.⁵⁴ After having been converted to Swedish circumstances by the Swedish Institute for Food and Biotechnology (SIK), it gives a number of approximately 1,86 million tons of CO₂e from the private households.⁵⁵ SEPA has, based on assumptions from WRAP and SIK, estimated the individual AFWH to 1,3-2 kilos a week, which is equal to 140-200 kilos of CO₂e every year.⁵⁶ The European consultancy BIO Intelligence Service (BIOIS) has been using life cycle analyses to estimate environmental impacts from food waste. Their result is 2,07 tons of CO₂e for every ton of food waste.⁵⁷ If applied to Swedish estimates⁵⁸ that the Swedish food waste from households is 910 000 tons per year, of which 57 percent is avoidable, GHGs from households would be 1,07 million tons of CO₂e annually.⁵⁹

The food life cycle can both be long and complex and it can be hard to affirm where the greatest effects emerge. Anna-Karin Johansson, environmental strategist at NFA, describes the issue: *“Any food production has an environmental impact, but if you throw your food, it has been made for nothing. The later into the food chain the food is thrown, the greater the environmental impact has become.”*⁶⁰ In Sweden, the primary production is the biggest source of carbon footprint in the food value chain.⁶¹ Second most emissions come from the consumer’s transports, followed by cooking and packages.⁶²

*“... temperature increases due to global warming will make it increasingly difficult to feed Earth’s growing population.”*⁶³

When definitions are now clarified and the magnitude of food waste has been explained, it is important to sort out why people actually throw the purchased food in their garbage.

3.1.4 Reasons behind the throwing of avoidable waste from households

There are many reasons why households throw away the food. Studies in the area show expired best before date, discarded leftovers and incorrect or prolonged storage. According to Tova Andersson, 45 percent of the AFWH is leftovers, 35 percent comes from the food that remains in the thrown packages and 20 percent is unused food.⁶⁴ The study also investigates why people throw edible food. Consumers certainly behave differently when it comes to handling of their purchases. WRAP found some considerable parameters in 2008. Elderly people in UK throw less than younger. The household size was found to have the greatest impact, where single person households throw more food per capita. This

⁵⁴ WRAP (2009), p. 6

⁵⁵ SIK (2008)

⁵⁶ SEPA (2008), p. 47

⁵⁷ BIOIS (2010), p. 16

⁵⁸ Appendix 3

⁵⁹ $(910000 \times 0,57) \times 2,07$

⁶⁰ Gunn, O. (2012) (Translated from Swedish)

⁶¹ Nilsson, K. & U. Lindberg (2011), p. 3; Andersson, T. (2012), chapter 6

⁶² Andersson, T. (2012), chapter 6

⁶³ Concluded in: Peng, S. *et al* (2004)

⁶⁴ Andersson, T. (2012), p. v

also correlates with the older people.⁶⁵ Age and gender differences affected Swedish food waste amounts, according to KfS.⁶⁶

What happens before the food ends up in a household ownership influences the outcome of the waste. Here are some reasons that often are considered to cause the unnecessary food waste.

3.1.4.1 Food overflow

There are many factors affecting our food habits. Some argue our society has an oversized supply of food available on the market, often offered for prices that might be too low. This overflow can make people lose respect for its original intended value. Refraining from consuming all the bought food provides no side effects, which increases the avoidable food waste. In the other way, consumption might cause obesity problems, which is another serious issue. Kevin D. Hall *et al* believe the main reason behind these problems is the food overflow in society.⁶⁷

3.1.4.2 Aesthetic standards

Many Swedes live far from the food production, which have created a great distance from the products' origin. Consumers sometimes do not know what food should look like. As a result, much food is thrown because it looks cosmetically imperfect; edible fish from the nets, bread crusts in factories, curved cucumbers or simply chipped fruit. Many products end up in the trash even though they are not unhealthy or less tasty. It is also present in stores, where non-standard looking food is dumped without an opportunity to be sold. Sometimes national or EU legislation regulates this.

3.1.4.3 Information and education

Knowledge is crucial in order to minimize the waste thrown by private consumers. For many people it is an established behaviour, which could be difficult to change. An early childhood education can advantageously help children develop sustainable habits, awareness and respect for the nature.⁶⁸ Teaching good examples of waste treatment in school opens up for sustainable future behaviour.

Food overload and a low price range have affected the way people buy food. Some would say it is too cheap, because we do not show enough respect for the food that is available. The products we consume have often been transported long distances along the life cycle chain, which has separated our relation to the producer. Some anthropologists argue that in a lot of cultures there is an existing respect for the environment and its protection. As the modern consumerism evolved in Europe and North America is spreading across the planet, these earth friendly cultures started to fade away. Therefore, education between countries is even more important. People may forget that less developed countries have food handling methods that richer countries can learn from. Swedish citizens are often a bit

⁶⁵ WRAP (2008), p. 5

⁶⁶ KfS (2009)

⁶⁷ Hall, K. *et al* (2009)

⁶⁸ Morgan, K. & R. Sonino (2010)

distanced from the food production and may not be sure when products are not edible anymore. For example, research in the subject reveals a lack of knowledge about date indications and what they exactly mean.⁶⁹ In the national study *Rapport från en slaskhink*, published in 2009, KfS suggests informational efforts at various levels in the society to:

“Increase the awareness and understanding of the discarded food effects on the environment and the global food security”

“Increase the awareness of the food’s lasting quality, meaning of the date indications, food storage etc. (focus on young people)”

“Increase the knowledge of how to best take care of a household’s food shopping, take care of leftovers, plan weekly menus etc.”⁷⁰

3.1.4.4 Systematic failures

A part of our behaviour is difficult to deduce and even more problematic to change. If we strive for a deep understanding and factors that drive us, insight is essential. Current forces make us act in certain ways without us thinking about it. In Sweden there are a few, powerful retailers on the market. ICA (almost 50 percent), Coop (over 20 percent), Axfood (approximately 15 percent) are the biggest. Bergendahls Food is the fastest growing retailer with a current market share of around 7 percent.⁷¹ These companies have been able to develop certain systems for customers. Grocery stores are certainly designed for making it comfortable for us to find what we are looking for but also to shop more. Some people might believe they have saved a lot of money from the “great” deals. In reality, much food will end up in the trash, which may equalise the economical profit. Consumers actually often underestimate what they throw away. It is particularly evidenced in a study by WRAP.⁷²

Our society also encourages experimental decisions. Every visit in the store welcomes people with new commercial messages, products and offers to create a demand, which may not even exist from the start. It is a hidden issue and a question of behaviour influences. How many yoghurt packages are actually reasonable to offer for sale? It may sometimes be unclear whether it is the customers who asked for those products or if it in reality is just the store looking for boosting their profit. Same question can also be applied to the bread assortments. In this case, stores have often so-called full right of return.⁷³ Unsold products can be sent back to the supplier without payment.

⁶⁹ KfS (2009); WRAP (2009)

⁷⁰ KfS (2009), p. 2 (translated from Swedish)

⁷¹ DLF (2012); LivsmedelsSverige (2010)

⁷² WRAP (2008), p. 19

⁷³ Can be translated to “full returrätt” in Swedish

3.1.4.5 Product quality examination

People often find it hard with examining the product quality. Adaptation to the society make many of us act in a frequently collective way. Because the societal standards described above, many would not consume “too old” products even if they were not too old to be used. A Swedish study tells us that two thirds of the respondents completely or partly agree that they examine the food’s product quality if the best before date has expired. Moreover, six of ten respondents found *fresh at least until*⁷⁴ a better label method than the former.⁷⁵

Date indication is also a hot topic in the UK in order to reduce the AFWH. Grocery stores are now asked to remove the labels *sell by* and *display until* and replace them with the recommended use by and best before dates. The Department for Environment, Food and Rural Affairs produces these guidelines in consultation with WRAP, consumer groups, regulators and the food industry.⁷⁶ A presentation of some additional Swedish investigations in the subject can be found in *Livsmedelssvinn i hushåll och skolor - en kunskapsammanställning*, published by NFA.⁷⁷

3.1.4.6 Food storage

The date indication label on the food package is valid if the product has been stored correctly. If the fridge temperature is colder than producer suggests, the product’s freshness will last longer. A warmer temperature or changed air humidity could shorten the time of lasting quality. From a consumer point of view, a correct storage is thus a necessity for a daily household routine. In 2011, NFA published *Förvara maten rätt så håller den längre - vetenskapligt underlag om optimal förvaring av livsmedel*, a report to help households store the food optimally to reduce their food waste.⁷⁸ It serves as groundwork for NFA’s environmental work.

3.1.5 Food packaging

The package has many important functions and one of them is to promote the product. Its nickname, *the silent salesman*, would not have been introduced 50 years ago without a reason. Packaging design involves a quantity of functions, including choice of material and design, but also an informational task. The package is often not enough to show the consumer what benefits (or drawbacks) the product brings. A way of showing this is with some help of labels. This tool can tell consumers about storage recommendations, date indications, environmental information etc.

Avoided food waste automatically saves the effort of producing packages, a great environmental impact. The main function for a package is to protect its content. If this function fails, GHGs and other negative impacts have been unnecessary. Material selection and its protection for the food play a major

⁷⁴ Translated from Swedish “*minst hållbar till*”

⁷⁵ KfS (2009), p. 1

⁷⁶ Batty, D. (2011)

⁷⁷ Modin, R. (2011)

⁷⁸ Modin, R. & M. Lindblad (2011)

role, why it must be taken into consideration. Scientists from Karlstad University in Sweden studied 61 families during 7 days and discovered that 20-25 percent of the food waste could be related with packaging. Especially three aspects were emphasised: too big packages, packages difficult to empty and food that had passed best before date.⁷⁹ Transport is another significant source of GHGs. The package should therefore be carefully designed in order to occupy a minimal space on transfer. A detailed presentation of food packaging and its climate change impacts can be found in *Klimatpåverkan och energianvändning från livsmedelsförpackningar* by NFA.⁸⁰

3.2 Literature description

3.2.1 The valuable waste

Several scientific areas have considered waste in one way or another. Focus has been on environmentalists since waste basically comes from natural resources. A major shift rose in the late 1980s and early 1990s, when concepts like *environment and competitiveness* and *resource productivity* emerged.⁸¹ Especially economists found the potential for innovation among the material previously considered as “useless”. Some people talk about a change from *waste management* to *resource management*.⁸² If there is a chance of capitalising on by-products, it is also possible to reduce the input material and thus production costs. Another hot concept is *revenue management*. Recycling can be used as an initial step for continued sale of the material.⁸³ A receptive relationship between companies in the value chain can favorably create synergy effects that enable reductions of total environmental impacts.⁸⁴ Thus, there are incitements for actors to work closely with each other.

However, it is important not to lose focus on the core strategies. When managing resource-reducing activities, obstacles could occur within the organisation itself. Material flows should be considered but actions cannot exceed a company’s main strategy. Results may challenge other functions and disturb processes that run the business.⁸⁵

The theories about effective resource use elaborated by Michael Porter, Claas van der Linde etc. are not considered enough, according to Renato Orsato, who has written the book *Sustainable Strategies - When Does it Pay to be Green?* Instead of only “*doing more with less*”, Eco-efficiency adds the dematerialisation concept and forms “*doing more with less and lower environmental impact*”. “*By focusing on Eco-efficiency strategies, firms aim at reducing both the economic costs and environmental impacts of organisational processes*”. It is a challenge to find new business opportunities from the former “waste” and make resources out of it.⁸⁶ Managers often find a hard work with understanding the flows of resources used by the company. Therefore, they also lack an ability to find an opportunity to

⁷⁹ Williams, H. *et al* (2012)

⁸⁰ Wallman, M. & K. Nilsson (2011)

⁸¹ Porter, M. E. (1990); Porter, M. E. (1991); Esty, D.C. (1994); Porter, M. & C. van der Linde (1995)

⁸² Grankvist, P. (2009), p. 77

⁸³ *ibid*

⁸⁴ Esty, D. C. & M. E. Porter (1998)

⁸⁵ *ibid*

⁸⁶ Orsato, J. R. (2009), pp. 46-48

streamline processes and thenceforth save money.⁸⁷ Orsato asks why companies do not generally exploit the resource efficiency strategies if theories show these great possibilities. When does Eco-efficiency pay? The theoretical suggestions indicate a resource gain potential in virtually every organisation. But that is not a correct answer. First of all, the conditions for which the company act, settle the prerequisites. It separates them from each other. Political agenda, stakeholders, employees and cultural circumstances are all important factors that influence actions. Moreover, Orsato find enhanced potential in the business-to-business (B2B) industry. If a company has large processing costs while generating a lot of waste and/or by-products, it might find a good reason as well as a great chance to make money out of these potential resources.⁸⁸ Eco-efficiency can advantageously be applied to agricultural processes where synergies enable new opportunities. Production leftovers may be used for other purposes and become animal food, biogas or other valuable resource. Collaboration in the agricultural industry has always been present. It has though been hampered by modern methods where agriculture is based on monoculture. At the same time, a biogas production growth integrates some stakeholders because the sustainable economic environmental advantages in the processes. Orsato sees a positive development where market mechanisms (governments, people etc.) encourage eco-efficiency strategies.⁸⁹

3.2.2 When does it pay to be green?

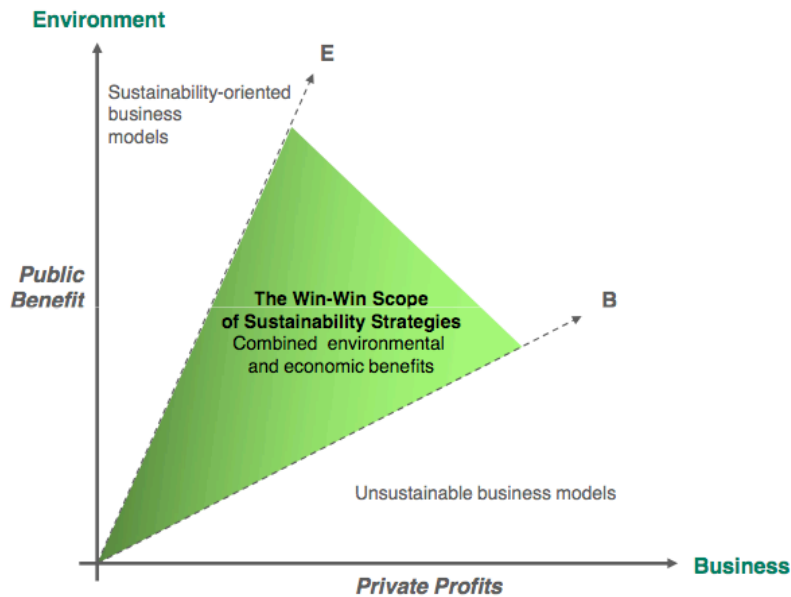
This question, “When does it pay to be green”, is vital for every actor in the food life cycle. Decision makers need to know why reductions, improvements and environmental actions should be made and when efforts are enough valuable. The concept of *corporate environmentalism*, examined in Orsato’s book, brings an easy explanation (see Figure 3.2 below). “Private Profits” at the horizontal axis includes actions that result in revenues for a business. In this case, selling more products in a convenience store would fit in here. The vertical axis implicates “Public Benefit”, which could be agricultural donations to homeless people. Although it may increase the overall welfare, the company will probably not obtain any financial resources. Within the green area “The Win-Win Scope of Sustainability Strategies”, actions enable both private profits and public benefits.

⁸⁷ Esty, D. C. & M. E. Porter (1998)

⁸⁸ Orsato, J. R. (2009), p. 59

⁸⁹ *ibid*, p. 200 f.

Figure 3.2 The Scope of Corporate Environmentalism⁹⁰



Supply and demand is important when it comes to trade. It does though not always work correctly, because such concept forgets some factors. Choice editing can help both consumers and actors to make fair decisions.

3.2.3 Choice editing

One may sometimes wonder who has the right to decide what should be available in the store. In the world of choice editing, environmentally offensive products are removed and replaced with better ones. A more correct definition would be *“is about shifting the field of choice for mainstream consumers: cutting out unnecessarily damaging products and getting real sustainable choices on the shelves”*, stated by the Sustainable Development Commission (SDC); the UK government’s independent adviser on sustainable development.⁹¹ The European Consumer Policy strategy (2007-2013) includes goals to *“equip [...] the consumer with the skills and tools to fulfil their role in the modern economy; [to make] markets deliver for them and [to ensure] effective protection from the risks and threats they cannot tackle as individuals”*. The strategy can *“provide the market tools to empower citizens, as consumers, to make sustainable environmental choices”*, even if it has been subject to criticism, according to Oksana Mont and Kate Power.⁹² Mont and Power also write that it encourages innovation and thus new products contributing to consumerism. Growth has been put in focus and not considered the limited

⁹⁰ *ibid*, figure 1.1

⁹¹ SCR (2006), p. 2

⁹² Mont, O & K. Power (2010), p. 2235 f.

non-renewable resources on Earth. The solutions can though conduce environmental improvements, which may equalise the process.

“[...] questions why the consumer should be the one left in the supermarket aisle to agonise over complex issues such as animal welfare, carbon footprints, worker’s rights and excessive packaging, often without any meaningful data on the label to inform their decision-making”⁹³

Governments have been choice editing for a long time, apparent or not.⁹⁴ Policy instruments influence, more or less, consumption patterns and levels. Choice editing is now a part of WBCSD's (World Business Council for Sustainable Development) strategy for a sustainable consumption in 2050.⁹⁵ It appears that the ones that really make changes in consumption are not consumers, although product labelling is important in transforming consumers to act more sustainable. But the informational strategies do only influence certain people and *“[...] not nearly enough, not fast enough, and not consistently enough to drive the transformation of consumer life required by a planet under stress”*.⁹⁶ Environmental labelling *“failed to get more than a minority of people buying”* the more environmental friendly products, according to SDC.⁹⁷ Instead, consumers changed their behaviour with help from choice editing by government, producers and retailers.⁹⁸

“Historically, the green consumer has not been the tipping point in driving green innovation. It follows, therefore, that business, as providers of those products and services, must have a critical role”⁹⁹

Some actors have though tried to reduce food waste amounts without forcing anyone. Although it always has been important to take care of the food, it is not until recently that greater projects around this issue have been started in Sweden. Here is a list with some of the most prominent topical cases:

3.2.4 Initiatives to reduce food waste

- SaMMA has been briefly introduced earlier in the thesis. NFA, SEPA and SBA work as convenors for the meetings that are arranged three times a year. It is *“a network for authorities, researchers, interest organisations and the industry, with actors in different sections in the food chain. The purpose of the cooperation is to, by way of providing contact area and information gatherer, act for a reduced avoidable food waste and thereby also reduced food waste.”¹⁰⁰* More about SaMMA and its members can be found in their policy statement.¹⁰¹

⁹³ Hickman, L (2007) (Citation by Tim Lang)

⁹⁴ Maniates, M. (2010) (see Table 8 for examples and features)

⁹⁵ WBCSD (2011), p. 9

⁹⁶ Maniates, M. (2010), p. 123

⁹⁷ SCR (2006), p. 3

⁹⁸ SCR (2006)

⁹⁹ SCD & NCC (2006), p. 27

¹⁰⁰ SEPA (2011b)

¹⁰¹ *ibid*

- In connection with the launch of *Sweden - the new food country*¹⁰² in 2008, SIK invited the industry to participate in various development projects to enhance the competitiveness. One of the projects is the book **VINN UTAN SVINN**, financed by SBA. It was released in April 2012. The book is made by Djupfrysingsbyrån in cooperation with various food companies and contains guidelines to reduce the food waste. Djupfrysingsbyrån is a member organisation and acts as a forum for companies that work with refrigerated and deep-frozen food.

- The Swedish politician Anna-Maria Corazza Bildt was elected in June 2009 to be a Member of the European Parliament (MEP). She has initiated an informational national campaign, *Basta till matsvinnet*¹⁰³, to spread the food waste issue.

- Another project is *Reduced food waste in the food chain - a holistic approach*.¹⁰⁴ Both production and retail actors are involved to identify parts of the chain; amounts, reasons and interventions. The project is estimated to finish in March 2013.¹⁰⁵

- KfS has worked since 2008 to reduce the waste in the whole food chain. Several studies have been made, including picking analyses and attitude surveys. A consumer guide called **Släng inte maten** is downloadable at their campaign site www.slangintematen.se.

- Lantmännen regularly promotes waste reduction activities by commercial messages for consumers. Their slogan *Från jord till bord* is well known and they have also released the book **Var rädd om maten** about how to take care of food instead of throwing it.

- Allwin is a young and fast-growing company that “help companies taking care of their overproduction”.¹⁰⁶ Established in 2010, it is today a business with several cooperation partners.

4 Analysis

The analysis has been divided into two parts; results and discussion. In results, the most interesting empirical material is presented. Different opinions are compared with each other and form relevant categories. The discussion section critically evaluates results, with help from theories, and is put into a broader perspective.

¹⁰² Translated from Swedish “Sverige – det nya matlandet”

¹⁰³ Can be translated to “End the food waste”

¹⁰⁴ Translated from Swedish “Minskat svinn i livsmedelskedjan – ett helhetsgrepp”

¹⁰⁵ SIK (2011)

¹⁰⁶ Allwin (2012) (Translated from Swedish)

4.1 Results

It is now time to present an assorted selection of the interview material. Only the divergent and interesting material has been selected for the analysis.

1. *What is the consumer's responsibility when it comes to food waste?*

*"You should not assume that it is the consumers who are primarily responsible for saving the environment and/or justice, worldwide conditions and God knows. That is to politicians, and companies."*¹⁰⁷

A majority of the respondents elucidate that consumers have some responsibility to use their food effectively. It includes planning, shopping, storing, cooking, eating and waste handling. In a perfect home, everything is finished on the plate. But some of the food might be inedible. *"There, I think consumers have a responsibility to ensure that what is still thrown, hopefully what can not be eaten, is thrown in the right barrel, and that municipalities are responsible to ensure that it becomes biogas"*, says the manager of Consumer & Environment at KfS (R2).¹⁰⁸ She especially highlights the importance to eat the purchased food, even if the "brown bag"¹⁰⁹ is a tempting alternative.

In Sweden, there are currently no substantial instruments forcing households to throw less, even if waste sorting is widely developed. *"Formally, you can not say that the consumer has a responsibility. There are no laws or regulations governing that you must not throw food, but I think you have a form of moral responsibility. You should actually take care of the produced food and try to avoid that it becomes waste,"* states a project manager for climate at SBA (G9).¹¹⁰ A waste expert at IVL Swedish Environmental Research Institute (IVL) (G7) agrees but wants to clarify relations between waste and economy: *"Most Swedes are not so short of money making it an argument. Money wastage is not something you see."*¹¹¹ The coordinator of Product Safety and Legislation at Swedish Grocery Traders (R1) also confirms this.¹¹² Another respondent works as development director at Lantmännen Cerealia (W2). He addresses two factors that influence the consumer behaviour; competence and wealth: *"If I have the opportunity and can afford to throw and I see no problem with that, it is not the same price tag, so to speak. Then I must have a really good proficiency in order to change my behaviour and understand the context."*¹¹³ Some people argue we have a lack of knowledge about real food production. More and more families live in urban areas, which make us lose connection with agricultural processes. It may also reduce the emotional bonds to the final food on the plate. This unawareness *"[...] means that we have to rely on and trust blindly in the labelling and we have poor knowledge about what the labels actually mean"*, believes a political advisor within food issues and food labelling from the European Parliament

¹⁰⁷ R2

¹⁰⁸ R2

¹⁰⁹ Is used in Swedish households to collect food waste for biogas and fertiliser production

¹¹⁰ G9

¹¹¹ G7

¹¹² R1

¹¹³ W2

(G8). His main recommendations are simple and explicit messages in the store, in order to not confuse consumers.¹¹⁴ Also R1 is sceptical about the information overflow: *“We have had overconfidence in labels.”* A continuing debate about environmental efforts and integrated marketing is found in question 6. Packaging and labelling is discussed in question 9.

Some respondents highlight the global perspective. A scientist in Environmental and Energy systems at Karlstad University (A1) does not think it is ethical when you purchase too much food and then throw it because you do not bother to take care of it. Further, she urges people not to waste resources, *“[...] particularly not food resources that partly is and will be a limited supply.”*¹¹⁵ R1 and W2 want to remind people of Earth’s finite resources and upcoming food crises.¹¹⁶ R1 does not think people want to realise what is going to happen. *“[...] and I think this is very unfortunate because if you have a good forward planning, you can resolve this in a more durable manner, you can also accomplish it at lower costs, I would say.”* Further, he criticises the Western world for acting in abundance; *“It has not been seen that there might be a shortage somehow. But once this shortage starts to occur, then of course costs will increase, and you will eventually understand that it is important to have long-term relationships.”* R1 therefore seeks new economic theories, where productivity is focused, because it will be difficult to substitute dwindling resources like oil, phosphorus and fish.¹¹⁷

2. What do you think about interaction between actors in the food industry to find joint solutions that reduce food waste?

Interviewees seem to agree that today much focus is put on food waste. Some of them refer to **The Food We Waste** and consider it has become an important and initial report for this issue.

A general discussion is focused on incitements and how actors should be motivated. W2 believes actors only will pursue this matter if there is competitive neutrality. It should not be any problem, says G8, because food waste reduction is not a competition.¹¹⁸ G9 finds it difficult because every company struggles for profitability; *“It is not easy to obtain a cooperation that benefits everyone.”*¹¹⁹

The retail industry obviously makes money when consumers buy more food, whether they eat it or throw it at home. It has also troubled former parts in the value chain, producing too much. Retail has created systematic strategies for success where the making of money on huge amounts of food is more important than quality, A1 argues, and underlines the quick supermarket growth in Europe; *“Supermarkets aim for seldom and big purchases while simultaneously we have had a development with an increasing number of single person households.”* She tells about a study where *“households that stated that they went shopping more often and smaller amounts, they threw less than those who bought in bulk.”* G7 agrees: *“[...] there are studies indicating that it is not at all more efficient to do weekly*

¹¹⁴ G8

¹¹⁵ A1

¹¹⁶ R1; W2

¹¹⁷ R1

¹¹⁸ G8

¹¹⁹ G9

shopping, but rather it may be better to shop every day - provided you keep an eye on what you have in the fridge.”¹²⁰

A1 is into discussing incitement differences between actors: *“Reducing wastage in the chain, i.e. retail’s own waste, there is an incitement to reduce. It is a cost that ends up on their behalf. [...] But that a consumer throws too much, it serves the other actors.”¹²¹* Logistically there are constantly discussions between retail and wholesale, insists the Logistics Director at Bergendahls Food. (R4). Their cooperation will ultimately affect the lasting quality of products purchased by the consumer in store, *“[...] which should reduce the total spoilage”*. *“And sadly, I think it is a bit so that many of these initiatives are not always taken until you see that it is demanded by the consumer.”¹²²*

A scientific project manager working at Lantmännen R&D (W1) wants to illuminate the differences between company sizes. In her opinion, big companies have several facilities and might not need any outside assistance. If you have a smaller company though, *“then I can certainly imagine that it is useful to consult or cooperate with other companies in similar business and so on.”¹²³*

The Swedish Institute for Food and Biotechnology (SIK) is an industrial research institute working to strengthen the competitiveness of the food industry. Their head of research (G3) has found a general information shortage along the value chain. It results in incorrect orders, from the retailer to wholesalers, producers and finally to the agricultural sector. R4 feels that many suppliers are too production-oriented, which make them inert compared to demand. Big batches lower unit costs but make it more complicated to find the correct level. Smaller and faster volumes create flexibility. Consequently, adaptation to the actual demand will be easier.¹²⁴

G3 thinks the information from retail to customers is very limited.¹²⁵ G7 continues and asks who actually determines the demand, consumers or retailers? *“To be a bit conspiratorial I do not think we consumers present all the requirements which retail believes we set in the store.”¹²⁶* G9 is also interested in supply and demand. She wants to explore where the waste emerges to map out behavioural patterns. For example, G9 means we should not blame consumers because stores do not even order products with a certain look or quality (see question 4). Those items thence become upstream waste.¹²⁷ According to G7, communicative actions would lead to smart solutions and win-win situations.¹²⁸ One suggestion is about temperatures along the cooling chain:

R2 and KfS struggle to make stores lower the temperature in refrigerated counters, from +8 (often used today) to +5 degrees Celsius. This would naturally prolong the lasting quality (positive for consumers) and also synchronise with temperatures used by the upstream industry. Food producers often use +4 degrees or lower. This is expensive for many stores and a massive investment, which is used as an argument. At the same time, products will remain longer in the store and might consequently slow down the turnover. A lowered temperature is also a hint that consumers should take into

¹²⁰ G7

¹²¹ A1

¹²² R4

¹²³ W1

¹²⁴ R4

¹²⁵ G3

¹²⁶ G7

¹²⁷ G9

¹²⁸ G7

consideration, according to R2.¹²⁹ Swedish people generally use a refrigeration temperature of +8 degrees Celsius, tells the development manager in Food Packaging at Flextrus (P2).¹³⁰ Further, refrigerated counters for vegetables might reduce the waste. But as stated in question 5, stores would not make this investment if there were no payback for the ventured money. *“Of course it is the economy that controls much but I know that many chains are very environmentally conscious and want to try to get better to show their customers that they are environmentally conscious in order to be credible.”* says G9.¹³¹

*“We have put doors on our fridges, it reduces the temperature, and we also save energy. You do the same! Reduce to five degrees in your own fridge and food will last almost twice as long”*¹³²

Another criticism directed at retail is their tempting sales methods, e.g. *“Buy three - pay for two!”* or *“Buy 5 for 50!”* Such offers lead to unplanned purchases that cannot be consumed in time, according to the CEO at Packbridge (P1). He suggests a possibility to keep purchased products on deposit to collect them at another time.¹³³ You rarely make a great deal, G8 argues. *“[...] it is just exposed in the sense that you think you save much.”* Although it would not be possible to force a certain way of advertising, G8 and the European Parliament want stores to act more sustainably.¹³⁴

3. Do you think actors in the industry collaborate in order to jointly reduce food waste?

All respondents agree: actors work within their own businesses to reduce waste, because waste is money. *“The industry is driven by producing food cost effectively with the least possible waste... Therefore, the waste here is on a controlled and low level. We consumers are the ones who are the major culprit”*, P1 explains.¹³⁵ R1 points out that there is and has always been a well-developed cooperation on purely commercial conditions.¹³⁶ And it is very important to satisfy the consumers, tells P1: *“It is obvious that the food retail industry wants to keep waste low by not ordering home more than what is being sold. At the same time you do not want to have empty shelves so it is a brinkmanship that is difficult.”*¹³⁷ Grocery stores work to provide all the products in demand. Therefore it is necessary to buy so many products that an overstock becomes necessary, explains R4.¹³⁸ The result is thrown food. *“We expect that when the store is open, they shall have the full range. And it is hard to deny that it actually generates avoidable waste,”* G3 stresses.¹³⁹ But A1 has an advice: challenge the “truths” about always

¹²⁹ R2

¹³⁰ P2

¹³¹ G9

¹³² R2

¹³³ P1

¹³⁴ G8

¹³⁵ P1

¹³⁶ R1

¹³⁷ P1

¹³⁸ R4

¹³⁹ G3

completely loaded shelves. Consumers today purchase more than what is needed. *“We want to ensure that everything is available at home”*¹⁴⁰

R2 and G8 ask themselves if consumers really need the huge selection of, for example, breads and yoghurts.¹⁴¹ R2 welcomes experimental attempts to narrow the selections, e.g. *“[...] We notice that lot of breads are left over and therefore we are reducing the number of varieties on test right now”*. Afterwards it is possible to analyse economic indications or simply ask customers for their opinion.¹⁴²

An environmental strategist from NFA (G1) finds SaMMA an important platform to find collective solutions for food waste reductions. *“It provides us with a good picture of what different players are doing and we may coordinate on those areas we consider be able to help each other, in order to prevent duplication.”*¹⁴³ But P1 does not entirely agree. The whole industry is not represented, according to him. Although it is *“a unique and transboundary organisation”*, the CEO misses representatives from parts of the value chain, e.g. food and packaging producers.¹⁴⁴ R1 appreciates SaMMA but is also critical in some aspects; *“[...] it is rather an exchange of information and it does not result in any sharp proposals that authorities should take any action. And certainly not anything about marketing activities.”*¹⁴⁵

12 of 19 respondents are active members in SaMMA.¹⁴⁶ Respondents who are involved are clearly more positive than the others about the group, as well as the overall industry cooperation. Its existence, purpose and performance were intensely discussed in the interviews.

Several respondents promote educational actions.¹⁴⁷ NFA wants to increase the awareness among consumers by broaching the problem in debate articles and news, tells G1.¹⁴⁸ Advice on how to take care of the food and reduce the AFWH can be found on their web page.¹⁴⁹ P1 thinks that NFA should have an advisory role.¹⁵⁰ It should start among consumers, in schools and at homes, says W1. She believes in information and inspiration; carrot rather than stick.¹⁵¹ Also the logistic manager at Lidl (R5) finds the individual responsibility most important: *“You buy and only you can decide whether to use the food product or not.”* His request is a campaign with informational advice about date indications, but does not have an answer who the main organiser should be.¹⁵² P1 suggests authorities, because consumers find them trustworthy.¹⁵³ A1 adds the role of the school.¹⁵⁴ P1 says: *“The SaMMA group has a high industry neutrality and should have a high level of credibility.”*¹⁵⁵ A store developer at Bergendahls

¹⁴⁰ A1

¹⁴¹ R2; G8

¹⁴² R2

¹⁴³ G1

¹⁴⁴ P1

¹⁴⁵ R1

¹⁴⁶ Appendix 1

¹⁴⁷ R1; W1; R5; G1; P1

¹⁴⁸ G1

¹⁴⁹ NFA (2011b)

¹⁵⁰ P1

¹⁵¹ R1; W1

¹⁵² R5

¹⁵³ P1

¹⁵⁴ A1

¹⁵⁵ P1

Food (R3) believes that the Swedish Consumer Agency (KO) could be an option *“but maybe retail should discuss it together and raise the issue and set requirements.”* She also finds calculations very important to increase the consciousness.¹⁵⁶

R1 and G4 encourage authorities to use informational instruments rather than regulations.¹⁵⁷ A public campaign, initiated by governmental organisations but financed by all actors, is R1’s suggestion. *“But the Swedish authorities are irresolute when it comes to these matters and I do not really know why”*.¹⁵⁸ According to the vice-chairman of the Waste Council as well as head of the Section of Hazardous Substances and Waste at SEPA (G6), it is very hard to change behaviours without very powerful regulations. *“Maybe you should consider what roles government authorities and municipalities have in their consumer enlightening duties.* He continues: *“From SEPA’s view, we do a lot to raise the issue. What then happens is difficult for us to regulate.”* [...] *In this case we have made some calculations showing that we have quite a large economic gain to reduce food waste, but to then push the issue to all actors, no government authority has the possibility to do either. So you must create ripples in the water and make others work further with it.*¹⁵⁹

4. Is it necessary to cooperate more, and in that case, how?

G3 believes that applied research and development financed by public funds could help the issue to be driven forward. There is a current risk to get stuck in a situation like Moment 22, he argues. Further, G3 and W1 indicate a defective flow of information along the value chain. Inaccurate ordering is both common and ineffective. *“Also to the consumer, the information that the retail offers, is of course very restricted”*, says G3.¹⁶⁰ SBA looks at mappings to understand what is thrown in stores and why. If consumers are not believed to want a certain type of carrots or potatoes, no order will be sent to the wholesalers. They have consequently been provided with information to notify the primary production that demand is lower than expected from the start. As a result, producers are better prepared with data and may now optimise upcoming cultivations. But it is quite a challenge for retailers to understand what customers desire; *“... the stores do not even add products with a certain look or quality [...] They are not added because the store do not think anyone wants to buy it, and then it becomes waste to the farmer.”*, says G9.¹⁶¹ A waste expert at SEPA (G5) and G9 stress that we, as consumers, are not exposed to choices like curved carrots or smaller potatoes (so-called *wonky fruits*). They do not think it is all about what we want because we are often not able to find these uneven products in the store.¹⁶² G9 welcomes a better interaction between the store and its consumer. If these wonky fruits are not sold - ask why; *“Should we continue or make it differently so we can avoid returning it?”* suggests G5.¹⁶³ R2 wants that the second-class fruit and vegetable assortment should be put in a basket with the message *“This will be excellent*

¹⁵⁶ R3

¹⁵⁷ R1; G4

¹⁵⁸ R1

¹⁵⁹ G6

¹⁶⁰ G3; W1

¹⁶¹ G9

¹⁶² G5; G9

¹⁶³ G5

for fruit salad or stew". But as the basket gets bigger, the sale of ordinary first class products will decrease.¹⁶⁴ We should be well aware about the retail business concept, G3 emphasises: "[...] *seen to a whole, reduced waste would be rather miserable, except from the consumers.*" Less thrown food in households may directly result in a weaker turnover.¹⁶⁵

A very popular concept among the respondents (especially R4) is a deli counter, located in the food store, where chefs make dishes from food which date is about to expire.¹⁶⁶ It makes it possible to take care of products that otherwise would become waste.

R2 recognises difficulties to compare studies between countries. It has earlier been mentioned in chapter 3.1.2. G8 agrees: "*To set targets you need to measure and in order to measure you need common definitions.*"¹⁶⁷

5. What is the reason behind the industry actors' attempt to reduce food waste?

Actors obviously have different reasons for their existence. Economy and goodwill are considered to be the driving forces for many food waste reductions. As G3 describes: "*Everyone is joyous over reducing waste upstream in your chain. I mean, retail is excited if the industry reduces waste. Then you can force prices down even more [...] but retail on the other hand is not equally keen on the economic perspectives that consumers reduce waste and so on.*"¹⁶⁸ It is not easy to generate enough profits for all the products in the assortment range, R3 explains. "*It is often primarily the producer who decides that they would like another thing and that they would like to capture market shares [...] So it is a bit what to work with, to look at what sells and what the demand is - maybe even harder.*"¹⁶⁹

Also responsibility purposes as well as the global perspective are widely emphasised (see more in question 1). "*When food is not taken care of, environmental impacts for producing the food have been in vain,*" stresses an environmental consultant within sustainable food production at SIK (G2) and others.¹⁷⁰

Aside from defined responsibility commitments, companies like Lantmännen also see future business opportunities.¹⁷¹ Reports by SEPA prove that it is expensive to waste food, according to G6.¹⁷² R2's description is distinct: "*To reduce the wastage provides money to the wallet and goodwill for the companies.*"¹⁷³ P1 goes along with her argument but understands companies with a tight schedule and tough sales objectives. Waste might not be the primary task, he explains.¹⁷⁴

A recurring topic is about biogas and using the food waste for energy production. G2 and R2 find it a good method to reduce environmental impacts from avoidable waste (e.g. AFWH), but stress

¹⁶⁴ R2

¹⁶⁵ G3

¹⁶⁶ R4

¹⁶⁷ G8

¹⁶⁸ G3

¹⁶⁹ R3

¹⁷⁰ G2; G1

¹⁷¹ W2

¹⁷² G6

¹⁷³ R2

¹⁷⁴ P1

that it is better if the waste never emerges.¹⁷⁵ Further, *“It must never happen that there is an eigenvalue for the facility to earn money and thus not reduce the waste”*, G7 explains.¹⁷⁶

6. How much do you think that the climate issue counts when actors discuss the issue of reduced food waste?

*“It provides some gunpowder to the debate”*¹⁷⁷

There were significantly different answers on this question. In general, respondents seemed to understand the importance, although a few spoke about climate change as a debate more than a real problem. Companies might just focus on goodwill rather than real life effects. Some would then dispute the long-term sustainability. However, who integrates climate change reductive activities into business is unclear. The political attitude is obvious; governmental organisations have distinct guidelines and representatives are well versed in the situation. When a discussion about a sustainable society in the EU is raised, it is primarily from a climate perspective they discuss food waste, tells G8. He thinks a lot happens politically and highlights SEPA’s many projects. *“If you look at the other actors, like suppliers and retail, then I perhaps do not think it is in focus.”* It is opposed by W1: *“[...] the same way as we put krona and cents on avoidable waste in our facilities, so we also strive to put climate impact”*. G8 continues: *“I actually doubt that the average consumer think much about the environment. [...] There is of course concern for the climate but I do not believe it is sufficient for action to concretely reduce waste. Can we get out that you actually save a lot of money and that you currently maybe throw one quarter of what you are buying, then I believe it has a larger explosive force.”* Except from the absence of common definitions (discussed in question 4), G8 also wants organisations to launch simple and comprehensible communication for ordinary people.¹⁷⁸

A1 does not think climate is a specifically prime issue for ordinary people because there are so many environmental problems within the food industry. That beef has a great climate impact might have been understood, but she believes that *“very few consumers spontaneously think additional carbon footprint as they dump food.”*¹⁷⁹ A general discussion among respondents is the complicatedness for consumers to buy the environmentally (or climatically) “better” product. *“The most obvious choices are not always the right ones”*, G7 explains. *“It is questions that are not easy to absorb if you are not conversant or interested. [...] Concerning food waste, it is never a good thing to throw, and it is thus very easy and thankful. [...] Food waste is generally an easy issue for politicians because reduced food waste also solves a big problem.”*¹⁸⁰

The confusion is not surprising, according to R1. It is unclear whether environmental efforts are included in the product. Taking responsibility should also regulate the cost, like capital and labor do. *“But as long as the effects not make an impact in terms of cost, it will not be embraced. [...] This is*

¹⁷⁵ G2; R2

¹⁷⁶ G7

¹⁷⁷ G3

¹⁷⁸ G8

¹⁷⁹ A1

¹⁸⁰ G7

actually a true logical tumble that we have accepted somehow. It conflicts with Polluter pays principle, so to speak. [...] If you could internalise these things, then I am convinced [...] that the environmentally better option will not be the most expensive option.”¹⁸¹

7. How do you think conditions to reduce food waste will develop in coming years?

“Based on what we are seeing, an increased demand on food all over the world, product prices will increase. The more expensive a product becomes, the more focus will be on using raw material as good as possible. [...] Great that demand increases and the food becomes more expensive, because waste will be reduced. [...] And it is not a question of any ethical driving impulsion, no it is a crass economic question.”¹⁸²

All respondents were positive to the future development. According to A1, more and more scientists track and count the waste. The increased understanding makes it easier to speak with politicians.¹⁸³ G5, G8 and others tell about 2014; the year of food waste in the EU.¹⁸⁴ It proves that it is very prioritised and I think it will be more focus, says G8. *“Our first step is to collect and sort out food waste but I also believe that more and more people will understand that it is even smarter to not make it occur.”¹⁸⁵*

G1 encourages efforts to reveal new intersections in the industry, particularly in the retail purchase of goods.¹⁸⁶ A closer cooperation between retailers and wholesalers aimed at more effective goods flow can prevent too large orders, which cause thrown food. G3 agrees and encourages the finding of business models where it is possible to allocate profits between the actors. But *“before one has taken the first step and received the first example that figures among all to their satisfaction, it is very difficult to get someone to want to start anything”*.¹⁸⁷ The same arguments are followed by A1. *“But testing these types of solutions is quite expensive. What we see ahead is new business models where you both take risks but also share profits together.”¹⁸⁸*

R5 definitely thinks an informational campaign about date indications is needed, although Swedes today are already very environmentally conscious.¹⁸⁹ See his discussion in question 3.

8. What do you think about the concept of choice editing, i.e. to deliberately remove those products from the store range that cause significant environmental impact?

The meaning of choice editing was at first not entirely clear for some respondents, which required an explanation. Everyone was then able to engage in a dialogue around the concept even though opinions were very separated from each other. R1 had observed that this is an old phenomenon: *“In fact, I do not*

¹⁸¹ R1

¹⁸² R1

¹⁸³ A1

¹⁸⁴ G5; G8

¹⁸⁵ G5

¹⁸⁶ G1

¹⁸⁷ G3

¹⁸⁸ A1

¹⁸⁹ R5

think it is strange because retail always choose to remove products. It is nothing new, but you select what product you want on the shelf.”¹⁹⁰ G7, G1 and R2 are very positive to choice editing. G7 makes some comments: *“I vote for choosing on behalf of the consumer. [...] I would simply be positive if the industry or politicians take their responsibility. [...] A collective decision would mean that you can not blame someone anymore ”*¹⁹¹ But G8 is not sure if top-down is the ultimate approach. Retail is a more suitable actor to take initiatives, communicate and change behaviours, he thinks.¹⁹² R2 finds the main responsibility among *“brave politicians and foresighted forward-looking companies. [...] Is there no legislation in any area, then clever companies can stay ahead”*.¹⁹³ Also A1 likes the concept of choice editing. As she discusses in question 9, while retailers possess all the knowledge, they should help consumers toward fair choices: *“I do not think retail shall provide what is directly bad, harmful or environmentally offensive just because some consumer may ask for it.”*¹⁹⁴ G1 also thinks this is a good option: *“We can probably not get away from that the retail's interest is to sell”* but *“[...] It is valuable if the stores work actively to set requirements on their suppliers and remove products you do not think are fair.”* It is though important with customer communication and thus makes it easy to find environmentally better choices, G1 explains.¹⁹⁵ If reasons behind adjustments are unclear, consumers could be furious, says P2.¹⁹⁶

G3 points out the retail stores’ own brands, which strategically limit the selection for consumers *“[...] but then primarily to increase their own profits”*. This technique can also be applied for sustainability issues and he thinks it could affect future patterns. The ordinary consumer is not professional and *“you are quite thankful if it is simple to be good when choosing”*, G3 states.¹⁹⁷

P2, R4 and G2 do not recommend removing popular products from the shelves.¹⁹⁸ Customers would then go to another store, which provides what you want, says R4 and G2.¹⁹⁹ G2 has a suggestion: *“For many products it is possible to reduce environmental impact from the product by reducing the waste that emerges in the production”* and *“In those cases where this is possible, the product may not necessarily be deselected because a major cause for the product’s environmental impact is fixed.”*²⁰⁰

A critical respondent is W2 who believes that many of the issues at stake are emotionally and irrationally driven, which might cause wrong directions: *“For example, we can take ecological, where science actually not all sees that ecologically grown is more resource efficient than conventionally grown”*.²⁰¹ P1 also supports the consumers and their right to make demands. He is reluctant to prohibit or remove products and rather pushes for informational efforts and education about the negative

¹⁹⁰ R1

¹⁹¹ G7

¹⁹² G8

¹⁹³ R2

¹⁹⁴ A1

¹⁹⁵ G1

¹⁹⁶ P2

¹⁹⁷ G3

¹⁹⁸ P2; R4; G2

¹⁹⁹ R4; G2

²⁰⁰ G2

²⁰¹ W2

effects: “[...] I generally think that the society we build is based on free choices and the whole democratic system is based on our human choices, no one who is above should make the decisions on our behalf.”²⁰²

9. How important is the package to reduce wastage, both to keep the food fresh and as a communications tool?

“To not wrap up the food is guaranteed good to increase the waste”²⁰³

Packaging is a very interesting waste reducing tool, according to the respondents. A great discussion is about environmental impacts from food versus its package and how much material you need to protect the contents. It is also clear that packages historically have been bad reputed and only been something you throw in the garbage. It is today better valued, W1, R1 etc. argue.²⁰⁴ According to A1, P2 and P1 it is important to value the contributions.²⁰⁵ Food usually causes the major impact, A1 explains: *“There are significant variations depending on what is packed, but generally for the entire food industry, it is often said that the package accounts for approximately five to ten percent of environmental impact, depending on what you are looking at. [...] If you pack a product of high environmental impact such as cheese and meat, then you can virtually do anything with the package to avoid throwing the food.”*²⁰⁶ P1 completes her reasoning: *“Of course you can split up the cheese into smaller pieces, with greater usage of packaging material and still have a favorable environmental equation since it saves cheese.”* Consumers do not generally know this, tells P1. *“Therefore, I believe in information that provides insight and subsequently a more judicious behaviour.”*²⁰⁷

R1 would like actors to see food and package as one single function. *“So right from the outset when you manufacture a product, you will see what kind of package that would solve this issue.”* He finds it especially important today because many additives are removed, which make the food less durable. Therefore, a package can increase the lasting quality. It is at the same time an effective way to get rid of the chemicals.²⁰⁸

A widely discussed issue is the packaging size. Single person households often purchase too big packages, which finally make them throw unnecessary food. The producer must support consumers by offering smart packages, argues W2.²⁰⁹ Smaller and appropriate packages would benefit the entire industry, according to P1 and P2.²¹⁰ A1 continues: *“We are drilled to consider less expensive per kilo, rather than also thinking of how much we need. [...] But if we make a purchase just because it is less expensive per kilo and then throw it, then it was not that cheap.”* A1 is specialised on food packaging for sustainable development. She has found some interesting market potentials for retail companies. If packages are adapted to appropriate food amounts, consumers will find them more valuable - and

²⁰² P1

²⁰³ G3

²⁰⁴ W1; R1

²⁰⁵ A1; P2; P1

²⁰⁶ A1

²⁰⁷ P1

²⁰⁸ R1

²⁰⁹ W2

²¹⁰ P1

throw less food, even if the price per kilo increases. And retailers are hopefully still financially satisfied, A1 explains. *“Instead of just selling much and cheap, you can sell the right quantity and just good stuff.”*²¹¹ As R2 suggests in question 4, P1 also welcomes experiments in the stores to understand consumers’ behaviour.²¹²

G8 thinks the industry should take their responsibility and share some information: *“Retail has all the knowledge about customers, purchase patterns and what is purchased [...] which also suppliers and producers should have quite good control of.”*²¹³ Same issue is discussed by A1. She is disappointed with retailers because progress is moving so slow: *“Retail is well aware of that we buy too much food and it has been broached on several meetings on which I have participated”*.²¹⁴

G8 promotes less and common food labels within the EU. *“I think it is the future somehow. The way it is now, that own brands have their own climate labels, it just feels confusing and weird.”* He continues: *“[...] it really does not matter how much information you got if it is not visible or graphic or available for the consumer.”*²¹⁵

*“[...] the most important is not to be able to sort the material or that it shall be as thin and light as possible, the most important is to protect the product.”*²¹⁶

10. What do you think of the current date indication and can it be modified to reduce food waste?

*“I do not know. We have not really considered that question. I guess it is handled by NFA and they are also connected to SaMMA.”*²¹⁷

There are widely different opinions about the currently incorporated date indications. Many respondents urge consumers to use their senses before throwing the food. People can often determine the freshness with help from eyes, nose and tongue. Some of them (G9, R4 etc.) also think safety margins are excessively large.²¹⁸

As R5 states in question 3, information activities about the date indication meanings are needed. *“But who should pay for this information, if it is a governmental organisation or other actors, it is difficult to say.”*²¹⁹ R1 suggests NFA.²²⁰

G3 and P1 advocate the comfortable safety margins we use today.²²¹ G3 finds many products too hard for consumers to confirm their freshness, like milk or cheese, and suggests dynamic labels and price determinations. *“So, it is possible to have a dynamic pricing that is connected to the number of*

²¹¹ A1

²¹² P1

²¹³ G8

²¹⁴ A1

²¹⁵ G8

²¹⁶ R1

²¹⁷ G6

²¹⁸ G9; R4

²¹⁹ R5

²²⁰ R1

²²¹ G3; P1

*days left at the best before date? It could be an interesting model to see how that affects.”*²²² Also P1 advocates possibilities to use an indicator integrated in the package. He tells about a solution where the barcode turns unreadable when the product has been heat exposed for a too long time. It is today tested at ICA stores.²²³

R2 and KfS and R3 want to change the current best before date to *fresh at least until*.²²⁴ R2 promotes the change and believes it would create huge publicity: “[...] *the question could show up in media, TV and everywhere and it would be an indication for people to ‘not throw on the best before date’*”. However, she likes the idea with first trying it on a smaller scale.²²⁵ G2 finds it essential to be certain about basic reasons behind the throwing of waste before taking any actions.²²⁶ G1 does not believe in a modified date indication. She argues that the consumer’s focus is on the date *per se*, not what is written before. *“If you should change the wording, you must dig deeper and see if it really would induce any meaning.”*²²⁷

An administrative official at Unit of Policy Instruments for Natural Resources at SEPA (G4) and P2 have also observed the benefits of “fresh at least until”, but want to remind that it is important to inform such a modification.²²⁸ G4 continues: *“So it is not only to rename and believe it fixes itself, I think not. But at the same time, a name change involves a cause to provide information. So I think it could be positive.”*²²⁹

4.2 Discussion

After having conducted and compiled the interviews, it is time for a further analysis. Theories will be evaluated together with the empirical material, in order to finally achieve a reasonable answer of the total thesis purpose.

Food waste is apparently a growing issue, for the industry, the society and its people. Consumers throw food that could have been eaten. The food is worth much in terms of money but it also affects our environment. Climate change is considered to be our most dangerous threat and agriculture is a big contributor. Several reasons why it becomes waste have been examined. All of them need actions to be solved. Production, wholesale, retail and consumers; all actors have different incitements for reducing food waste (discussed in question 2). Companies obviously work hard in their own processes to streamline and thus save resources. Renato Orsato would call it eco-efficiency. Production and trade in the food industry is very applicable at taking care of and minimising resources, at least when it comes to a lucrative activity. Businesses have tight schedules, as P1 states in question 5. At the same time, governmental organisations, NGOs etc. put growing pressure on utilisation, which also citizens and media willingly embrace. It will however not distinctly affect the household waste.

²²² G3

²²³ P1

²²⁴ R2; R3

²²⁵ R2

²²⁶ G2

²²⁷ G1

²²⁸ G4; P2

²²⁹ G4

Incitements for helping consumers are generally minimal. The food chain (but not the final consumer) earns money when a greater proportion of food becomes waste at homes, which certainly is a great problem, confirmed by respondents working in the industry (question 3, 4 etc.). Therefore, it is essentially important with benefits that might change actors' thoughts about resources. This is perhaps where the Swedish government comes in.

If activities can be positioned within the Win-Win Scope of Sustainable Strategies (chapter 3.2.2), companies have the possibility to save money and at the same time receive some valuable goodwill. Particularly in the B2B industry, basic conditions are usually positive (chapter 3.2.1). However, it requires a favourable ambiance and not least some strength by the company (or encouraging tools, see chapter 4.2.2) since financial payback is far from guaranteed. At the same time, creative initiatives open up for first-mover advantages. By implementing something extraordinary, an entrant may obtain an important head start that could be very favorable. Respondents asked themselves who should take the initial step in order to help households reduce their waste. Whoever it may be, basic knowledge about food handling is considered as one main issue.

4.2.1 Knowledge

Urban people have obviously been distanced from food production. It is briefly described in chapter 3.1.4.3. The well developed trade system, where food is effectively transported over the world, has enabled great price reductions. Consequently, the actual value may actually be higher than current food costs. Older food rather throws than being tested with a tongue, nose or hand.

Date indication is a powerful tool and very trustable for many consumers. People today are scared to get in touch with germs and diseases. This is a widespread behaviour and not easy to transform. The date indication system used today is apparently misleading because it often becomes a reason for discarding edible food products. It has briefly been described in the theory chapter and then discussed by respondents. The interviews contained some suggestions. A name change from "best before" to "fresh at least until" could transform people's mindset about food quality examination. But, as some respondents stated, it requires a lot of preparatory work and investigations before implementing such a change. At the same time, it could be a great possibility to also broach food waste issues for the whole country.

Information and education are considered most important among those interviewed (see question 3). School is a central place for developing a healthy behaviour and respect for food. But also adults need to be informed. A couple of national incentives have been shown in chapter 3.2.4. These often need some active work to be found and are generally aimed at people with a specific interest in the food waste issue.²³⁰ Therefore, a majority of the respondents request public campaigns. How should such a campaign be designed in order to reach the Swedish people? Many believe that authorities are found most trustworthy. As mentioned in question 3, R1 would like to see initiatives by governmental organisations, jointly financed by other actors. You can reduce risks and costs of individual companies by placing the eggs in different baskets. Additional partners also enhance the credibility among consumers and could give more power to an initiative. A collective national campaign where not only governmental

²³⁰ Andersson, T. (2012), p. vii

institutions are participants would create awareness. SaMMA is suggested by several respondents as a potential driver for this type of activity. But the group is though currently not working actively for launching any projects.

Governmental organisations constantly investigate and estimate food waste amounts and sources. These publications then often work as basis for organisations and policy makers. Payback versus efforts may though be hard to evaluate. It naturally leads us to regulations and the introduced concept of choice editing.

4.2.2 Tools

Who enforce the sustainable changes, consumers, retailers or the government? It might be a too complicated question for a straight answer but is definitely a relevant and arguable one. Chapter 3.2.4 introduces the reader to the power of regulations. Some organisations and individuals do believe in the consumer's free will, others do not. Who should decide the product range? Although environmentally inferior products (by various reasons) have been excluded for a long time, choice editing has now become widely discussed. Most of the scientifically undergone and presented material supports such an approach, including studies from the EU. Regulative decisions, like the examples in Maniates, M. (2010), table 8, help consumers to make environmentally better choices, without even thinking about it. Actors can advantageously use choice editing, whether it concerns package design, food contents, production methods or available recycling possibilities. There are however differing opinions whether to implement this strategy or not. Some respondents (particularly P1) believe in the consumer's right to choose. The political tension is unavoidable and changing laws is both demanding and sensitive. Therefore, businesses might be the ones that should make real changes. The industry possesses golden knowledge about materials, resources, behaviours and patterns. It makes it easier for them to make the "right" decisions than consumers (and public authorities?). Changes must obviously be consistent with rest of the organisational vision, mainly financial goals (chapter 3.2.1).

Consequently, other stakeholders must consider the new conditions. It can generate a dynamic product development with a great focus on innovation and sustainability. The new range though, requires acceptance from customers. Communicating is very important to maintain their trust. Reasons behind adjustments must be clear, as P2 stated in question 8. However, by choice editing, consumers do no longer have a need for concern about production methods since this is something companies have "taken care of". It is though important not to forget that some people may find choice editing as a step closer to a "big brother" society. A further discussion can be found in the end of chapter 4.2.4.

Swedes generally meet the desired food for the first time in a convenience store. Retailers are therefore important actors in the game of food waste.

4.2.3 In the store

The store is systematically constructed for customers to find what they are looking for but also to shop more. Although people already before the visit have prepared themselves with purchase lists etc., purchases often differ greatly from the original plan. Many reasons can be found in the store and

altogether they contribute to the total amounts of AFWH. The retail sector has power to influence consumers (as explained in chapter 3.1.4.4). Its central message “*buy more!*” creates unplanned and wrong decisions. When the consumer finally arrives at home, approximately 10-20 percent of the food will be thrown, whereof possibly half could have been eaten.²³¹ What lies behind the behaviour is difficult to determine. It is however clear that retail companies very much influence consumption patterns. It opens up for discussing systematic failures:

- It is important to question whether it is consumers or retailers who create the demand. Shelves are today always fully stocked. Further, many stores are open from early morning until late at night. It ensures customers that desired products are always available. At the other hand, there will always be an over ordered stock in store which leads to uneaten food. Thrown products will then have been unnecessarily produced.

- Another reason for increased food waste is about product range. Some food types offer a huge assortment and new products are continuously introduced. It is today possible to find sour milks flavoured with a never-ending variation of fruits, berries and spices. The bread department has in recent years grown to its own small shop and sometimes it may even be difficult to find your own favourite. Are these assortments really demanded by consumers? Read next chapter for a further discussion about supply and demand.

- The problems with aesthetic standards have been introduced in chapter 3.1.4.2. As customers we expect the food to look in a particular way. We rather stay away from wonky fruits, which retailers are fully aware of. In turn, because the store requires standardised products, it ultimately means that the farmer is unable to sell what has been grown. This is however not completely the truth. Because consumers are not even able to find different looking products, the real demand cannot be clarified. Behavioural research can help businesses and consumers communicate with each other. See more in the next chapter.

- The waste increasing behaviour can also apply to products that are about to expire. Because of the generous opening hours and constantly crammed shelves, consumers can almost always purchase the most recent produced products. It leads to large waste amounts from stores. Within the current system, a certain proportion will always become waste. Flexible shelves in the shape of an accordion might benefit both consumers and retailers.

These examples encourage some investigations about supply and demand. Closer relations between consumers and retailers open up for accurate and also adjusted purchase patterns.

4.2.4 Cooperation

In this thesis, a main aim has been to find cooperative solutions that help consumers reduce their AFWH. It is importantly beneficial if actors maintain a dialogue on supply and demand. Since consumers purchase their food in stores, retailers can take actions that help the whole food system. For example, some stores have started to take care of expiring products. With help from chefs and a deli counter in the store, dishes are produced out of the “waste”, which no longer has to be thrown (see question 4).

²³¹ Appendix 3 & 4

Even though it not particularly reduces AFWH, it is a responsibility taking activity that also encourages a resource-based mindset.

One big approach is about consumers' opinions. Is it reasonable that all products are always available? What is enough to satisfy consumers? What do we actually think of abnormal fruit shapes? Because the societal behaviours and "systematic failures" mentioned in question 4 etc., stores do not put all expiring products for sale. Some respondents request challenging and innovative behavioural research to find out what the true demand is. That would be an interesting subject for actors in the chain and could definitely benefit consumers and retailers as well as other actors. Right now, many people obviously buy and cook too much, care too little or possess too little knowledge about food handling. Purchased products become waste although some reasons might be unclear. A company like Allwin (see chapter 3.2.4) can take care of some products but far from all.

A1 has already described the paradoxical relation between the number of supermarkets and single person households. Consumers go to bigger stores where it is possible to find the full assortment and lower costs. Offers are obviously tempting because products are sold. Ultimately, it is though unclear whether it has been worth buying in bulk because for many, more food will be thrown. This entire discussion could be facilitated by addressed behavioural experiments. Several universities in Sweden (and other countries) pursue types of related science. By challenging current sales patterns connected to issues that cause AFWH or unnecessary waste from stores, old habits can change the way people see food today. A successful systematic change may also result in more accurate ordering strategies. A further text about this is found in the next chapter.

One big ineluctable discussion is about the actors' roles. To what extent should companies along the chain support consumers in their choice of throwing food or not? If incitements are too hidden for producers, wholesalers and retailers, neglected activities might be fairly explicable after all. Thence, there is a risk of ending up outside the scope of the win-win strategy. As Swedish authorities have no distinct function that comprises practical efforts, an undesirable vacuum is created. "Irresolution" might be the right word, described by R1 in question 3. According to G6, SEPA does "[...] a lot to raise the issue. What then happens is difficult for us to regulate". Companies within the food chain might though rely on governmental institutions, which ultimately represent the Swedish people. As described in the introduction, NFA has not formulated detailed plans for the food waste reductions. The present situation is indeed frustrating. New business models are discussed in question 7, but since waste is not usually prioritised (P1 in question 5), expensive solutions call for collaborations. More actors give a broader perspective and debate and make it also possible to share risks and profits (A1 in question 7). Solutions might be discovered within the food chain. It also meets requirements for the future extended producer responsibility, mentioned in chapter 1.1.

4.2.5 The food chain

Actors in the food industry may find it difficult to recognise advantages (except for goodwill) in helping consumers reduce their waste. But respondents had some suggestions that both enable reductions and can profit many actors. G3 requests a more efficient system where smaller orders make it easier to satisfy the current demand. It would help agricultural enterprises produce right amounts and avoid that

some become unnecessary waste. Wholesalers would also benefit because more accurate estimations when trading the products. It gives a possibility to streamline processes and decrease days of inventories. The retail sector can improve customer satisfaction by enabling right amounts and also lower costs for expired and therefore unsold products. Finally, successful streamlining leads to extended lasting qualities, which favour consumers.

The cooling chain has good potential for improvements since retailers and consumers often use higher temperatures than upstream actors. If the industry would agree on a lower temperature standard, consumers could be inspired and educated and products would consequently last longer. There is also a chance for retail companies to receive some enjoyable goodwill (provided that they want to make an investment).

A package can have many functions. At first, it protects the food. Secondly, it can work as a communications tool. Because the packaging material generally not causes much environmental impact compared to its content, it usually pays to divide the food in smaller packages. It also fits better for single person households, who often buy too much food. Smart packaging is valuable for customers and retailers could also be satisfied because with smaller packages, price per kilo increases.

People are the final consumers in the food chain. As shown in Figure 1.1, their purchased products can be eaten, thrown in household waste or (if possible) become food waste. Although the latter will result in energy or fertiliser, consumers must be informed that eating is the environmentally and economically best alternative.

5 Conclusions

Actors in the Swedish food chain are generally well informed about advantages that come with food waste reductions. Actions are valuable in terms of economic, environmental and other factors. It is not even related with rocket science. The great aim has been to find future solutions, which can benefit multiple actors, preferentially in a cooperative way. Many earlier works have focused on either statistical investigations or addressed consumer advice. This thesis has found a gap among actors in the food chain. With help from current stakeholders as well as unexpected cooperation strategies, it is possible to find new solutions – with help from households. It is time for both authorities and businesses to start communicating, because food waste is a great issue that comes with many opportunities.

No answers are matters of disparagement but rather constructive criticism. Optimism and sincerity have driven this work forward.

- Governmental organisations should further clarify their roles in the food waste reducing debate. Many reports and investigations are published but outcomes are imponderable. Since some actors in the industry seem to rely on them, great actions might be neglected. A company needs promising tools where lucrative activities open up for business ideas and win-win situations. Many actors give more credibility and make it easier to reach households. SaMMA is definitely important since it consists of professionals from different industry areas. However, its purpose

does currently not result in any concrete interventions. Clear signals from the Swedish government that invite cooperation, and perhaps a developed SaMMa, could facilitate actions.

- Consumers meet food in the store, which naturally put retailers in focus. The retail sector knows much about purchase patterns but generally use them for increased sales. With help from behavioural science, it is possible to find out why products are or not are purchased, why food is eaten or thrown, what consumers would like to change in the store and much more.
- A well-developed trade system has distanced urban people from food and its production. As a result, knowledge about product origins are generally weaker than before. Schools and parents need to teach children what is right or wrong. Also grown-ups need guidance. Today, several campaigns are running. What we need is the same message from all parts of the food chain, with simple information and common definitions. Consumers throw food that could have been eaten, not because they are stupid, but because products are undervalued and you rather purchase new food than examine the quality. Educational actions must be taken to show people that date indications work as assistance, not rules. Consequently, the system needs real-life investigations to find out if a radical change (for example a change to “fresh at least until”) is needed.
- Some theories (and respondents) encourage regulations, other do not. It is though an interesting idea, worth experimental research. Particularly stores are found interesting since it is the place where consumers find and purchase the food. Choice editing can advantageously bring positive results and makes it more natural for consumers to make fair decisions. Behavioural and preparatory investigations are though very important before taking such a definitive action. Finally, the food industry must agree if encouraging tools are enough. If not, regulative actions will force changes, but may not entirely become popular among consumers.

6 Recommendations

A thesis work includes an important learning process. Although the purpose must be focused, there will always emerge more or less subjective interesting science areas. This is my list of recommendations for the future food industry.

- Continue tracking and evaluating the food. More accurate background information brings power to long-term changes. Examine all food types to find out where real problems emerge and where environmental impacts as well as financial drawbacks come from. Investigate different people and households to get a deeper understanding.

- Challenge old consumption habits by communicating directly with consumers. The true demand might not be what is offered in stores. Invite households to the debate and communicate with them. Find out the intrinsic demand and make it easy for people to act smart.
- See the future with resourced-based eyes. Innovative and sustainable solutions are respectful and open up for first-mover advantages.
- Do not invent the wheel twice. Take a look outside Sweden for information exchange and cooperation. Create a system with common picking analyses, food waste definitions and compare solutions.
- Teach children as well as grown-ups to be critical with date indications. Best before date is not a rule, rather an advice.
- Food waste is not entirely avoidable and that is why we need a functioning system for biogas production. However, it is very important to inform people that it would be better if the food never had been produced.

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All electronic sources were successfully accessed on 17 November 2012

Appendix

Appendix 1. Respondents

Governmental organisations:

	Organisation	SaMMA
G1	Environmental strategist	
G2	Environmental consultant within sustainable food production	✓
G3	Head of research	
G4	Administrative official, Unit of Policy Instruments for Natural Resources	✓
G5	Waste expert	✓
G6	Vice-chairman of the Waste Council & Head of the Section of Hazardous Substances and Waste	✓
G7	Waste expert	✓
G8	Political advisor within food issues and food labelling	✓
G9	Project manager for climate	✓

Packaging:

P1	CEO	✓
P2	Development manager in Food Packaging	

Production and wholesale:

W1	Scientific project manager & responsible for sustainability issues	✓
W2	Development director	

Retail:

R1	Coordinator of Product Safety and Legislation & Member of the NFA Waste Council	✓
R2	Manager of Consumer & Environment	
R3	Store developer	✓
R4	Logistics director	
R5	Logistics manager	

Academia:

A1	Scientist in Environmental and Energy systems	✓
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Appendix 2. Different definitions of waste from studies in the field¹

Country, source	Concept	Definition
Sweden, current report	Livsmedelssvinn/Svinn	<i>Food waste that is thrown but could have been consumed if it had been handled differently</i>
Sweden, Kfs	Onödigt matavfall	<i>Food waste that is thrown but could have been consumed if it had been handled differently</i>
UK, WRAP	Avoidable waste	<i>Food waste that is thrown but could have been consumed if it had been handled differently</i>
UK, WRAP	Possibly avoidable waste	<i>Food that can be eaten with some cooking methods or that is eaten by some people, e.g. bread crusts and apple peels</i>
UK, WRAP	Unavoidable waste	<i>Unavoidable food waste, e.g. meat bones and coffee grounds</i>
Norway, EMMA	Nyttbart	<i>Food waste that is thrown but could have been consumed if it had been handled differently</i>
Denmark, Landbrug & Fødevarer	Madspild	<i>Food waste that is thrown but could have been consumed if it had been handled differently</i>
Netherlands, LNV	Voedselverspilling, Food waste in translated reports	<i>All food that was produced to be eaten by people but was not consumed by people</i>
Austria, the university in Wien	Original food	<i>Food in unopened packages or unpacked whole foods</i>
Austria, the university in Wien	Partly used food	<i>Opened packages and partly used food</i>
Austria, the university in Wien	Leftovers	<i>Remains from preparation and serving</i>
Austria, the university in Wien	Preparation residues	<i>Unavoidable food waste</i>
USA, ERS/USDA	Food loss/ food waste	<i>Often include both edible and inedible food waste, in households and restaurants and such. In some reports it appears that they only include edible and/or households</i>

¹ Translated from: Modin, R. (2011), p. 10

Appendix 3. International comparison between food waste amounts and avoidable food waste²

Author, country, year	Food waste (tons)	Food waste/household (kilos per week)	AFWH (tons)	AFWH/household (kilos per week)	AFWH (%)
Andersson, T., Sweden, 2012 ³	848 000	3,64	297 000	1,22	35
Jensen, C. <i>et al</i> , Sweden, 2011 ⁴	674 000	5,6	239 000	2,1	35
KfS, Sweden, 2008 ⁵	-	5,6	-	-	57
SWM, Sweden, 2004 ⁶	910 000	3,87	-	-	-
EMMA, Norway, 2010 ⁷	420 000	4,6	240 000	-	54
WRAP, UK, 2009 ⁸	8 300 000	6,0	5300 000	4,0	65
WRAP, UK, 2008 ⁹	6 700 000	5,3	4 100 000	3,2	61

² Based on: Andersson, T (2012), chart 4.3

³ *ibid*

⁴ Jensen, C. *et al* (2011)

⁵ KfS (2009)

⁶ Calculations from: SWM (2005), p. 51; SWM (2008), p. 7

⁷ EMMA (2010)

⁸ WRAP (2009)

⁹ WRAP (2008)

Appendix 4. Avoidable food waste from households, in different countries and studies¹⁰

Country	Proportion of the households' food waste (%)	Amount per person and year (kg)	Proportion of food bought home (%)	Cost per household and year (SEK)
Sweden ¹¹	-	56,3 ¹²	-	-
Sweden ¹³	57	56	-	-
Sweden ¹⁴	35	54,59 - 63 (per household and year)	-	-
UK	65	87,5	14	ca 5300 (£480)
Norway	54	50	-	-
Holland	45	43 – 60	-	ca 3600 (€400)
Denmark	Estimation: 50 ¹⁵	60 – 65	15 – 20	ca 8600 (7000 DKK)
Austria	-	40	-	-
U.S.	-	-	14	-
Australia	-	-	-	ca 4000 (\$616)

¹⁰ Based on Modin, R. (2011), chart 3

¹¹ SWM (2008)

¹² 98,8 x 0,57

¹³ KFS (2009)

¹⁴ Andersson, T. (2012)

¹⁵ Lanbrug & Fødevarer has assumed a waste of 50 percent of the food waste and applied this to the statistics of food waste from Miljøstyrelsen

Appendix 5. Organisations

English	Country	Swedish	Abbreviation
The All Party Committee on Environmental Objectives		Miljömålsberedningen	APCEO
BIO Intelligence Service			BIOIS
The Cooperation for reducing food waste		Samverkansgruppen för minskat matavfall	SamMa
		Dagligvaruleverantörernas Förbund	DLF
The Department for Environment, Food and Rural Affairs	UK		ERS/USDA
Economic Research Service at U.S. Department of Agriculture	US		EMMA
Emballasjeoptimering og matavfall	Norway		IPCC
Intergovernmental Panel on Climate Change			IVL
IVL Swedish Environmental Research Institute		IVL Svenska Miljöinstitutet	
Lanbrug & Fødevarer	Denmark		
Miljøstyrelsen	Denmark		
The Ministry of Agriculture, Nature and Food Quality	Netherlands		LNV
The National Consumer Council	UK		NCC
The National Food Agency in Sweden			NFA
Stockholm Consumer Cooperative Society		Livsmedelsverket	Kfs
Svenska MiljöEmissionsData		Konsumentföreningen Stockholm	SMED
The Sustainable Development Commission	UK		SDC
The Swedish Consumer Agency		Konsumentverket	KO
The Swedish Board of Agriculture		Jordbruksverket	SBA
The Swedish Environmental Protection Agency		Naturvårdsverket	SEPA
Swedish Grocery Traders		Svensk dagligvaruhandel	
The Swedish Institute for Food and Biotechnology		Institutet för Livsmedel och Bioteknik AB	SIK
Swedish Waste Management		Avfall Sverige	SWM
United Nations Commission on Sustainable Development			SCD
United Nations Development Programme			UNDP
Waste & Resources Action Programme	UK		WRAP
World Business Council for Sustainable Development			WBCSD



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