

Such a waste, household food waste



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Topic: Interaction between consumers and supermarkets to reduce household food waste.

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Abstract:

One of the major challenges the world faces today is to provide enough affordable and healthy food products for the growing world population under changing environmental conditions. Food waste is an ever growing problem at household level, which brings along negative environmental, economic and social consequences. Reducing the amount of household food waste might be one of the solutions to provide enough affordable and healthy food products. There are all kinds of initiatives to reduce the amount of household food waste, but yet no significant reduction is feasible. These initiatives include governmental awareness campaigns to make consumers aware of the impacts of food waste, and to give them tips about how to avoid food waste. The cause of the unfeasible effects of the initiatives is that not only consumers are responsible for the amount of household food waste, other food supply chain actors influence the amount of food waste at household level as well.

Especially supermarkets are big contributors to the amount of household food waste. Supermarkets try to influence consumers in all possible ways, to make them buy as much as possible even though consumers might not even need that much food. Also the assortment and packaging attributes of supermarkets influence the amount of food waste at household level. Because supermarkets are co-responsible for household food waste, the change exists that supermarkets can also reduce the amount of household food waste. Based on a literature study the possibility of supermarkets supporting the reduction of household food waste, instead of creating it, will be analysed. The manners of interaction between supermarkets and consumers will be analysed as well.

Using the literature analysis conclusions were made about the position of supermarkets in supporting household food waste and willingness of supermarkets to become involved in the reduction. Overall supermarkets were reluctant to get involved because they fear a reduction in profit as a result of household food waste reduction.

Preface

Ever since I started studying in Wageningen my interest for sustainability and food supply chains grew. So I, and the people around me were not surprised about the topic of my thesis. I really enjoyed working on my bachelor thesis and I hope that you as reader will enjoy it as well. I want to thank my supervisor Geoffrey Hagelaar for the support and good advices, and I also want to thank my second supervisor Stefano Pascucci for additional support. And last but not least I want to thank my brother for putting my reference list in alphabetic order.

Summary

In this thesis I analyzed whether supermarkets are able to influence the amount of household food waste. Food loss and waste are serious problems with environmental, economic and social consequences. Food loss and waste contribute to global warming, and the factors that influence the global warming effect really needs to be reduced.. Furthermore food loss and waste threaten food security and social justice and it causes pollution and depletion of scarce and non-renewable resources. The majority of food waste in developed countries occurs at household level. That is why this thesis is focused especially on household food waste. Consumers have a direct interaction with the second last actor of the food supply chain, namely the supermarkets. There is a lot of research available about how supermarkets influence consumers' choices but not related to food waste. That is exactly why this thesis topic is chosen. The amount of household food waste needs to be reduced drastically, and all possible options that might reduce household food waste need to be investigated.

The research is done based on a literature study, all different kind of national and international articles from the Wageningen University library are reviewed for this study. A snowball effect is being used during the literature study. Once relevant articles were found, their references were used as a source of information for further research on a particular subject.

In the first chapter an introduction and the material and methods are given. Furthermore the issue of food waste is further investigated to make a clear statement about the food waste problem. The purpose of this chapter is to give insight into the wide extent of the problem. In the second chapter literature has been consulted to find the drivers for household food waste behaviour. Before household food waste can be reduced the causes of household food waste should be indicated in order to create optimal household food waste reduction action plans. For the third chapter literature has been accessed to see why supermarkets have such a big influence on consumers and to see what supermarkets can do to support and help consumers to reduce household food waste. The reluctance of supermarkets to actually become engaged in household food waste reduction and the reasons behind the reluctance are also investigated in this chapter. In the fourth chapter the interaction between supermarkets and consumers will be analyzed, and an further insight in the importance of communication about social responsibility actions will be given. In this chapter an example of contradicting sustainability messages of a common supermarket is given as well. The final chapter analyses the combination of the two separated chapters of consumers and supermarkets. It also provides some recommendations in order to increase consumers' and supermarkets' incentives to get involved in the reduction of food waste at consumer level.

The result of this thesis are that consumers are not able to reduce their food waste on their own, due to the fact that some drivers of household food waste are outside the control of consumers. Those drivers can be inside the control of supermarkets, and supermarkets have big influences on their consumers, and are therefore they are good actors to support household food waste reduction. It is expected that pioneering supermarkets start getting involved in the reduction of household food waste. They start offering different portion sizes and promote their products in a way that will not affect the amount of household food waste negatively. Regular supermarkets are able to apply those actions as well, but at this point they fear the negative consequences of household food waste reduction too much to actually apply the same actions as the pioneering supermarkets.

Everyone who is interested is welcome to read this thesis. The thesis will especially be interesting to readers who have environmental concerns and are also concerned about the global food waste problem.

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Chapter 1

This chapter will start with introducing the thesis topic and describe the materials and methods used to conduct this thesis. Furthermore more detailed information about food waste and insights in the extent of the household food waste problem will be given in this chapter.

1.1 Introduction

Currently is a big challenge to adequately feed the growing world population in a manner that socially responsible, has economic benefits and reduces the negative impact on the environment (Searchinger et al., 2013). The increase in world population leads to an increase in the demand for food. Adequate action needs to be taken in order to be able to supply enough food for this growing population. If the amount of food waste is being reduced, it will be easier to provide food for this growing population (Lipinski et al., 2013).

Food waste has negative environmental social and economic consequences and carries a lot of costs (Scholz et al., 2015). Economically seen, wasting food is a waste of money, worldwide all wasted food has a value of about 550 billion euro (WUR, 2016a). A social consequence of food waste is that food waste has negative impact of the availability of food to others (WUR, 2016a), which creates hunger among millions of people (Payne, 2014). Wasting food not only means that resources are wasted, in addition it also produces greenhouse gas emissions in vain (Scholz et al., 2015). Food waste contributes to the unnecessary use of freshwater and fossil fuels and to the emission of methane and CO₂ from decomposing food (Hall et al., 2009).

Worldwide about one third of the food is wasted. That is about 1.3 billion tonnes of food every year, and is about 179 kg per person (Monier et al., 2010). In medium- and high-income countries food is lost and wasted mainly at later stages in the food supply chain. In developed countries the behaviour of consumers plays a big role in the total amount of food wasted (UNEP, n.d.).

One good way to tackle the problem is to reduce the amount of food waste at consumer level. Overall consumers generate the most food waste in developed countries (Stancu et al., 2016; UNEP, n.d.). Research by Dooren and Mensink (2014) concluded that 70 percent of the consumers is prepared to change their food waste behaviour. Consumers' arguments to reduce their food waste are; that it is simply wrong, that it is a waste of money, and that many people in the rest of the world are hungry (Dooren, Mensink, 2014). But actual reduction is not forthcoming (Dooren, Mensink, 2014). Also van Dam (2016, p.123) mentions in his book that: "The majority of consumers claims to consider sustainability generally important but does not act accordingly. This gap between positive consumers attitudes towards sustainable development and actual non-sustainable consumer behaviour is one of the persistent problems in sustainable marketing". Multiple other studies indicate that intentions are not always good predictors of actual behaviour (Armitage, Conner, 2001; van Dam, 2016; Stefan et al., 2013; Stancu et al., 2016). Before this gap can be bridged and household food waste behaviour can be changed, the reasons behind this gap need to be recognized.

It is relevant for all kinds of policy makers to know the drivers behind household food waste. Policy makers in developed countries show an increasing interest towards ways to decrease food waste, due to its environmental and social consequences. Public authorities, governments, universities, industry representatives and other organisations all try to reduce the food waste (Stancu et al., 2016).

Little is known about consumers' behaviour towards food waste and the drivers of households food waste. Such research is highly relevant, because prevention of food waste is one of the most suitable ways to deal with the food waste problems (Stancu et al., 2016). Household food provisioning is embedded in everyday family practices and embedded in routines (Evans, 2012; Thomas, Garland, 2004). Consumers report that they routinely buy more food than needed (Evans, 2012 ; Buurman, Velghe, 2014).

Trade-offs and goal conflicts impact consumer behaviour towards food waste which might explain the deviant behaviour between attitudes, intentions and behaviour (Aschemann-Witzel et al., 2015a).. A few more drivers that form consumers routines and therefore influence consumers' household food waste behaviour are mentioned in box 1. In addition, Toine Timmermans (2016) explains in a documentary called ‘ ‘ Food Surplus’ ’ that due to the low food prices consumers can afford to waste their food and that that is why throw away habits are still embedded in food related routines (Vara:groen licht, 2016). Routines provide comfort and predictability to consumers (Jastran et al., 2009). Marketers and other actors have little power to influence consumer routines and practices (Betsch, Haberts, 2005), but due to its dynamic quality routines are changeable (Denham, 2002). A part of this change, towards household food waste reduction behaviour, needs to be done with the help of upstream supply chain actions (Aschemann-Witzel et al., 2015b).

Another driver that is associated with food waste behaviour are the socio-demographic factors of consumers. Larger households waste generally more food (Koivupuro et al., 2012), and households with higher incomes waste more food (Stefan et al., 2013). Lower amounts of food waste are associated with older consumers (Stancu et al., 2016).

Box 1

Households	<ul style="list-style-type: none"> • Lack of planning/knowledge concerning food purchase and storage • Impulse purchases (buying items that are not currently needed) • Purchasing of new products that the consumer then 'do not like' • Inadequate package sizes (e.g. oversized ready to eat meals) • Poor storage management (e.g. inadequate wrapping) • Confusion about date labels ('best before', 'use by') • Lack of skills for food preparation • Poor experience in planning meals • Preparing oversized meals • Lack of skills for recombining leftovers into new meals
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Box 1: Sources of waste at households (Priefer et al., 2016)

The food supply chain is domino-like, when one part of the food supply chain is affected, the whole food chain is affected (McKeefrey, 2000). A food supply chain includes all actors needed in the process that a piece of food takes from producer to consumer (Buurman, Velghe, 2014). There are several upstream supply chain actors that may influence consumers and their food waste behaviour, but the supermarket is the only actor that directly interact with the consumers (Scholz et al., 2015; Buurman, Velghe, 2014). That is why the supermarket will be further analysed in this thesis.

Supermarkets influence household food waste behaviour. This is caused by supermarkets' strategies to make consumers purchase a lot of products in order to increase their profit (Buurman, Velghe, 2014). Supermarkets use (volume) promotions, marketing, store lay-outs, packaging features and multiple other methods to stimulate consumption (Blanke, 2015). Once consumers are being tempted to buy more than they actual need, the amount of household food waste is more likely to increase (Buurman, Velghe, 2014). So why should supermarkets become involved in household food waste?

Due to the fact that supermarkets' strategies negatively influence the amount of household food waste, they could play an important role in the reduction of household food waste. There is a gap in literature about how and to what extent supermarkets are able to change the household food waste behaviour. This thesis will be focussed on the relation between supermarkets and the reduction of household food waste because, the 'throw away' habits of consumers need to be reversed, and supermarkets have an enormous capacity to influence and innovate in this area (Presswire, 2006). Ben Bradshaw, former minister for local Environment in the UK, mentioned that: " Consumers are making a significant contribution to tackling the nation's waste by embracing recycling and we are now looking to the retailers to step up and play their part by helping to design out waste before it happens.

Until the supermarkets demonstrate clearly that they are willing to lead by example we cannot expect consumers to get fully engaged with reducing their own waste. ” (Presswire, 2006 , p. 1).

Supermarkets and consumers interact and communicate with each other frequently (Buurman, Velghe, 2014). This communication happens in different forms and different channels are used during the communication (Lauritzen, Perk, 2015). Nowadays supermarkets communicate about some actions they take to reduce household food waste, but those actions are based on a trade-off between genuine wanting to reduce the negative consequences of household food waste and making profit (Scholz et al., 2015). Currently most regular supermarkets only involve in the reduction of food waste if it will have commercial and economic benefits for them. Different from regular supermarkets, pioneering with actions to reduce household food waste completely new types of supermarkets are making their entrance. Those new supermarkets are selling food without packages. Consumers need to bring their own jars, cans, tray etc. that they can fill with just the amount of food they need. Consumers can decide by themselves how they are going to take their groceries home and can decide on the portions they buy, the aim is to reduce the amount of packaging and food waste at consumer level (De Amersfoortse, 2016). The messages conveyed by this new type of supermarkets and regular supermarkets communicate about household food waste are different.

Despite of the actions of consumers and supermarkets to reduce food waste at consumer level, there is still a large amount of food wasted in households. The interaction between supermarkets and consumers needs to be improved, and the involvement of consumers and supermarkets with regard to household food waste reduction needs to be improved as well. A lot of research is been done to detect the consequences of food waste and the amount of food wasted but, there is a gap in literature about how other actors besides consumers can positively influence the amount of household food waste. That is why in this thesis the possibility of supermarkets supporting the reduction of household food waste will be further looked into.

1.2 Methods and Material

This thesis is based on a theoretical research, a non-empirical approach to research making use of published researches. This research is done to gain an understanding of the underlying drivers behind household food waste, and motivations of supermarkets and consumers to reduce the amount of household food waste. No real measurable data and statistical analysis are done in this research, so in this thesis a qualitative type of research is being used.

Firstly, an extensive literature review is conducted to get a better insight in the global food waste problem, and its consequences. Furthermore the drivers behind consumer food waste are stressed out into further detail. and literature is being retrieved with regard to the interaction and communication between supermarkets and consumers.

For the literature review I searched the WUR library databases Scopus, Agecon search, Ovid, Springer, and I used the database google Scholar. I also used the website of the World Research Institutes to get access to information about the impact and extent of food waste. Furthermore I used the website of the Waste and Resources Action programme (WRAP) for information about how to reduce household food waste and the reluctance towards food waste reduction. During the literature review I used the citation pearl searching approach, I began with one article of interest found during searching a database and I consulted the references of the article to build a body of literature that is relevant for this thesis.

The search terms used are:

Food waste
Consumer
Retailer
Supermarkets
Food waste behaviour
Food provisioning process
Consumer behaviour
Supermarket food waste
Communication consumer and supermarket
Supermarket influence
Drivers household food waste
Reduction

I used different combinations of these search terms and searched for them in the title abstract and keywords. Once I found articles I quickly reviewed the abstracts and based on the abstracts I decided whether the articles were relevant for this thesis or not. .

After the literature review I did a critical analysis on all the articles and information that I found and combined it. After the critical analysis I divided all the usable over five chapters. At the end of each chapter a table is provided with an overview summary to help the reader to remember the main points introduced in that chapter.

1.3 Literature review on food waste

There is an increasing public and political concern about the present state and the impact of food loss and waste (Koester, 2015; Stancu et al., 2016). The broad concepts of food loss and waste will be explained in this part of chapter 1. Furthermore the facts about the current and future food loss and waste will be mentioned and the consequences of food loss and food waste will be described. Finally the benefits of food loss and waste reduction will be revealed in this section.

1.3.1 The food waste problem

By the year 2050, the world needs to adequately feed more than 9 billion people, in a manner that advances economic development and reduces negative impact on the environment. This is one of the challenges the world faces over the next decades (Searchinger et al., 2013). There exists a gap between the amount of food available today and the amount of food needed in 2050. If the global food demand continues on its current trajectory there is a need for 60 percent more food calories in 2050 compared to 2006. This gap is partly due to the increasing population and the increase in wealth. By 2030 at least 3 billion more people are likely to enter the global middle class. People in the middle-class will almost certainly demand for more resource-intensive foods like meat and vegetable oils. At the same time, around 870 million of the world's poorest people remain undernourished and have hunger every day (Searchinger et al., 2013). The current amount of global food loss and waste is more than enough to feed all those hungry people in the world (Melikoglu, Lin, Webb, 2013).

Some experts mention that equal distribution of food could will solve this future food challenge (Searchinger et al., 2013). But the Food and Agriculture Organisation (FAO) concluded that if all the food calories available in the world today were equally distributed across the estimated population for the year 2050 and no calories were lost between farm and fork, those calories would still fall short of more than 200 kcal per person per day based on the average daily energy requirements (FAOSTAT,2012; UNPD, 2011). The average daily energy requirements of the FAO are 2,300 kcal per person a day (FAOSTAT,2012). So the current amount of global available food is insufficient to feed the world in 2050. The FAO defines food availability as all edible food intended and available for human consumption, it is the sum of food consumed, food lost after harvesting and food wasted up to the point of consumption (Searchinger et al., 2013). There is a need for a solution to eliminate hunger and to provide the growing world population with sufficient food.

Based on the *great balancing act*¹, reduction of food waste could be considered as a one of the solutions for a sustainable food future (Searchinger et al., 2013). Reducing food waste is an achievable and important approach to making both food production and consumption more sustainable and it will deliver significant economic, social and environmental benefits (WRAP,2015). If the current rate of food loss and waste were to remain in 2050, the gap of 200 kcal per person per day would grow to a shortage of more than 900 kcal per person per day based on the average daily energy requirements (Searchinger et al., 2013). If only the current food waste and loss rate would be cut in half by the year 2050 the world would need about 1,314 trillion calories less food per year than it would if food waste and losses would continue in the same rate as it is now (Lipinski et al., 2013). Overall global food availability is lower than it would be due to food loss and waste, this negatively affects the food security and requires the agriculture system to produce massive amounts of additional food to compensate for the food that is not consumed by people (Lipinski et al., 2013). Reducing food loss and waste is beneficial because it would make more food available, could improve the finances of farmers and other actors in the value chain and it would avoid a wide range of environmental impacts (Searchinger et al., 2013).

¹ Series of working papers on creating a sustainable food future

1.3.2 Food loss & food waste

In literature there is a distinction between food loss and food waste. Unfortunately there exists no consensus about the definitions (Koester, 2015). There are over 100 different definitions of ‘food loss’ and ‘food waste’ (FUSIONS, 2014). Food waste and food loss appear when food intended for human consumption is not used as such (Soethoudt, Bos-Brouwers, 2014). The FAO defines food loss as any change in the availability, edibility, wholesomeness or quality of edible material that prevents it from being consumed by people (FAO, 1981). Food loss is the unintended result of an agricultural process or technical limitations (Lipinski et al., 2013). Food waste is defined as the loss occurring at the retail and final consumption stages and is related to retailers’ and consumers behaviour (Parfitt et al., 2010). Drinks are also included in the term food waste (WRAP, 2015). Food waste can be distinguished in avoidable and unavoidable food waste. Avoidable food waste can be defined as the waste of edible food, this includes products that could have been eaten and consist of prepared but uneaten food, food which was left and expired and other food products that were disposed of in edible conditions. Unavoidable food waste can be defined as waste that occurs during preparation of food, this includes: bones, peels, shells, stalks, cheese rinds, coffee ground, meat and fish remains, tea residue, etc. (Soethoudt, Bos-Brouwers, 2014; Bernstad Saraiva Schott, Andersson, 2015).

1.3.3 Food waste around the globe

Food is lost and wasted to a varying extent across the globe, across all stages of the food supply chain and across all types of food (Lipinski et al., 2013). Multiple attempts have been made to quantify global food loss and waste over several decades, motivated partly by the need to highlight the scale of the loss and waste in relation to the hunger across the world (Parfitt et al., 2010.) The FAO estimated that 32 percent of all food produced in the world in 2009 was lost or wasted (Gustavsson et al., 2011). That is about 1.3 billion tonnes of food every year (UNEP, n.d.). Food waste estimations are made based on weight, a ton of fruit is the same as a ton of grain, which is the same as a ton of meat. But we cannot simply compare a ton of meat with a ton of grain (Koester, 2015). Converting the weight of the 32 percent of food production that is lost and wasted worldwide into calories means that global food waste and loss amounts to approximately 24 percent of all food calories produced (Lipinski et al., 2013). This means that about 1 in 4 calories intended for consumption is never actually eaten. These facts must sound shocking in a world full of hunger, volatile food prices, and social unrest (Lipinski et al., 2013).

In the United States the amount of food wasted every year is nearly 61 million tons (Kojima, Ishikawa, 2013). For Australia the amount of food waste generated every year is 4 million tons (Dee, 2013). South Korea generated 6,24 million tons of food waste every year (Hou, 2013), China generates 92,4 million tons per year (Lin et al., 2011) and in Japan the generated food waste is about 21 million tons per year (Kojima, Ishikawa, 2013). In Europe food waste generation is around 90 million tons annually (EC, 2013). The United Kingdom generates most food waste in Europe, namely 14 million tons (WRAP, 2013). These numbers indicate that food waste generation occurs in similar magnitude in industrialised countries (Gustavsson et al., 2011). Figure 1 shows the amount of food loss and wasted in kcal per capita per day for different regions (Lipinski et al., 2013). This figure indicates the big differences between the amount of food loss and waste in developing and developed countries.

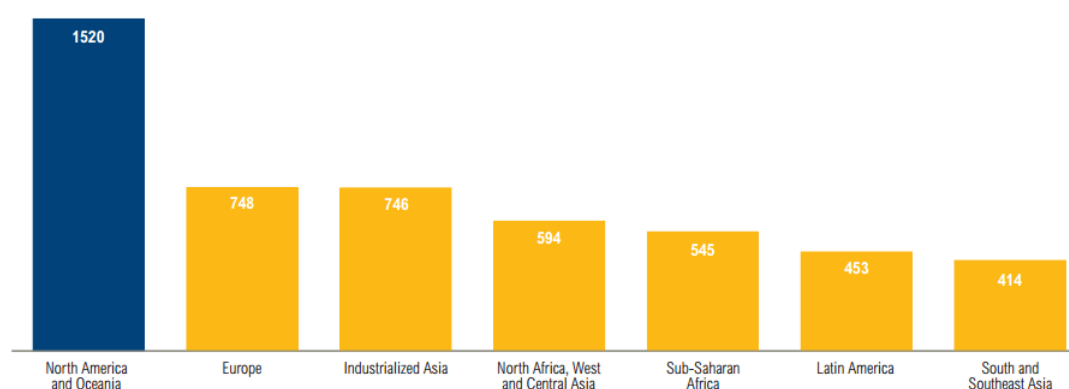


Figure 1 Food lost or wasted by region (Kcal/capita/day), 2009

Source: Lipinski et al., 2013.

Today, 56 percent of the total global food waste occurs in the developed world, including North-America, Oceania, Europe and the industrialized Asian nations of China, Japan and South Korea. However on a per capita basis, North America and Oceania stand out from other regions, with around 1500 kcal per person per day lost or wasted from farm to fork (FAO,2011). The developing countries account for 44 percent of the global loss and waste (Lipinski et al., 2013). On a per- capita basis, much more food is wasted in developed countries than in developing countries (Gustavsson et al., 2011). There exists a substantial difference between the stage in which food waste generation occurs in developed countries and in developing countries. In developing countries more than 40 percent of food losses occurs at the postharvest and processing stages, due to managerial, financial, and technical limitations in harvesting techniques as well as in storage and cooling facilities (Gustavsson et al.,2011; UNEP , n.d.). In developed countries over 40 percent of food waste occurs at the retail and consumer levels. Figure 2 shows food lost or wasted by region and stage in the value chain and supports the fact that in developing countries more food is wasted at consumer level, compared to developing countries (Lipinski et al., 2013).

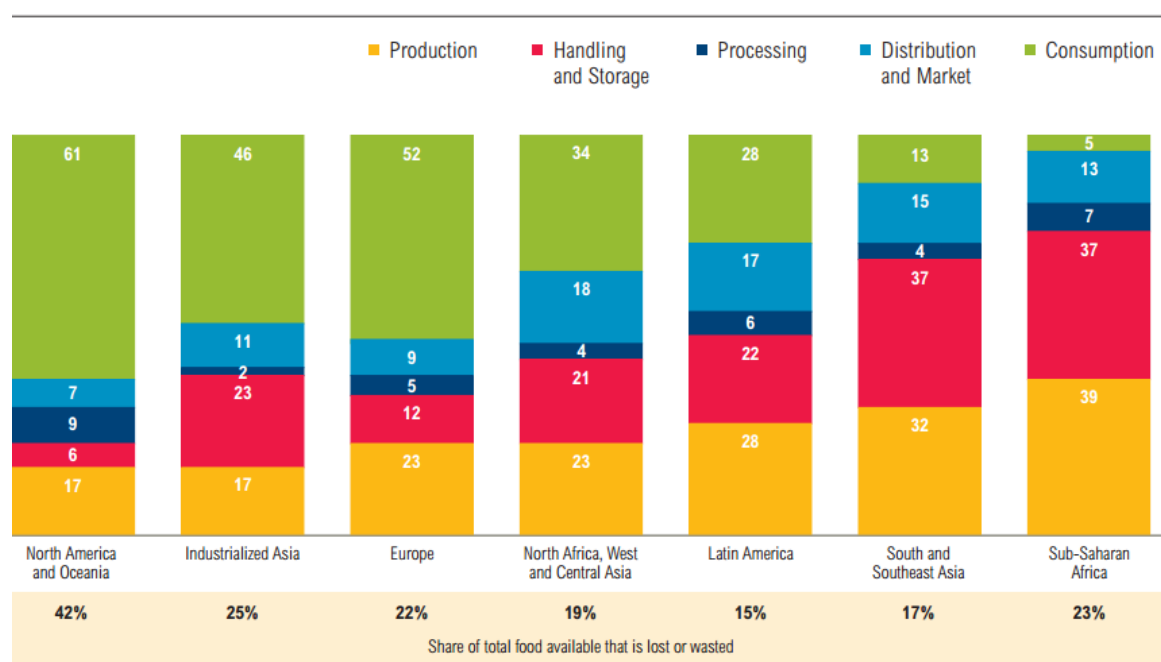


Figure 2 Food lost or wasted by region and stage in value chain, 2009 (Percent of kcal lost and wasted)

Source: Lipinski et al., 2013

1.3.4 Measuring food waste

Measuring of food loss and waste happens in different ways, and measuring methods vary among different studies. Sometimes small numbers of households need to weigh their food waste, or they need to use a kitchen diary and report waste in it. Other researchers use behavioural studies, including thousands of households (Parfitt et al., 2010). Yet others use archaeological excavations of landfill sites to determine the historical levels of food waste (Jones, 2006), or estimate household food waste based on existing research (Sibrián et al., 2006), or use statistical models to estimate household food waste (Hall et al., 2009). This makes it difficult to compare and relate different food waste studies with each other (Parfitt et al., 2010).

1.3.5 Consequences of food waste

Food waste is a major problem in modern society and carries substantial economic, environmental and social costs (Scholz et al., 2015), which will be discussed below.

Economically seen waste and losses reduce farmers' incomes and increase consumers' expenses (Lipinski et al., 2013). In fact money is getting trashed when food is wasted (Payne, 2014). It reduces the economic wellbeing of all actors in the food supply chain. Worldwide all wasted food has a value of about 550 billion euro (WUR,2016a). In the United States approximately 85 billion euro worth of food is thrown away every year (Parfitt et al., 2010), in China the estimation is that 28 billion euro worth of food is thrown away (Zhou, 2013). 27,8 billion euro worth of food is wasted in Australia (Dee, 2013) and in Europe 40 billion euro worth of food is thrown away each year (WRAP,2015). The value of wasted food is based on producer prices, however the value of food increases through the supply chain. So the true economic costs of food waste are much higher (WRAP, 2015). Besides the fact that food waste is a waste of money, it is also expensive to collect and treat the wasted food. Food waste is the largest component sent to landfills (Payne, 2014). The costs of landfilling 32 million tonnes of food waste in the United States for example are around US\$1.5 billion a year (EPA,2014).

Furthermore food waste and losses bring along serious environmental issues. Food loss and waste are a waste of land and water and it produces greenhouse gas emission in vain. The global amount of food loss and waste in 2009 was responsible for 3,300-5,600 million metric tons of greenhouse gas emissions. This amount is almost equivalent to the total amount of greenhouse gas emission from energy consumption in the United States in 2011 (EIA,2012). An average farm in the US requires 3 kcal of fossil fuel energy to produce 1 kcal of food (before accounting for energy requirements of food processing and transportation), this means that the total amount of food waste in the US accounts for approximately 300 million barrels of oil per year (Hall et al., 2009). The food waste in landfills are a source of the greenhouse gas methane, this gas has 21 times the global warming potential of carbon dioxide (Payne, 2014). The emission of greenhouse gasses, contributes to the global climate change and thus to global warming. Food loss and waste accounts for approximately 173 billion cubic meters of water consumption per year, this amount is 24 percent of the total global amount of water used in the agriculture sector (Kummu et al., 2012), this is enough water for 9 billion people to use 200 litre of water a day (Stuart, 2009). Furthermore, 198 million hectares of cropland per year are used to produce all the lost and wasted food, that is an area about the size of Mexico (Kummu et al., 2012). Additionally, 28 million tons of fertilizer are used to make the total amount of lost and wasted food grow each year. The use of fertilizers contributes to emissions of ammonia and other greenhouse gases, soil acidification, eutrophication of surface water and pollution globally (Li et al., 2013). The resources that are used when producing this lost and wasted food also have negative influences on the natural landscapes and the ecosystems (Lipinski et al., 2013). All the mentioned environmental consequences address the fact that there is a need for a more sustainable food provisioning process with less food losses and waste (Searchinger et al., 2013).

Furthermore food loss and waste also have social consequences Food waste is an unethical problem, because food loss and waste have negative impact of the availability of food to others (WUR, 2016a), which creates hunger among millions of people (Payne, 2014). The huge amounts of food wasted could feed millions of hungry people, while yet developed countries spend billions a year to produce food that is never actual eaten, and millions a year to collect and dispose the wasted food (Gunders, 2010). Furthermore farmers will desperately try to provide enough food not only to feed the

many gaping mouths, but also to satisfy our demand and our addiction to surplus. This will have negative social consequences for those farmers, who need to work extremely hard (Payne, 2014).

1.3.6 Types of food wasted

The amount of food loss and waste, and the food categories most wasted are not always consistent across studies (Parfitt et al., 2010). Overall studies indicate that perishable food items account for the highest proportion of food loss and waste. Fresh fruit and vegetables are the most-wasted items, followed by other highly perishable products like bakery and dairy products, meat and fish (Pekcan et al., 2006; WRAP, 2008; Morgan, 2009; Thönissen, 2009).

Food types vary in terms of their water and land use and caloric content per kilogram and the resources needed to produce the food that is why it is hard to compare different types of food. Based on a study by Searchinger et al. (2013) by caloric content cereals comprise the largest share of global food loss and waste with 53 percent. The share of meat is relatively small with 7 percent. In figure 3 the share of global food loss and waste by food type in 2009 are displayed by calories and by weight. However there remains a relatively large difference between the environmental impacts of the different food types. Meat for example has a large environmental impact in terms of greenhouse gas emissions, land use and water consumption per calorie. This combined with the high economic costs of meat may indicate that reducing meat loss and waste should receive at least as much attention as other commodities, despite the relative smaller share of caloric loss and waste (Rejinders and Soret, 2003; Searchinger et al., 2013).

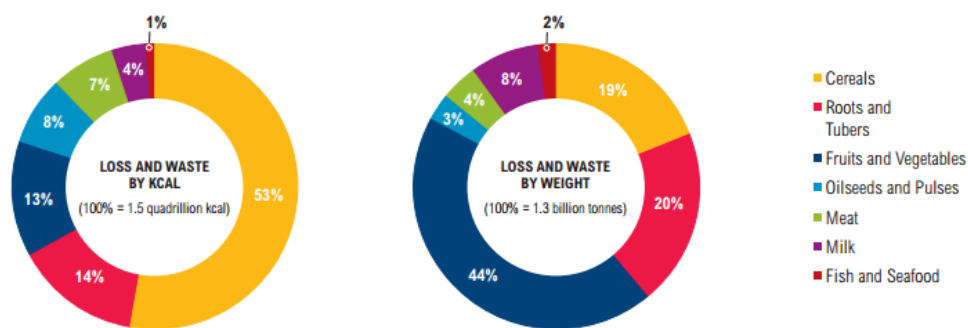


Figure 3: Share of Global Food loss and waste by commodity, 2009- (Lipinski et al., 2013)

1.3.7 Food waste along the supply chain

The global food and agriculture sector has a value of around US\$8 trillion along the food supply chain, which is 10 percent of the global gross domestic product (GDP). It provides employment to over a billion people, which is a third of the world's workforce (ILO, 2014). There exists food loss and waste along the entire food supply chain. Any effort to reduce food loss and waste therefor needs to start with diagnosis of where it occurs (Lipinski et al., 2013).

Food loss and waste along the food supply chain is the outcome of many drivers: resource limitations, climate, the market economy, legislation and cultural differences etc. (Parfitt et al., 2010). Loss in production stage occurs during or immediately after harvesting on the farm. Loss in the handling and storage stage occurs after products leave the farm for handling, storage and transport. During the processing and packaging stage there are also losses. Losses and waste in the distribution and market stage occurs during distribution to markets, including waste at wholesale and retail markets. At consumer level waste occurs in home or in the business of the consumers (Lipinski et al., 2013). In terms of numbers approximately 24 percent of the global food loss and waste occurs at production stage, another 24 percent during handling and storage and 35 percent of the global food waste occurs at the consumption stage (Lipinski et al., 2013). The existence of food loss and waste in all stages of the food supply chain indicates that food production, supply and consumption at the moment is not as efficient as it could be (WRAP, 2015).

1.3.8 Food waste at consumer level

Overall consumers generate the most food waste in developed countries (Stancu et al., 2016; Lipinski et al., 2013). Consumers are followed by agriculture, the hotel and catering sector, the processing and storage sector, supermarkets and the food processing industry (Dooren, Mensink, 2014). At consumer level, food waste in Europe is estimated to represent more than 50 percent of the total food waste (Kummu et al., 2012) and even up to 60 percent in the US (Griffin, Sobal & Lyson, 2009). When using retail prices to value the global food waste at consumer level the value would exceed US\$400 billion (WRAP, 2015). A reduction of 20 – 50 percent of the current global consumer food waste could deliver savings of between 55 and 140 million tonnes of food per year based on 2011 global food waste levels. These savings will have a production value between US\$80 and 200 billion. A reduction of 20- 50 percent of future food waste based on the potential future levels of consumer food waste could deliver savings of between 110 and 280 million tonnes of food which has a value between US\$120 and 300 billion (WRAP, 2015). The potential scale and multiple benefits of reducing household food waste makes it worth the effort of trying to reduce food waste at consumer level (Lipinski et al., 2013).

1.3.9 Future food waste

Consumer food waste is an ever growing problem, and this is illustrated on the basis of the amounts of household food in the United Kingdom over the years. Pre-second World War studies indicated that 1 -3 percent of food was wasted in British households (Cathcart, Murray, 1939). The next big study in the United Kingdom, in 1976, showed that between 5,4 and 6,5 percent of food was wasted in households (Wenlock et al., 1980; Osner, 1982). In 2008 the Waste and Resources Action Programme (WRAP) indicated that the amount of food wasted per year in UK households in 25 percent of the purchased amount (by weight) (WRAP, 2008). This indicates that the amount of food waste at consumer level increased a lot over time.

The estimated future trends in global food waste are that solid waste and urban food waste are predicted to increase by 51 and 44 percent respectively, from 2005 to 2025. Due to the rapid economic and industrial developments in Asia, urban food waste production is likely to experience the largest increases in Asia. The expected urban food waste in Asiatic countries could rise from 278 to 416 million tonnes per year from 2005 to 2025 (Adhikari et al., 2006). In developed countries the forecast is that the majority of food waste is continuing to be produced postconsumer, driven by the low price of food relative of disposable income, consumers high expectations of food quality standards and the increasing disconnection between consumers and how food is produced (Parfitt et al., 2010). The increasing trend of urbanization will only increase the distinction between consumers and their food, it disconnects populations from how food is grown, and this is likely to further increase food waste generation (Parfitt et al., 2010). If there is no action taken these are all strong indications that global food waste will rise significantly (WRAP, 2015; STOA, 2013).

On the other hand it could be that the amount of household food waste will reduce in the future due to global resource and commodity limitations and climate change (Parfitt et al., 2010). Multiple studies suggest that with the help of specific actions reduction of future food waste is possible (WRAP, 2013).

1.3.10 Food waste reduction

The costs of reducing food waste are relatively low this is due to the fact that mostly behavioural change is needed to reduce food waste at consumer level. And the potential economic social and environmental benefits are substantial high (WRAP, 2015). It is relatively straightforward to calculate the immediate benefits of food waste reduction for consumers and businesses when they reduce their own waste. The overall impact on economic growth is more complex to calculate. Reducing food waste and losses will increase the food availability and the economic productivity and at the same time reducing food loss and waste can alleviate poverty while reducing negative impacts on the ecosystems, climate, land and water. So reducing food waste sounds like a “win-win” scenario (Lipinski et al., 2013; WRAP, 2015).

Reducing household food waste by 50 percent between 2012 and 2020 could lead to savings of approximately around 192 euro per person (US\$270) (Rutten et al. 2013). Which leaves more money available for health education and other household benefits (Lipinski et al., 2013).

Reducing waste and losses can alleviate poverty because it reduces poverty and advances rural development, while still being effective (Lipinski et al., 2013). And reducing postharvest losses can increase the amount of food available to farmers for sales and for their own consumption (Lipinski et al., 2013).

Furthermore reduction of food loss and waste helps reduce greenhouse gas emissions from agriculture to levels consistent with stabilizing the climate and the global warming. It is important to stress out that reducing food waste is much more effective in reducing greenhouse gas emission than any other form of food waste treatment (WRAP, 2015). The WRAP (2015) calculated that 7 percent of all global greenhouse gas emission is caused by food waste, this is 3.3 billion tonnes of greenhouse gas emission every year. WRAP estimated that by the year 2030 it is possible to lower the global greenhouse gas emissions by at least 0.2 billion and possibly as much as 1 billion tonnes per year through food waste reductions (WRAP,2015). Better utilizing food already produced reduces the need to convert more land, apply more fertilizers, raise more livestock and use more energy for producing, processing, transporting and storing food. Less food loss and waste means less food in landfills, which means less methane emissions from rotting food (Lipinski et al., 2013). And, reduction of food losses and waste avoids agricultural expansion into remaining natural terrestrial ecosystems and relieves pressure on fisheries (Lipinski et al, 2013).

So there are a lot of benefits connected to food waste reduction, but why is not everybody reducing food waste on a large scale?

1.3.11 Support food waste

Governments are uniquely placed to ensure and support food waste reduction, especially at consumer level. But governments cannot solve the problem of increasing food waste alone. Collaboration within the food supply chain can lead to higher levels of waste protection (WRAP,2015). Food business have a key role in this, especially the large retailers (WRAP, 2015). The top 15 global grocery retailers are responsible for over 30 percent of global grocery sales (Bodimeade, 2013), they have big influences on the consumers as well as on the rest of the supply chain (Buurman, Velghe, 2014).

Many businesses, including supermarkets are unaware of the financial and environmental benefits of food waste reduction. There is often little data about on the amount and types of food waste arising and there is reluctance to share such data amongst each other. Supermarkets are also reluctant to change and reduce food waste due to competitive pressure in the retail market. These factors explain why not more action is being taken to reduce food waste (WRAP, 2015).

But supermarkets are the one place where consumers have direct interaction with one other actor of the food supply chain (Buurman, Velghe, 2014). And supermarkets have a good position to influence consumers with the help of all different kinds of communication methods (Lauritzen, Perk, 2015). So it is really important that supermarkets get involved in supporting consumers to reduce their food waste. In chapter 3 supermarkets will be further analysed to see whether they can influence household food waste.

There is no single solution to reduce food waste. The effectiveness of solutions will depend on the state of development and focus of the entire food industry, the scale and nature of the businesses, existing policy and regulatory landscapes, diets and culture etc.. Action plans to reduce food waste need to be integrated, looking across the whole supply chain. Integrated actions will deliver much more results than action in isolation (WRAP, 2015). Significant reduction in the amount of food waste is certainly possible, but it will require collaboration between the food supply chain actors. (WRAP,2015).

1.3.12 Conclusion

A lot of research is being done to the amount and extent of food loss and waste and the consequences. There is more food loss in developing countries compared to developed countries. And there is more food waste in developed countries compared to developing countries. And most of the food waste

occurs at consumer level. Due to food loss and waste money is get trashed, resources are used in vain and negatively influences the availability of food. It is unsustainable to continue wasting and losing food as is currently happening.

This thesis will continue to focus on food waste and the reduction of it. In order to provide a sustainable food future all food supply chain actors should contribute in de reduction of household food waste (WRAP, 2015). This thesis will especially look at consumers and supermarkets. Consumers are big contributors to the food waste problem. Without any actions being taken, the future amount of household food waste will only increase. That is why it is important to tackle the household food waste problem and prevent its consequences from worsening. The drivers behind food waste at consumer level will be reviewed in the next chapter. Once these drivers are known, corrective actions to reduce household food waste can be created. Consumers are not the only actors that influence the amount of food waste at consumer level, supermarkets create household food waste as well. This thesis will further look into the relationship between the last to actors of the food supply chain, and see whether there exists a change to reduce the amount of household food waste once consumers and supermarkets support each other in the reduction.

Food loss and waste needs to be reduced in order to feed the growing world population.
There is more food loss in developing countries compared to developed countries.
There is more food waste in developing countries compared to developed countries.
Most of the food is wasted at consumer level.
Money is getting trashed when food is wasted.
Resources are used in vain when food is wasted.
The availability of food is in danger when food is wasted.
Mostly perishable food is wasted.
The food waste problem is expected to increase.
Cost of food waste reduction are relatively low, because a lot of behavioural change is needed.

Chapter 2 Consumer food waste

As already mentioned consumers are the biggest contributors to the total amount of food wasted in developed countries. Prevention of food waste seems feasible because there appears to be a lot of potential for reduction in food losses and waste, especially at consumer level (Kummu et al., 2012). Moreover prevention of food waste is the most promising way to achieve environmental, economic and social benefits compared to alternatives that deal with the recycling of food waste (Gentil et al., 2011).

To successfully reduce food waste at consumer level it is essential to have a clear understanding of the drivers behind household food waste and the factors that influence food waste-related consumer perceptions and behaviours both in households as well as on points of purchase (Aschemann-Witzel et al., 2015b). Although preventing food waste is suggested to be the most promising initiative for decreasing the environmental impact of food waste, little is known about consumers' behaviour towards food waste and the determinants of household food waste. In comparison to the amount of literature aiming to estimate the amount of food waste and its social, environmental and economic consequences, studies on consumer behaviour towards food waste are scarce (Stancu et al., 2016). Actually focus should be shifted towards eating the food instead of discussing the wastage of it (Quested et al., 2013). Insights into the determinants, drivers, perceptions and behavior consumers have towards food waste provide a basis for initiatives that promote food waste prevention and reduction at the household level (Achemann-Witzel et al., 2015b ; Stancu et al., 2016).

2.1 Food provisioning process

Many food-related behaviours are embedded in households' food provisioning processes (Jensen et al., 2012; Sobal, Bisogni, 2009). The disposal of food is included in this process (Munro, 1995), and therefore the process will be clarified. The food provisioning process refers to the entire "life cycle of food". The life cycle of food consist of five steps, as describes in table 1, the first step is the acquisition of the food which starts when consumers go to the supermarket to purchase food products. The second step is the preparation of the food, this means the peeling, chopping, blanching etc. of different meal ingredients. The next step is cooking, which includes the boiling, baking, roasting etc. of the meal ingredients. The following step in the food provisioning process is eating, which happens when the consumer consume the meal. And finally the last step is the disposal of the food, which includes the freezing and storing of leftovers and throwing away food in the bin etc. (Bava et al., 2008). The food provisioning process is a continuous cycle without fixed start and end points (Marshall, 1995).

Table 1: Steps in the food provisioning process

Steps in the food provisioning process	
Step	Activity
Acquisition	Going to supermarket, purchasing grocery items
Preparation	Peeling, chopping, blanching, etc. of meal components
Cooking	Boiling, baking, roasting, etc. of meal components
Eating	Meal consumption
Disposal	Cleaning up, freezing and storing leftovers, etc.

Source: Bava et al., 2008

Most experts stress that the lack of planning and management during the food provisioning process is at the heart of the household food waste problem. The lack of planning and management is embedded in constraints of time, and the fact that during the food provisioning process little priority is given to behaviour that reduces food waste. Furthermore there exists a lack of knowledge and know-

how about how to properly store, cook and dispose food. This coupled with a culture of consumerism, food abundance and low food price levels means that consumers tend to buy way too much food and do not care that much about the risk of wastage in the subsequent steps to act in a way that avoids food waste (Aschemann-Witzel et al., 2015b; Evans, 2011).

All steps of the food provisioning process cause food waste at consumer level. During the acquisition step consumers show little tolerance for visual food imperfections, therefore consumers' willingness to pay (WTP) is lower for food with visual imperfections (Yue et al., 2009). Consequently, food is wasted at supermarket level, because food with visual imperfections are not being purchased (Aschemann-Witzel et al., 2015b). This cause of food waste is related to status consciousness. A South African study argued that "status consciousness" (the perceived need to signal status via products) also influences the purchase behaviour of consumers. Especially low income/education consumers take status consciousness into account when making purchasing decisions (Marx-Pienaar, 2014), they demand for food without visual imperfections and leave food with visual imperfection on the supermarket shelves. Likewise, the WTP for perishable products decreases throughout the shelf life of food products, this happens especially quickly when the quality of the product is significantly affected (Aschemann-Witzel et al., 2015b). But then again the WTP is higher in situations in which consumers plan to stop the aging process, by cooking the product right away or freezing it (Tsiros, Heilman, 2005). Checking expiration dates depends on the food category, and consumers interpret labelling dates differently depending on the food category during the acquisition step (Boxstael et al., 2014). Consumers are less willing to buy food with visual imperfections and products close to the expiration date. By knowing this there is a reason to believe that consumers will not serve food with visual imperfections at home, and would rather throw away the food if it was in their possession.

Furthermore, the way the food is set in package can also be a driver for household food waste. A Swedish household study concluded that 20-25 percent of food was wasted due to packaging factors. Packaging factors such as: packages being too large, packages being difficult to completely empty and best before dates on packages that confuses consumers lead to an increase in household food waste (Williams et al., 2012). Especially the fact that package portion sizes are too big is often mentioned by consumers as one of the drivers for household food waste (Aschemann-Witzel et al., 2015b). When retailers offer only big portions, or when the big sizes are relatively cheaper, consumers often buy too much food which will lead to food waste (Aschemann-Witzel et al., 2015b; Priefer et al., 2016). On the other hand, generally consumers do not make optimal use of packaging functions and the information provided on it. So they are not aware or simply do not use the package optimal to prolong the food product's lifetime at home (WRAP, 2013). The main faults consumers make is that they maintain the refrigerator temperature too high, keep leftovers too long, store fruit and vegetables incorrectly, use date labelling to assess disposal even if it no longer applies after opening etc. (Terpstra, 2005). So consumers do not always handle food storage right, and therefore the products' lifetime at home will be shorter (Terpstra, 2005). And shorter product's lifetimes at home means more household food waste, because food needs to be consumed way faster (WRAP, 2013).

Once purchased, generally food products get stored first before they will be prepared to eat. The incorrect storage of the food products will shorten the shelf-life of products and that increases the amount of household food waste (Aschemann-Witzel et al., 2015b). Besides this many customers keep stock of potentially never used items that were bought for a special recipe or for special occasion that has never occurred. At some point these items will be thrown out and increase the amount of household food waste (Wansink et al., 2000).

Likewise the lack of connection between consumers and the production of food may influence the decisions consumers make during the entire food provisioning process and increase the amount of household food waste. It is difficult for consumers to visualize the growth and the production of food products and they have no clue about the time, materials and resources needed to produce their food. That is why consumers might lack the understanding and the ability to properly value their food. When consumers are not aware of the value of their food they tend to waste food earlier (Aschemann-Witzel et al., 2015b). So the distinction between consumers and their food will probably lead to more food waste in the disposal step of the food provisioning process.

During the disposal step it often happens that consumers feel guilty, feel bad or are worried about wasting the food. Those feelings make consumers first place their leftover food somewhere else, typically the fridge, in order to keep open the possibility that they might eat the leftovers at some point

in the future. But however, most of the time the leftovers already decayed before consumers actualize the possibility to eat the leftovers. So feeling bad, feeling guilty or being worried about wasting food makes consumers store the food elsewhere before they throw it out in the bin (Evans, 2012).

It should be recognized by now that the amount of household food waste is influenced by different things during the food provisioning process. Because consumers go through the food provisioning process many times, routines in the food provisioning process will be formed. The formation and the influences of routines on food waste behaviour will be investigated based on existing literature in the next section.

The drivers indicated for food waste at consumer level are:

Little tolerance for food imperfections
Too large portion sizes
Packages being difficult to completely empty
Confusing date labels
Consumers not using the packaging optimal
Incorrect storing techniques
Keeping stock of potentially never used items
Lack of connection between consumers and production
Lack of planning and management skills
Feeling guilty, bad or being worried

2.2 Routines

Consumers food waste behaviour turns out to be pretty hard to change, this is caused by the routinized nature of the food provisioning process.

As reported before all food related behaviours are embedded in the households food provisioning processes. Due to the repetitive nature of the food provisioning process, food-related behaviour becomes routinized (Thomas and Garland, 2004). Generally, routines arise when consumers face repeated decision problems over and over again, and they find a particular solution that works well in that situation (Jastran et al., 2009). Consumer routines in the food provisioning process can be recognized by the observable repetitive patterns with predictable regularity which are noticeable in the food provisioning processes of households. Routines in the case of food provisioning are basically food choice scripts (Stancu et al., 2016). Food scripts include procedural knowledge consumers use in specific food-related situations, containing plans of how to act in a specific situation. Embedded routines provide comfort, predictability and stability to consumers (Jastran et al., 2009; Sobal, Bisogni, 2009). Consumers use planning, shopping and cooking routines as a guide during the food provisioning process and the decision problems it brings along (Stancu et al., 2016).

Consumers' planning routines contribute indirectly to the shopping and cooking routines (Jensen et al., 2012; Stancu et al., 2016). Planning routines that will have a positive effect on the amount of food waste in households include for example, checking the household inventory, making shopping lists and planning meals ahead. Planning routines can also have a negative effect on the amount of household food waste, this happens for example when consumers do not plan meals ahead, do not check household inventory and do not make shopping lists. All these activities will have an impact on the shopping and cooking routines of consumers (Evans, 2012).

Shopping routines are partly affected by the planning routines of the consumers and can have positive or negative influences on the amount of household food waste. Shopping routines like, buying too much food or unintended products, or being tempted by volume promotions will have a negative effect on the amount of household food waste. Shopping routines that include buying just the amount of food the household needs, and not being tempted to buy volume promotion will have a positive influence on the amount of household food waste (Evans, 2012).

The reuse of leftovers embedded in the cooking routine is the most important indicator of household food waste at the cooking stage of the food provisioning process. The better the reuse of

leftovers will lead to less food waste at consumer level (Stancu et al., 2016). A lot of consumers are unable to improvise meals out of what is left in the fridge, and most of the time this has to do with the cooking confidence and skills of the consumers (Halkier, 2009).

The routines used during the food provisioning process of consumers are influenced by the confidence and skills that consumers have in their ability to perform and manage these activities (Stancu et al., 2016). This means that cooking skills have an impact on consumption (Hartmann et al., 2013), and that the degree of confidence in cooking has an influence on the shopping routines of consumers (Winkler, Turrel, 2009). A lack of cooking skills constrain consumer's food choices, they are generally more reluctant to experiment with cooking than other consumers with better cooking skills (Bava et al., 2008). Experimenting with food can lead to an decrease in the amount of food waste (Aschemann- Witzel et al., 2015b). A lack of cooking skills also mean that consumers will find it difficult to improvise meals out of leftovers, which causes leftovers been thrown away (Aschemann- Witzel et al., 2015b). This shows that skills and the ability of consumers to deal with food provisioning activities play an important role in explaining food waste (Lyndhurst, 2007; Watson, Meah, 2013). Furthermore consumers' food provisioning routines are shaped by the social and cultural backgrounds of consumers and what they have been taught about the food market environment that they face (Aschemann- Witzel, 2015b).

Routines are extremely important in explaining actual food waste behaviour compared to the intentions of consumers not to waste food. Routines simplify daily household activities and make life run more smoothly. It provides stability and comfort to consumers when food provisioning processes are predictable and when they know what to expect from day to day and week to week (Jastran et al., 2009).

In order to change consumer behaviour and reduce household food waste, the planning, shopping and cooking routines need to change. Marketers and other actors have little power to influence consumer routines and practices (Betsch, Haberts, 2005). Routines are not easy to change, especially in the light of many other goals and associated trade-offs involved in food consumption (Aschemann-Witzel et al., 2015b). As mentioned by Tione Timmermans (2016) consumers do not have an incentive to change their routines at the moment, this is partly due to the relative low food prices which makes it unnecessary for consumers to change their routines (VARA: Groen licht, 2016). But nevertheless routines have a dynamic quality and are therefore able to adopt to changing contexts as necessary. So, routines are resilient and consistent, but yet always evolving as the household situations change (Denham, 2002). In the next section the trade-offs consumers face during the food provisioning process and which make it hard to change routines will be mentioned.

The drivers for food waste at consumer level due to routines:

Not planning meals and shopping trips
Buying too much food
Low cooking confidence and skills

2.3 Trade-offs

Consumers are facing different types of trade-offs when they make food-related decisions. The presence of such trade-offs makes it hard to change consumers food waste behaviour. These trade-offs occur in every step of the food provisioning process. Consumers handle trade-offs differently from each other and they set their priorities in various different ways. The way consumers handle trade-offs depends on motivation, and managing capabilities as well as the presence of conflicting goals and the trade-offs will have implications on the shopping and cooking behaviours of consumers (Aschemann-Witzel et al., 2015a). Conflicting goals are rooted in psychographic variables, such as health orientation, feelings of disgust, safety concerns, the wish to be a good care-taker of the family etc. (Aschemann-Witzel et al., 2015b). So basically consumers use routines when facing a trade-off, and they develop routines based on trade-offs (Jastran et al., 2009; Aschemann- Witzel et al., 2015a).

During the acquisition step at the supermarket consumers face the trade-off of packaging waste versus food waste (Koivupuro et al., 2012). Consumers need to choose between one large

package, with less packaging waste but presumably more food waste, or smaller portion packages with presumably less food waste and more packaging waste (Aschemann-Witzel et al., 2015a).

During the acquiring step as well as the cooking step consumers make a trade-off between reducing their food waste and being a “good” food provider for the members. A good food provider wants to ensure that all the household member’s wishes and tastes are satisfied, potentially on the expense of purchasing and cooking too much, this allows pickiness and will most likely cause household food waste (Graham-Rowe et al., 2014; Evans, 2011). So here there is a trade-off between being a good food provider and reduction of household food waste.

There exists a lot of consumer confusion about and misinterpretation of the date labelling with regard to food products. Here the trade-offs consumers make in relation to other drivers of food-related behaviours come into play. Consumers rather dispose a product than risk any perceived health risk rooted in food safety concerns. The perceived risk level is higher in scale due to the lack of knowledge and misinterpretation of the date labelling with regard to real and assumed food safety risks (Aschemann-Witzel et al., 2015b). Thus there is a trade-off between the anxiety about the food safety and health risks versus concerns about food wastage. So, basically consumers weigh their priorities on waste reduction and prevention for the sake of the environment versus safety for oneself and their household members (Watson, Meah, 2013).

Another trade-off consumers make occurs during the eating step of the food provisioning process. It is found that consumers or their household members might just simply dislike eating the same meal twice, or they may even feel a certain disgust at the thought of storing and eating leftovers. So consumers need to choose between not wasting food versus storing and eating leftovers, which they disgust (Aschemann-Witzel et al., 2015b).

During the eating step of the food provisioning process another kind of trade-off arises when food does not taste up to consumers expectations. Then consumers need to make a decision between just continue eating the food or simply dispose the food (Aschemann-Witzel et al., 2015b).

Surroundings influence the way consumers make trade-offs. The food choice environment of the store, the retailer’s choice of supply and the marketing and communication of de retailers influence are all surroundings that affect the trade-offs consumers face during the food provisioning process(Aschemann-Witzel et al., 2015b). Trade-offs and goal conflicts can be seen as one of the causes of the gap between consumers’ intentions not to waste food and their actual behaviour (Aschemann-Witzel et al., 2015a). The last factors that may influence the household food waste behaviour are social-demographic factors. They will be stressed out beneath.

Trade-offs consumers face during the food provisioning process:

Packaging waste versus food waste
Reducing food waste versus being a ‘good’ food provider
Environment versus safety
Not wasting food versus eating leftovers
Eating food consumer dislikes versus wasting the food

2.4 Social- demographic factors

Multiple social-demographic factors have an influence of the household food waste. The strongest direct connection between food waste and socio-demographics is the household composition in terms of age and number of household members and their income (Aschemann-Witzel et al., 2015b). Larger households waste generally more food (Koivupuro et al., 2012) and households with higher incomes also waste more food (Stefan et al., 2013). A study of Koivupuro et al. (2012) concluded that particularly woman stood out as the household member that generates the most avoidable food waste. Furthermore, in households where grocery shopping was mainly done by woman the amount of household food waste was considerably higher compared to households where only a man or both spouses were responsible for grocery shopping (Koivupuro et al., 2012). Age also plays a role in the amount of household food waste. Consumers that have experienced scarcity during or after the second world war hardly waste food (Quested et al., 2013). Apart from truly having experienced scarcity, older consumers tend to overall waste less food (Stancu et al., 2016; Stefan et al., 2013). Quested et al.

(2013) underline the importance of taking into account how historical developments have shaped today's food wastage behaviour in the society. Once the development of today's throwaway is known, good solutions for the food waste problem can be developed. But overall the socio-demographic drivers of food waste do not play a major role in explaining household food waste as compared to routines and perceived behavioural control (Aschemann-Witzel et al., 2015b).

2.5 Intentions towards food waste reduction

It is important to stress out how intentions of consumers to reduce their food waste are formed and how the intentions influence the actual food waste behaviours in households. The theory of planned behaviour links intentions to act to actual behaviour (Ajzen, 1991). The theory of planned behaviour posits that behavioural intention is the primary antecedent of actual behaviour (Ajzen, 1991). Consumers are generally waste averse (Bolton & Alba, 2012; Stefan et al., 2013). So based on the theory of planned behaviour there is a reason to believe that intentions to reduce food waste, will lead to household food waste reduction (Stancu et al., 2016). Behavioural intentions are determined by consumers' attitudes towards the behaviour, their subjective norms and their perceived behavioural control (Stefan et al., 2013).

Consumers' attitudes, such as moral attitudes and lack of concern towards food waste consequences determine consumers' intention not to waste food (Stefan et al., 2013). Consumers attitudes towards food waste represent in general a favourable or unfavourable evaluation of food waste reduction behaviour. More favourable attitudes towards food waste reduction are expected to translate into stronger intentions to reduce food waste, built on the theory of planned behaviour (Ajzen, 1991). There are a few things that can influence consumers' attitudes towards food waste, and therefore influence the intentions of consumers. One thing is the amount of money that consumers are able to save when avoiding food waste, the higher the amount of money they can save by food waste reduction the stronger the intention for food waste reduction. Other influencers are more ethical and are related to fairness (e.g., in the light of worldwide hunger), values or religious beliefs or environmental concerns (Aschemann-Witzel et al., 2015b). The more consumers believe that they should not waste food, the stronger their intention not to waste food will be (Stancu et al., 2016).

The subjective norms account for the perceived social pressure to undertake behaviour to reduce household food waste (Thøgersen, 2006). So the higher the social pressure from for example peers, friend, family etc. , the higher the intention to reduce household food waste. But in fact, as research of Stefan et al., (2013) found out subjective norms have weak effects in relation to actual food waste behaviour.

Perceived behavioural control refers to people's perceptions of their ability to perform a given behaviour. The perceived behavioural control is determined by the total set of control beliefs, i.e., past experiences with food waste reduction or beliefs about the presence of factors that may facilitate or impede performance of the food waste reduction behaviour. The more the total set of control beliefs facilitate food waste reduction the higher the intentions to reduce household food waste will be (Ajzen, 1991).

Sadly, there exists a gap between consumers intentions to avoid and reduce food waste and their actual food waste behaviour. Especially the intentions to reduce food waste that arise from attitudes and subjective norms do not result in food waste reduction behaviour (Stancu et al., 2016). The majority of consumers have intentions to include sustainability in their food provisioning processes but consumers do not act according to their intentions (van Dam, 2016). A study conducted by Stefan et al. (2013), also concluded that the intention not to waste food does not have a significant effect on the actual household food waste. Furthermore Stancu et al., (2016) mentioned that the intention not to waste food had a rather small contribution in explaining actual household food waste behaviour. There are multiple other studies that also conclude that the intention not to waste food is not a good predictor of actual household food waste behaviour (Armitage & Conner, 2001). The gap suggest that food waste behaviour is not fully under control of the theory of planned behaviour (Stancu et al., 2016; Ajzen, 1991). In order to achieve household food waste prevention and reduction drivers for food waste behaviour should be tackled, instead on focussing on increasing consumers' intention not to waste food.

2.6 Changing behaviour

When changing consumers' food waste behaviour attention needs to be given to targeting the household routines (Stancu et al., 2016). As mentioned before it is necessary to provide information and knowledge about food waste to consumers. Since consumers tend to forget information it is necessary to repeatedly provide the information via different sources (Aschemann-Witzel et al., 2015b). When the information and knowledge is directed to consumers undergoing crucial life moments the chance exists that the provided information and knowledge changes the food provisioning behaviour and routines of the consumers (Aschemann-Witzel et al., 2015b). Because as reported, routines are embedded in consumers' everyday life, but they have the ability to change when household normal routines become unsure. Routines have a dynamic quality and are able to adapt to changes in attitudes, beliefs, behaviour and food provisioning processes (Denham, 2002). For example, information about date labelling will reduce the confusion about food safety. When consumers understand the date labelling correctly this will have a positive impact on the trade-off consumers make between food safety and food waste. And will probably reduce household food waste, because products will only be thrown out once they are unsafe for human consumption. If consumers also learn to assess foods by the looks, smell and taste of the food the positive impact on food waste reduction will increase (Aschemann-Witzel et al., 2015b).

According to the study of Stancu et al. (2016) efforts to change cooking routines may have the largest impact on household food waste, but shopping routines have a great potential as well. Consumers should learn how to reuse their leftovers in a safe, delicious, good and proper manner. One way to impact these food-related routines is to improve people's skills related to these routines through, for example, cooking courses, booklets on how to deal with food-related routines, education and campaigns (Stancu et al., 2016). Providing consumers with practical tools for their planning and shopping activities will also have impact on consumers' food waste behaviour. Practical tools are, for example, shopping list templates or checklists to remind consumers to check their inventories before they go shopping (Stancu et al., 2016). Improvement of the cooking and shopping routines can directly lead to lower food waste (Stancu et al., 2016).

Surroundings crucially influence consumers during the entire food provisioning process, and they influence the trade-off decisions consumers face. Consumers might learn social norms from food waste debates in the media, the introduction of leftover cookbooks or waiters in restaurant asking whether you would like a doggy bag. These social norms are shared among personal networks, families and friends and will influence the personal norms of individuals. So in order to change consumers food waste behaviour actions that positively influence personal norms towards food waste or that trigger peer influence can be successful (Aschemann-Witzel et al., 2015b).

2.7 Conclusion

There is a gap between consumers intentions to avoid food waste and their actual food waste behaviour. Since consumers' food waste perceptions, habits and behaviour are so embedded in planning, shopping and cooking routines and consumers' everyday lives, a high level of involvement with regard to food waste avoidance is necessary on the part of the consumers (Aschemann-Witzel et al., 2015b). It is hard to change consumers food waste behaviour because of the formed routines. In order to change consumers behaviour and reduce food waste, consumers must change their perceived capabilities and routines related to food waste (Jastran et al., 2009; Stancu et al., 2016). When changing those routines action is needed at the individual consumer level but also on retail level (Aschemann-Witzel et al., 2015b). Not all the drivers of household food waste are inside the control of consumers and that is why supermarkets will be reviewed as actors to support the reduction of household food waste. So the questions that remain are why supermarkets need to get involved in the reduction of household food waste? And why some supermarkets are getting involved in the reduction of household food waste and do other supermarkets fear to get involved in the reduction? And what supermarkets can do to tackle the household food waste problem? What are pioneering supermarkets

already doing to reduce the household food waste problem? And on what scale are they currently operating?

Drivers for food waste occur during the entire food provisioning process.
Trade-offs influence consumers planning, shopping and cooking routines.
Intentions not to waste food do not influence actual food waste behaviour.
Routines have the ability to change.
Changing food waste behaviour should be focussed on changing routines.

Chapter 3 Supermarkets

Food waste reduction and prevention must come through the consumers because the majority of food is wasted in their name (Payne, 2014). There are signals that the food waste at consumer level is an increasing problem (STOA, 2013), but other studies suggest that, with the help of specific actions of other actors, a reduction of household food waste is possible (WRAP, 2013).

Consumers may lack the skills, knowledge and solutions to reduce household food waste all by themselves, but other actors can help them to reduce household food waste (WRAP, 2015a). Governments play a major role in helping and supporting consumers to reduce and prevent household food waste, but they also are not able to solve the problem of household food waste alone (WRAP, 2015a). So which actors are able to support the consumers and the government in reducing household food waste? In this chapter there will be investigated whether supermarkets have a good position to support the household waste reduction, and how they can contribute to household food waste reduction.

3.1 Why supermarkets?

Governments and consumers need the help of other actors to be able to significantly reduce the food waste created by consumers (WRAP, 2015a). Which actors are qualified to help governments and the consumers? Well, food businesses can play a central role in the reduction of household food waste, and in particular the large grocery retailers can support consumers to reduce their food waste. Supermarket are able to communicate to consumers on a large scale about how to avoid and reduce household food waste, and they can implement tools and innovations to support consumers in reducing household food waste. Retailers play such a central role because supermarkets are the direct link in the food supply chain between consumers and producers (Scholz et al., 2015). Supermarkets are constantly in the search for attention of consumers, and customers pay attention to them when they enter the shop, read flyers, see advertisements etc..

Supermarkets aim is to increase their sales by making consumers purchase as much as possible (Buurman, Velghe, 2014). They seek consumer attention and try to attract customers through the use of flyers with special offers, fixed low prices or high quality and service. Supermarkets try to stimulate consumers to buy as much as possible with the help of lights, music, demonstrations, store layouts etc. (Buurman, Velghe, 2014). The aim to seduce consumers to buy as much as possible contradicts to supporting household to reduce their food waste. But besides this contradiction the supermarket is still the number one place where customers get their food, and that is why it is such a good place to make customers aware of their food waste and support them to reduce the household food waste (Buurman & Velghe, 2014). In supermarkets there is a direct interaction between the retailer and the final food supply chain actor, the consumers, and that is why supermarkets play a key role in reducing household food waste (Lipinski et al., 2013; Buurman & Velghe, 2014).

Furthermore supermarkets are the number one food business to support consumer to reduce their household food waste because, presumably no other shop is visited as often by consumers as a supermarket (Buurman, Velghe, 2014). The average customer visits the supermarket between 2,5 and 3,2 times a week (van Berlo, 2011). So there is no other shop that has such a frequent interaction with household members, this is another reason why supermarkets are the designated actors to help consumers reduce their food waste. A detail where supermarkets should pay attention to when creating actions to help reduce household food waste is that the average supermarket visitor is more often a female than a male (Buurman, Velghe, 2014).

Supermarkets have strong influences on consumers lives, because they are the ones that eventually decide on the assortment in the store, and thereby determine what the customers can and cannot purchase and consume (Buurman, Velghe, 2014). Nevertheless, nowadays consumers use their consumption to express their political, environmental and ethical opinions. This phenomenon is called political consumerism (Delacote, Montagné-Huck, 2012). More and more consumers are reflecting on the traditional supply chain hierarchy, and thereby they are questioning the power of supermarkets and the role of experts. Supermarkets are unable to hide, cheat or spin anymore because consumers are better able to compare data and promotions, demolish price structures, destroy marketing strategies

and consumers can transfer and purchase their groceries at other supermarkets. Therefor supermarkets will no longer shape consumers lives completely, instead supermarkets will shape the way their business is run based on their consumers (Bond, 2009). In the end the consumers are through their purchases and consumption of products the final judges of supermarkets' behaviour (Russell, Russell, 2009). An example of how consumers can influence supermarkets' assortment is given in box 2.

In 2012, a picture of pre-packed peeled bananas in a German supermarket shelf appeared on different social media websites. Naturally, bananas have a biodegradable packaging, which makes it unnecessary to pack them. The skin of the bananas makes it easy to transport and store them. And it is not very hard to peel bananas, you do not need a knife, the skin practically falls off on its own. That's why most customers thought selling pre-packed peeled bananas is ridiculous. What made it even more ridiculous is the fact that the supermarket chain's slogan urges the customers to use more common sense when it comes to the environment when shopping. Customers of the Billa Supermarket chain called for a boycott of the stores, and eventually the supermarket chain apologized and has withdrawn the pre-packed peeled bananas from the assortment (Baker, 2012).



Box 2: consumers that influence assortment of supermarket (Baker, 2013).

The top 15 of global supermarkets chains are responsible for over 30 percent of global grocery retail sales (Bodimeade, 2013). The 'throw away' habits of consumers need to be reversed, and as mentioned supermarkets have an enormous capacity to influence and innovate in this area (Presswire, 2006). Recently, supermarkets have been making a greater effort to reduce their own food waste and to communicate their efforts to the public (Schneider, Leberorger, 2014), now it is time they start to reduce a bigger food waste problem. Due to their enormous influencing capacities they can start reducing household food waste and communicate these efforts to the public. Further on in this chapter the lack of supermarkets involvement in household food waste will be mentioned, and the reasons behind this will be stressed out.

3.2 Food waste at retail level

In discussions about food waste and food waste prevention, retail is often blamed for being a big contributor to the total amount of food waste (Schneider, Lebersorger, 2009). However, only a small percentage of the overall amount of food wasted along the food supply chain is produced at retail level (Schneider, Leberorger, 2014). The estimated amount of food waste at retailers in developed countries is varying between 5% in the food supply chain in Germany (Kranert et al., 2012), 6.5 % in the Swedish food supply chain (Stare et al., 2013) and 7,6% in the food supply chain in the United Kingdom (WRAP, 2010).

Food waste in supermarkets occurs when they throw away food in whose packaging has been damaged for example. And they also throw away food that is approaching its expiration date (Payne, 2014). Besides this customers are also causing food waste in supermarkets, when they pinch to hard in fruit to see whether it is ripe for example (Buurman, Velghe, 2014). The waste landscape of modern supermarkets make consumers apathetic to food and food waste and the fact that so much food is being wasted. They notice that the supermarkets waste food, and just simply copy that behaviour

(Payne, 2014). As mentioned above supermarkets are reducing their own food waste, they do this by donating the food, which they would have otherwise thrown away, to charity (Giroto et al., 2015).

The little share of supermarkets of the total amount of food wasted in the supply chain does not mean that supermarkets do not cause food waste in other parts of the supply chain. As mentioned before food waste happens in every stage of the food supply chain. It starts on farms from the very moment seeds are placed into the ground (Payne, 2014). Farmers are under the natural pressure of disasters such as pests, drought, diseases etc. but modern farmers in developed countries are under the additional pressure of supermarkets and manufacturers. Supermarkets have strict cosmetic requirements and standards for all food items in their store (Payne, 2014). Western standards demand uniform products that meet length, weight and colour (Stuart, 2009). Carrots, for example, must be straight and vibrant in colour, carrots that do not meet these requirements are left to waste. All types of fruit and vegetables like, kiwis, citrus fruit, nectarines, apples, peaches, tomatoes, lettuces, pears and strawberries are all restricted to the same cosmetic regulations that require a specific weight and need to be without (natural) blemishes such as spots or small bruises. These regulations result in large amounts of food waste. A pear farmer with 20,000 pear trees, for example, estimates that roughly 5 tons of his harvest are typically left in the field to rot (Bloom, 2010). And in the United Kingdom a third to a half of all vegetables grown for supermarkets are rejected, largely because of those strict restrictions (Stuart, 2009). So supermarkets contribute to food waste at the beginning of the supply chain.

But then again supermarkets are catering for human demands, the supermarkets apply aesthetic standards to accept or reject foods based on the assumption that consumers only purchase foods that fulfil these standards (Aschemann-Witzel et al., 2015b). And indeed consumers show little tolerance for cosmetic imperfections, customers with higher environmental concern are more tolerant (Yue et al., 2009). At the point of purchase consumers use the appearance of the food as a cue to estimate the level of food quality (Aschemann-Witzel et al., 2015b), and that's why supermarkets attach much value to the cosmetic standards of food products. So as long as consumers demand well-shaped fruit and vegetables, supermarkets will set high requirements for farmers, and food loss at farmer level will continue (Payne, 2014).

Supermarkets also cause household food waste, because of the volume promotion, portion sizes, date labels that cause confusion, unclear storage advices etc. (Stancu et al., 2016). The causes of household food waste are also mentioned in chapter 2. Most of the mentioned causes are due to supermarkets decisions, actions and assortments. Because supermarkets are partly causing household food waste they are definitely the right actor to solve the household food waste problem.

3.3 Supermarkets involvement

The financial, social and environmental benefits of reducing food are significant, as mentioned in chapter 1. But there is still little action taken by supermarkets to reduce the household food waste (WRAP, 2015a), while they have such a good position to do so. Businesses, especially supermarkets may have concerns about the impacts of reduced customer waste (WRAP, 2015a). For successful household waste reduction it is important to provide supermarkets, and other food businesses, with clear evidence of the drivers for action. The drivers for action may be financial benefits, public pressure or pressure from consumers or other businesses (WRAP, 2015a). Furthermore there need to be demonstrated to supermarkets that waste prevention measures are mostly behavioural and therefore mostly low-costs actions are needed for success (WRAP, 2015a). Generally supermarkets give storage advices to customers when they ask about it, but supermarkets are not actively trying in their store to reduce household waste (Buurman, Velghe, 2014). There are a number of reasons that can explain the fear for involvement in household food waste reduction.

3.4 Fear for involvement

The current activities of retailers are driven by increased efficiency and the aspiration of achieving optimal revenue (Aschemann-Witzel, 2015b). Many retailers are unaware of the financial, commercial and environmental benefits household food waste reduction will have for them (WRAP, 2011a). There may not be a strong or visible enough economic incentive for supermarkets to reduce food waste at

consumer level (WRAP,2015a). The reduction of household food waste brings costs, and supermarkets fear that the benefits would not exceed the costs of supporting food waste reduction. However the social and environmental benefits from reducing household food waste can provide additional incentives for supermarkets to improve their corporate social responsibility position and to improve their relationships with its suppliers, consumers and communities. This can count as a strong motivator to help reduce household food waste despite the weak economic encouragement (WRAP,2015a).

Supermarkets are also reluctant in implementing activities to reduce household food waste because they fear that their profits will decrease. It is true that consumers may increase their consumption of non-food items when their income increases. And that consumers will buy less food when they try to reduce their household food waste (WRAP, 2015a). But generally, the improvement of the supermarkets corporate social responsibility can generate goodwill for the supermarket and increase supermarkets profits (Russell, Russell, 2009). Consumers who perceive a supermarket as more socially responsible also maintain a higher level of loyalty towards that company, which indicates a better competitive position for supermarket that try to reduce household food waste (Pivato et al., 2008). Researchers of the WRAP (2014) concluded that half of the amount of money household saved because they reduced their food waste was used to buy more expensive foods and drinks. While the other half was either saved or spent on non-food products and services. So based on this research the profits of supermarkets on food and drink purchased will decrease by less than the reduction in the amount (or weight) of food purchased due to the increased spending on more expensive food and drinks. So this reduces the negative financial impact of lower food sales on food retailers. The sales of big grocery retailers that also sell non-food items might even increase, because the money saved by households by food waste reduction is spent on non-food items (WRAP, 2014). The reluctance of a supermarket to reduce household food waste can even lead to a reduction in profit (Klein et al., 2004). Consumers can use political consumerism when they notice that the supermarket is not corporate responsible enough. They can for example boycott the supermarket to put pressure on the supermarket (Klein et al., 2004). Supermarkets fear decrease in their profits when they start actions to reduce household food waste, but actually they need to fear decrease in their profits when they do not take any actions (Russell, Russell, 2009).

Furthermore supermarkets fear to share data about the benefits for them of reduced household food waste. This is due to the commercial confidentiality concerns and competitive pressure. Once a supermarkets find a way to reduce household food waste and can benefit from it, the supermarket would probably not share this with its competitors (WRAP, 2015a). But transparency and data sharing among supermarkets about the benefits of household food waste reduction can start an extra competition for supermarkets, they all want to be the supermarket that reduced household food waste the most (Channel 4, 2012). So transparency and data sharing among supermarkets can be beneficial for the reduction of household food waste, and even for supermarkets.

The one thing that supermarkets do not fear is a financial penalty for creating household food waste. Supermarkets would have started to involve in the reduction of household food waste a long time ago when supermarkets suffer a financial penalty. The pressure to reduce household food waste would have been way higher if supermarkets suffer penalties, and supermarkets would have recognized the enormous influence they have on household food waste (WRAP, 2015a). But in real life it is hard to implement financial penalties for supermarkets based on the food waste of their consumers (WRAP, 2015a).

Consumers are trying to change their food waste habits now the retailers need to step up and play their part by helping to design out food waste before it happens, because they have the best position to do so. Until supermarkets demonstrate that they are willing to reduce their waste, and help consumers reduce their waste, it cannot be expected that consumers get fully engaged in reducing their own waste all by themselves (Presswire, 2006). The real impact of supermarkets will arise when the commitment of supermarkets to reduce packaging and food waste becomes 'business as usual' for them (Presswire, 2006). Food retailers need to work together with their consumers to understand how their actions influence consumers and how their actions can help to reduce household food waste (WRAP, 2015a). But it is important to keep in mind that much of the worlds' food is sold by smallholders and small businesses. Large food retailers are undoubtedly able to have a significant impact on household food waste reduction, but small and medium sized retailers require different

types of messages and support and are less likely to sign up to voluntary agreements (WRAP, 2015a). Some supermarkets, mostly large retailers, are trying to make household food waste reduction 'business as usual', and start initiatives to actually reduce the food waste at consumer level.

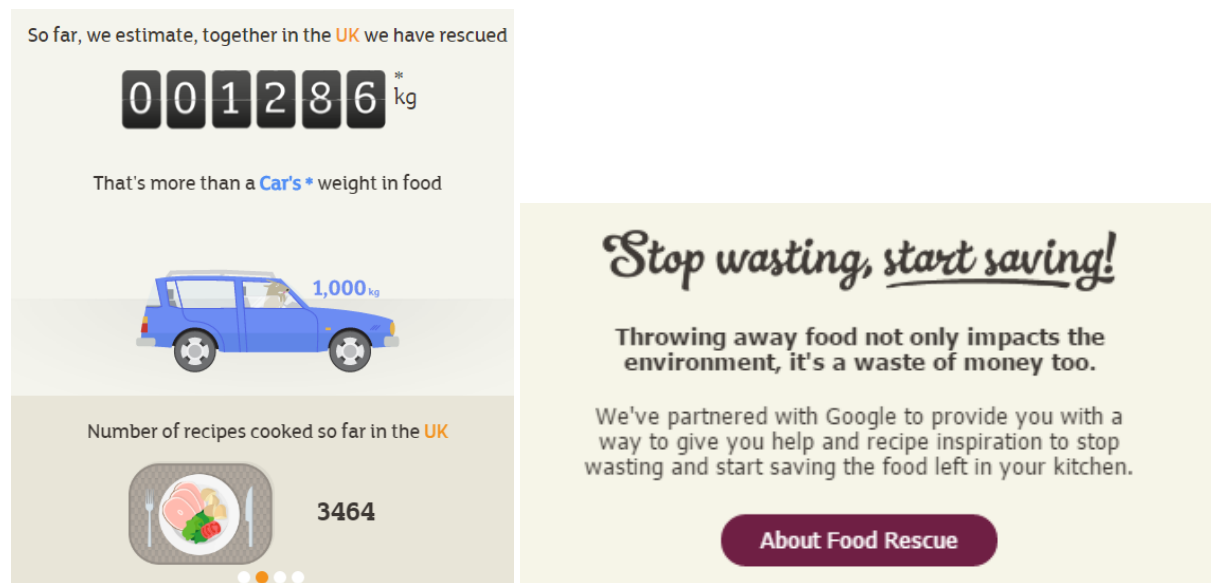
3.5 Pioneering supermarket initiatives

Pioneering supermarkets have come up with a number of different approaches to tackle food waste at consumer level (Lipinski et al., 2013). There are some signs of progress in reducing food waste at the consumption stage due to those pioneering approaches, but it is still relatively small and concentrated in a limited number of supermarkets and countries. There is a need to scale those approaches up in order to create a really significant reduction of household food waste (Lipinski et al., 2013). There are many drivers behind food waste at consumer level, as mentioned in chapter 2, the pioneering supermarkets try to influence those drivers (Gunders, 2012).

A lot of consumers do not realize how much of the food waste is actually occurring at their homes. In 2006, 90 percent of the UK customers thought that they were wasting very little food. That's why pioneering supermarket started campaigns to raise awareness amongst consumers (Lipinski et al., 2013). Awareness about household food waste can influence consumers food provisioning routines. Once consumers have more insight in the enormous amount of food they waste, they can start making different trade-off decisions which will eventually change the food provisioning routines (Aschemann-Witzel et al., 2015b). Lipinski et al. (2013) also mention that creating awareness among consumers is a good way to influence consumers food waste behaviour. Campaigns can also give guidance and instructions to consumers about how to maintain food safety, and how to interpret and understand a label (WRAP, 2015a). Some supermarkets try to inform their customers with the help of flyers and magazines, but supermarkets that inform their customers in-store are rare (Buurman, velghe, 2014). Below an example of a campaign of pioneering supermarkets will be given. The third- and fourth- largest grocery retailers in the United Kingdom, Sainsbury's and Morrison's respectively, created waste reduction campaigns. These campaigns pointed out the issue of food waste and tips for reducing food waste to consumers who might otherwise be uninformed. They spread their campaigns through in-store displays, flyers, websites with recipes, storage tips, and information on freshness and shelf lives of the food products. There was significant evidence that the amount of household food waste indeed decreased due to these campaigns (Lipinski et al., 2013). Another example is that of the Worcestershire county council in the United Kingdom. They started a campaign to reduce food waste in a small geographic area with around 9000 households. They undertook a 3 month campaign in 2011, 70 local businesses including supermarkets formed partnerships and helped consumers to reduce their waste. The campaign reduced the household food waste in that area with 14.7 percent in just 3 months (Lipinski et al., 2013). Another example of a food waste reduction campaign introduced by a supermarket is given in box 3.

Box 3

One concrete example of a campaign is Sainsbury's Food Rescue campaign. The slogan of the campaign is: Food rescue: Stop wasting, start saving. Sainsbury created a new online tool called Sainsbury's food rescue to help families cut down their food waste. The tool gives tips and ideas on how to use up the food that consumers already have in their possession. Users can give the tool input up to nine ingredients to find recipe ideas. In this way consumers are able to turn food items they already have into something delicious, before the items will pass the expiration date. The tool also estimates the total weight of the food already saved and the amount of money saved with the help of the tool. Currently (19 Jun. 16), they estimate that the tool rescues more food than the weight of a car. Consumers are able to keep up with these estimates via the tool. Sainsbury made a campaign video for their new tool, to make consumers aware of the fact that action to reduce food waste at consumer level is needed. Consumers are able to view this video online (Brooks, 2014).



Dates provided on the packaging of food and drinks are intended to provide the customer information about the freshness and safety of the food products. But the different types of labels confuse the customers about how long the food is safe for them to store and when they should dispose food products (Gunders, 2012), this problem is also identified in chapter 2 as one of the drivers behind household food waste. Consumers use the date labelling when making a trade-off between food safety and food waste (Aschemann-Witzel et al., 2015b). One fifth of the household food waste in the United Kingdom is thrown away because food is being perceived as out of date due to wrong interpretation of the labelling, but most of that food is still edible (WRAP, 2011b). And earlier research of the WRAP (2008a) mentioned that almost three quart of their respondents used the expiration data displayed on the label to decide whether or not food was still edible (WRAP, 2008). In another research consumers where asked whether they would throw food that has reached the expiration data out as soon as they noticed it, 48 percent of the respondents said that they would immediately throw the food out , without checking the sensory aspects of the food to see whether or not it is still edible (CREM, 2010). These researches address the fact that in the trade-off between food safety and food waste consumers choose more often for food safety and thus throw away food that is actually still safe just because they did not interpret the date labeling correctly (Aschemann-Witzel et al., 2015b). So there may be room to reduce unnecessary household food waste by clarifying the meaning of date labels and change the ways in which they are used, displayed and interpreted by consumers (Lipinski et al., 2013). The confusion is mostly due to the number of different date terms that appear on packages. In the United States there

are three commonly terms, namely ‘sell-by’, ‘best if used by’ and ‘use-by’, all three refer to the taste quality of flavour of the food instead of food safety. However consumers often view those dates as a measure for food safety (USDA, 2011). Due to this misconception, consumers will throw away their food because they believe it is not safe to eat anymore (Lipinski et al., 2013). Grocery retailers should remove the guesswork from determining what a date on a package means, to provide clarity to customers and to reduce household food waste. One of the world’s largest retailer, Tesco, is serving more than 50 million customers around the world. Tesco has an ambition to reduce global food waste by working with its producers and suppliers, and by helping customers to reduce their food waste. Tesco conducted a research to see whether there exists real confusing among customers about the different dates on packages. They did a pilot with using only a single data code on meat, vegetables and fruit in supermarkets in the United kingdom. The pilot lead to significant food waste reduction and that is why Tesco decides to simplify its entire date coding system (Lipinski et al., 2013).

Enhanced storage and freezing guidance helps consumers to understand the best way of storing different types of food. Because as mentioned in chapter 2 the bad storage practices of consumers are a driver for food waste during the food provisioning process (Aschemann-Witzel et al., 2015b). The storage guidance’s needs to be displayed either on pack or on the loose produce bags, and it will encourages customers for example to store particular products in the fridge where it will last considerably longer (WRAP, 2015a). A variety of processing and packaging techniques can also help to increase shelf-life, in order to decrease household food waste (WRAP, 2015a). Longer shelf-lives will lower the change of food waste, and that is why providing consumers with good storage advices is a good initiative for supermarkets to support household in food waste reduction (Aschemann-Witzel et al., 2015b). The co-operative Group in the United Kingdom, owning 2,800 supermarkets across the country, has begun printing tips for improving food storage and lengthening shelf-life for fruits and vegetables directly on the packages in which consumers place their purchases. They started this initiative in order to assist customers in optimizing their storage practices and increase the shelf-life of their purchases (Ferguson, 2009). In the picture below one of the packages for fruit and vegetables introduced by the co-operative group is shown, on the bag storage tips are given. In this way supermarkets can improve the confidence and skills of consumers around managing and preparing food, and as mentioned in chapter 2 confidence and skills influence household food provisioning routines (Stancu et al., 2016). The higher the confidence and skills of consumers around managing and preparing food the lower the amount of household food waste will be (Stancu et al., 2016).



[online image¹]

One other driver of household food waste is that consumers simply purchase too much food (Evans, 2012). This is partly due to the fact that supermarkets use (volume) promotions which aim is to make consumers buy more than they actually need, this of course negatively influences the amount of household food waste (Blanke, 2015). There are different types of promotions: the buy-one (/multiple) -get-one-free promotions, multiple products which get sold as one for a fixed price (three products for 2 euro), or a price reduction. Generally supermarkets do not take household food waste into account when deciding on the type, the amounts and the price of promotions. When deciding on the price of promotions only the selling price of other supermarkets is taken into account (Buurman, Velghe, 2014). The Co-operative Group, which gives consumers storage advises, also abandoned the “Buy-one- get- one- free” promotions for the perishable products. They switched to price reduction promotions on such products instead (Ferguson, 2009). In this case consumers are less tempted to buy more food than they actually need, which will reduce the amount of household food waste. The Tesco supermarkets and the Dutch part of the Lidl supermarkets still have Buy-One-Get-One-Free promotions, but the second product can be picked up later. So customers are having the benefits of the promotion but they are less likely to waste their food, because they can postpone the retrieval of the second item. It is beneficial for the supermarket as well, because the supermarkets are more or less ensured that the customer will visit the store again (Buurman, Velghe, 2014). Most supermarkets give discount on food products that are reaching their expiration date, this is in order to reduce supermarkets food waste. When consumers buy this types of products they are generally aware of the fact that they need to consume the product pretty quick after they have purchased it (Buurman, Velghe, 2014). So discount on almost expiring food products will not have a big influence on household food waste, as compared to buy-one-get-one-free promotions and volume discounts.

Consumers also mention portion sizes as one of the drivers for household food waste (Priefer et al., 2016; Aschemann-Witzel et al., 2015b; Buurman, Velghe, 2014). Consumers argue that if supermarkets would offer different portion sizes, that their food waste would reduce significantly (Buurman, Velghe, 2014). Different portion sizes give consumers the change to be able to buy just the amount of food they need. The reverse of offering many different portions is that supermarkets are likely to have more waste, because they overstock all the different portion sizes (Buurman, Velghe, 2014). And different portion size packages mean more packaging materials, which lead to more packaging waste. But the rise in packaging waste is “less evil” than food waste, given that the environmental impact of the used resources of food waste is way bigger than the environmental impact of the used resources for packaging waste (Aschemann-Witzel et al., 2015b). Differences in prices among different portion sizes can also be a stimulant for food waste. When the price of the biggest portion size is relative low in relation to the smaller sizes, consumers are more likely to purchase the bigger one, even when they do not need the bigger one. So because of the price differences between the different portion sizes can make customers to buy more than they actually need, which will lead to household food waste (Buurman, Velghe, 2014). Supermarkets do not take household food waste into account when deciding on the selling price of the different portion sizes (Buurman, Velghe, 2014). Most of the supermarket do offer different portion sizes, but none of the supermarkets adapt the prices of the different portion sizes to avoid household food waste. So here might be room for a pioneering supermarket to jump in. One new trend in the field of portion sizes is the arrival of stores where people can decide on the exact portion sizes they purchase. This new trend will be described next.

In September 2015 a bag&buy store opened in the Netherlands. The store only sells products out of dispensers, trays and jugs, so it is a store without packaging. People bring their own pots and jars to put their purchased food products in. This is a sustainable way of grocery shopping because it will reduce the amount of plastic, paper and cardboard packages we use. Another benefit is that consumers are able to decide on the amount of food they buy, they are not bounded to the portion sizes that supermarkets offer. Because consumers can decide on their own portions it is easier for them to buy the exact amount of food that they need, which can lead to household food waste reduction (Bag & Buy, 2015). Unfortunately the bag & buy store went bankrupt so consumers in the Netherlands are no longer able to decide on the portion and packaging of the products they buy and are bounded to the supermarket constraints again. But there are some more successful examples in other part of the world. In America there is a biologic supermarket, Wholefoods, with a special section “bulk foods” , which is a great success. And in Berlin a store named Original unverpackt opened its doors. In Antwerp there is a same type of store named Zero Waste (De Amersfoortse, 2016). The opening of such stores

suggests that there is a demand of consumers for stores that will help its customers to reduce their household food waste. This shows that some pioneering supermarkets are trying to adjust their store concept to make it easier for consumers to buy more sustainable products. Hereafter in this thesis this type of stores will be referred to as: new type of store.

Status consciousness and the lower willingness to pay for food with visual imperfections also leads to food waste at consumer level. A big retail company in the Netherlands, Albert Heijn, is selling ‘*buiten beentjes*’ which can be translated into misfits. They sell fruit and vegetables that otherwise would have been rejected based on their looks, this is a brave attempt to relax the cosmetic food standards (Kromkommer, 2014).



[online image²]

Because the initiatives are still small scale, there is no significant reduction in the global amount of food waste. But that fact that supermarkets are trying to reduce the household food waste proves that supermarkets are finally seeing the benefits of household food waste reduction, and that probably more supermarkets will follow the example of these pioneering supermarkets. Pioneering supermarkets can be described as supermarkets that recognize that some drivers of consumers' food waste are inside their control and try to do something about this. Once this happens it is likely that significant reduction of global household food waste will occur. The fact is though that all pioneering supermarkets are large retailers, but small and medium retailers are not involved yet. In Europe 99,1% of all the 287.000 food and drink companies are small or medium sized enterprises (FoodDrinkEurope, 2014). These small and medium sized enterprises need to join the pioneering supermarkets before large scale household food waste reduction can occur.

3.6 Conclusion

Supermarkets do have a great position in helping consumers and governments to reduce household food waste. They have the capacity to influence consumers, and have direct interaction with their consumers. Many drivers of household food waste are inside the control of supermarkets, and this makes them really important in food waste reduction at consumer level. Those drivers are promotions to make consumers buy more than they actually need, the offering of too large portion sizes, confusing date labels, bad storage guidance's and unresealable packages. Supermarkets are the ones that can influence those drivers such that it would be easier for consumers to change their food waste behaviour. But supermarkets do not yet feel an incentive to actually do so. Supermarkets fear a decrease in profits when they start supporting household food waste reduction, because they believe that consumers will significantly buy less food. Supermarkets are also reluctant to share data about the benefits of food waste reduction with other supermarkets, because they do not want to lose their market position. When these benefits are not being shared other supermarkets will indeed not feel an incentive to support household food waste reduction. Supermarkets need to become aware of the benefits of household food waste reduction, and what the benefits for them will be. Household food waste reduction will have global environmental and social benefits, and economic benefits for consumers. It is true that consumers will generally buy less food, but they will spend their money on more expensive food products and other products. This will soften the fact that consumers buy less

food products. Supermarkets that are also selling non-food products will benefit even more from household food waste reduction. They need to share information about household food waste reduction among each other, and follow the example given by the pioneering supermarkets. Supermarkets need to become aware of their good position to really do something about the global household food waste problem. And they need to become aware of the fact that in order to reduce household food waste they generally do not need a lot of financial resources, instead it is a matter of changing consumers' food waste behaviour (WRAP, 2015b).

Supermarkets need to interact with consumers when they want to influence the actual food waste behaviour. Interaction between supermarkets and consumers plays a key role in the reduction of household food waste. The interaction and communication between the until so far separated consumer and supermarkets parts will be analysed in the following chapter.

Supermarkets directly interact with consumers and therefore they have a good position to influence their food waste behaviours.
Drivers of food waste at consumer level influenced by supermarkets are:
<ul style="list-style-type: none"> - Volume promotions - Portion sizes - Confusing date labels - Unclear storage advices - Unresealable packages
Pioneering supermarkets experiment with actions to reduce those drivers by:
<ul style="list-style-type: none"> - Awareness campaigns - Providing tips and storage advices - Selling food with visual imperfections - Making date labels less confusing - Offering different portion sizes - Changing the types of volume promotion - Opening stores without packages
Most supermarkets fear profit reduction once they get involved in the reduction of food waste at consumer level.
Consumers can use political consumerism to enforce action of supermarkets

Chapter 4 Interaction

In this section the separated consumer and supermarket parts will be combined. This combination is necessary to see how the two last actors of the food supply chain interact, and whether or not interaction can actually reduce the massive amount of household food waste. Supermarkets have direct interaction with consumers (Scholz et al., 2015), and no other shop is visited as often as a supermarket (Buurman, Velghe, 2014). That is why they can play such an important role in the reduction of food waste at consumer level (Lipinski et al., 2013). Communication is important when supermarkets want to influence the throw away habits of the consumers. There is a lack in the literature about the possibility of household food waste reduction when consumers and supermarkets combine and adjust their actions to each other. First some literature about the communication between supermarkets and consumers will be reviewed. And based on the previous found literature an analysis will be done to see the similarities and dissimilarities between the incentives and drivers for actions and communication to reduce food waste at consumer level. In the final chapter recommendation for supermarkets about how they can best support household food waste reduction will be given. And recommendations to increase the incentives of supermarkets as well as consumers to get involved in the reduction of household food waste will be mentioned in the final chapter..

4.1 Importance of interaction

There is a direct interaction between supermarkets and consumers (Buurman, Velghe, 2014), and supermarkets and consumers communicate in different ways. Today supermarkets face more and more pressure to be socially responsible (Aguilera et al., 2007). If supermarkets do not communicate with their customers about the progress they are making on environmental issues, consumers will assume that the supermarket is doing nothing (KW, n.d.). Supermarkets can adopt a variety of different methods to communicate their socially responsibility policies and action towards consumers (Lauritsen, Perk, 2015). Supporting household food waste is one of the many actions supermarkets can take to become more socially responsible, due to the fact that household food waste has a lot of negative environmental, economic and social consequences. Consumers are increasingly aware of the consequences of their consumption pattern, if supermarkets do not fulfil their social responsibilities consumers will have criticism on the supermarkets and might even go shop elsewhere (White et al., 2012). As a consequence supermarkets are trying to communicate their social and environmental actions they take (Lauritsen, Perk, 2015). Communication about social responsibility is now part of supermarkets positioning and marketing strategies as an instrument to strengthen their brand image, reputation and consumers loyalty (Campbell, 2007). This is important because consumers evaluate and distinguish individual supermarket brands partly on the social responsibility policies of supermarkets (Wang, Anderson, 2011). The more consumers are aware of social responsibility policies of supermarkets the more benefits it will have for supermarkets (Green, Peloza, 2011).

Besides the fact that supermarkets communicate about their role in becoming more social responsible, they also play an important role in making consumers more social responsible (Caruana, Crane, 2008; Buurman, Velghe, 2014). This is essential because supermarkets cannot tackle the household food waste problem by themselves, consumers need to take actions themselves as well. Consumers have certain levels of responsibility and need to create more responsible consumption patterns in order to significantly reduce household food waste (Caruana, Crane, 2008). Consumer responsibility is influenced by actors such as retailers, consumer associations, government bodies, media and consumers themselves (Thompson, 2004). As mentioned in the introduction as well as in section 2.1, consumers often see themselves as social responsible with regard to household food waste. They mention that they do not waste food very often, but in fact they do (WRAP, 2015; Stefan et al., 2013). So communication between supermarkets and consumers about household food waste is important, because it can increase the social responsibility of supermarkets and consumers with regard to household food waste.

4.2 Communication methods

There are no clear guidelines about the best way to communicate social responsibility policies and actions (Du et al., 2010). And therefore it is unclear what communication method is the most beneficial for consumers and supermarkets (Lauritsen, Perk, 2015). Some experts argue that implicit methods are the most effective. Supporters of this strategy mention that explicit communication increases the likelihood that consumers sense supermarkets' self-interests as the core motive for communication social responsibility policies and actions (Morsing et al., 2008). But opponents argue that explicit communication methods are more effective, as consumers rely on social responsibility communication to assess and contrast different brand morals (Wang, Anderson et al., 2011). However, due to the internet the implicit/explicit and the private/public domains blur, which makes open debate among consumers and supermarkets possible (Mangold and Faulds, 2009). Supermarkets nowadays make use of interactive and non-interactive ways of communication (Coffaro, 2006; Lauritzen, Perk, 2015). But it is unclear whether interactive or non-interactive communication works better to reduce household food waste (Coffaro, 2006).

In the research of Lauritsen and Perk (2015) implicit communication is described as values, norms and rules that result in mandatory and customary requirements for supermarkets communication about their social responsibility. Supermarkets practicing implicit communication about their social responsibility might conduct similar practices to those supermarkets that use explicit communication. Implicit communication, however, is not conceived of as a voluntary and deliberate decision made by the supermarket, it is rather as a reaction to or a reflection of the institutional environment of the supermarket (Matten, Moon, 2008). Supermarkets that only use implicit communication are simply just conforming to law and institutional requirements regarding to social responsibility. One example of implicit communication is the supermarkets mandatory reports (Lauritzen, Perk, 2015). Supermarkets that use explicit communication about their social responsibility action and policies communicate deliberately, voluntarily and often out of strategic considerations (Porter, Kramer, 2004). When supermarkets use explicit communication they clearly involve social responsibility in the communication of their policies and practices towards all their stakeholders, including their customers (Matten, Moon, 2008).

Other researchers use different types of definitions for implicit and explicit communication. With implicit communication they mean everything a supermarket 'says' without the use of words or images. This is actually everything the supermarket demonstrates on daily basis. The supermarket is implicitly communicating a message by the ways the supermarket acts and behaves. And in this case explicit communication consists of verbal (spoken or written) and visual messages. So explicit communication is covering all types of media and means of expression. Lack of consistency between supermarkets' implicit and explicit communication has a negative effect on the supermarkets. A consistent supermarket is attractive and convincing according to its customers. A supermarket that communicates inconsistent messages generates confusion, irritation and mistrust among its consumers. So using this definitions the communication of supermarkets will only be trusted if the implicit and explicit communication of the supermarkets is consistent (Ravenstein, 2012). And thus, explicit communication messages to reduce household food waste can only be effective if the implicit communication is consistent with it.

Non-interactive communication is a one-way communication method (Lauritsen, Perk, 2015). One-way communication methods do not allow the consumers to react on the message sent by supermarkets (Coffaro, 2006). Examples of non-interactive communication are mail and posters, however once a poster has a QR code on it for example it becomes interactive communication. Simply sending a static web page with the help of e-mail is also a form of non-interactive communication, but once this e-mail contains links to click on it becomes an interactive form of communication (Coffaro, 2006). Interactive communication is a two-way communication method (Lauritsen, Perk, 2015 ; Coffaro, 2006). Because of the two-way communication consumers are able to recall extra information about the messages sent by supermarkets and consumers can react on the messages (Coffaro, 2006). Interactivity has an effect on attention and memory of the consumers. Coffaro (2006) concluded in his research that consumers pay more attention to interactive messages compared to non-interactive messages. And that customers were able to remember the brand, products and messages better when using interactive communication compared to non-interactive communication. Especially the arrival of

the internet and multimedia devices expanded the use of interactive communication methods used by supermarkets (Coffaro, 2006). But it would not be beneficial for supermarkets to only use interactive communication methods, this is due to the fact that internet is often used for interactive communication. The arrival of the internet expanded the methods for interactive communication, but different socio-economic classes have very different access levels to the internet (Bucy, Newhagen, 2004). Some people simply do not have access to the internet or e-mail, so when only using interactive communication it will be hard for supermarkets to reach those people. Other people that do have access to internet and e-mail may be leery of interactive messages because those people believe that the messages contain viruses or use spyware (Coffaro, 2006). However, consumers are quickly becoming more accepting towards the internet (Belch, Belch, 2004) and more and more people have access to internet and e-mail, so this might suggest that it is possible to reach the majority of consumers through interactive communication in the near future (Coffaro, 2006). The internet also makes it easier for consumers to create viral heat waves on both good and bad supermarket policies and actions, this can either make or break a brand image and reputation (Campbell et al., 2011). The best combination between implicit, explicit, interactive and non-interactive communication methods remains unclear. But there is one thing that will increase the effectiveness of any communication method, extensive exposure to the message supermarkets want to give (Maignan, 2001). Extensive exposure will improve consumers' memory, knowledge and perceptions (Hinz et al., 2011; Aschemann-Witzel et al., 2015b). And furthermore Lauritsen and Perk (2015) found that consumers prefer interactive social responsibility communication above non-interactive communication.

4.3 Examples of communication methods

Some drivers of household food waste are influenced by supermarkets, household food waste is partly caused by the portion sizes supermarkets offer, confusing date labels, type of packaging supermarkets offer, promotion actions, pricing strategies, unclear storage advices etc. as indicated in chapter 2.3. So if supermarkets want to increase their market position with regard to social responsibility, supporting reduction of household food waste is a good way to do so (Lauritsen, Perk, 2015). And supermarkets need to communicate about their support in order to actually increase their market position (Lauritsen, Perk, 2015). At the same time communication can increase consumers' social responsibility with regard to household food waste (Caruana, Crane, 2008). The communication method can be interactive or non-interactive, explicit or implicit (Lauritsen, Perk, 2015). Communication methods of supermarkets with the aim to reduce household food waste are for example, texts in store as well as on supermarkets web sites, social media and advertisements, real actions, promotions, the handling of complaints and through supermarkets' employees.

Through texts supermarkets want to spread a clear message about household food waste to make consumers aware of the consequences and massive amount of household food waste. Furthermore text can provide consumers with tips to reduce food waste at household level. Once consumers get tips about the best way to store different kind of food, there exists a great possibility that the amount of household food waste will be reduced. Text can be placed on posters, flyers, pamphlets and displays, media platforms etc. and can appear instore as well as outside the supermarket (Matamalas, Ramos, 2009). This way of communication can be non-interactive as well as interactive. Most of the text in stores is non-interactive (Coffaro, 2006). Especially supermarkets' web sites and social media provide an interactive communication platform for supermarkets and its consumers to communicate about household food waste (Lauritsen, Perk, 2015). When using the implicit and explicit definitions of Ravenstein (2012) communication through text is a way of explicit communication because words and visual messages are used. And when using the definition of Lauritsen and Perk (2015), it depends on the institutional environment of the supermarket whether or not the message is implicit or explicit.

With the help of concrete actions supermarkets want to show their involvement in social responsibility. Supermarkets can start offering different portion sizes for example, or change the date labelling, consumers argue that this will support them in the reduction of household food waste (Aschemann-Witzel et al., 2015b; Buurman, Velghe, 2014). When using the implicit and explicit definitions of Ravenstein (2012) changing the assortment and start offering different portion sizes is an

implicit way of communication. It is something that supermarkets show on daily basis. But once they start communicating about the assortment change through text explicit communication is being used (Ravenstein, 2012). When using the definition of Lauritsen and Perk (2015) this type of communication is explicit communication, because there are no compulsory actions supermarkets needs to take with regard to household food waste production. Most of the time the action are non-interactive, but the communication through text about these action can be interactive.

Supermarkets promotions and pricing strategies seduce consumers to buy more than they need (Buurman, Velghe, 2014). Changing promotion and pricing strategies can help consumers to reduce household food waste (Buurman, Velghe, 2014). Especially the buy-one-get-one-free promotion have a high potential to contribute to the amount of household food waste (Buurman, Velghe, 2014). by changing the types of promotion to buy-one-get-one-for-free-later instead of buy-one-get-one-free the amount of household food waste can be reduced. The type of promotions supermarkets offer are an explicit way to communicate supermarkets' involvement in household food waste reduction, when using the explicit definition of Lauritsen and Perk (2015). Promotions are often communicated with the help of text, and as mentioned above text is also an explicit communication method when using the definition of Ravenstein (2012). The change into buy-one-get-one-free-later promotions is a form of interactive communication. Because consumers need to big up the other item later, and interact with the supermarket again. Consumers are being involved in the promotion now.

When consumers have complaints about supermarkets, the way the complaint is handled determines consumers perception towards the supermarket. An good example of a consumer complaint is mentioned in box 2 on page 25, the supermarket handled the complaint by removing the bananas from the shelves, ad avoided a big boycott. The ability for consumers to complain is a form of two-way communication between supermarkets and consumers and is therefor and interactive communication method (Lauritsen, Perk, 2015). When using the implicit and explicit definitions of Lauritsen and Perk (2015) complaint handling and the ability to complain is a form of explicit communication. When using the definition of Ravenstein (2012) this is also a form of explicit communication, because in order to complain words (spoken or written) are necessary.

Supermarkets should not forget to include their employees in their communication strategies. By keeping their employees informed on their strategy towards household food waste reduction, supermarkets can be confident that their employees communicate the right messages to their customers (Linton, n.d.).

If supermarkets want to become more socially responsible by supporting the reduction of food waste at household level and communicate this towards their consumers, they should consider all these types of communication possibilities.

4.4 Skeptical consumers

Consumers are aware of the fact that social responsibility actions of supermarkets can increase the supermarkets value and therefore are more alert on the ulterior motives for ethical and socially responsible strategies and activities of supermarkets (Porter and Kramer, 2004). That is why consumer are being skeptical towards the ethical and social responsibility claims of supermarkets (Ellen et al., 2006). When consumers find out that the policies and actions supermarkets communicate about social responsibility are not being complied or inconsistent it will negatively influence supermarkets' brand image and reputation. Consumers will feel betrayed and their negative feelings will have larger influences on the brand image and reputation than the positive feelings they held towards the brand prior to the communication about social responsible policies and activities (Lauritsen, Perk, 2015). Supermarkets needs to make sure that there is no inconsistence between the implicit and explicit communication of supermarkets (Ravenstein, 2012). Nowadays there are supermarkets that communicate contradiction things regarding household food waste, which is confusing to consumers and supermarkets face image and reputation damage.

4.5 Example contradicting message of supermarket

The Dutch supermarket chain Plus has been rewarded as the most sustainable supermarket in the Netherlands. Plus scored the highest of all supermarkets in the use of sustainable policies mainly

related to fruit and vegetables, job satisfaction of employees and consumers' in store experience. Now they are advertising about the fact that they are the most sustainable supermarket in the Netherlands (PLUS, 2015). They inform consumers about being the most sustainable supermarket chain in TV-commercials, newspaper ads, on their website, in interviews, through the use of multimedia and with the help of posters in the stores.

Plus also communicates about several actions that they take to avoid food waste. They try to donate as much of the supermarkets' food waste to charity. Textual communication about the fact that they donate food to charity is also an explicit communication method (Lauritsen, Perk, 2015; Ravenstein, 2012). The fact that they do donate the food is more a kind of implicit communication (Ravenstein, 2012), because donating is embedded in the way the supermarket acts and behaves. Plus is communicating about the donations and actually donating, so there are no contradictions that can confuse consumers in this case.

To avoid household food waste they spread a magazine with storage tips among their consumers, which is called the 'storage guide' (Kromkommer, 2015). In an interview with Kromkommer they mention that they believe they are genuinely trying to avoid and reduce food waste (Kromkommer, 2016). Nevertheless, on this front Plus is giving contradicting messages. In one TV-commercial of Plus you see two kids damaging a cauliflower by drawing spots on them. Their mom returns the cauliflower to the Plus and gets a non-damaged new one. Plus calls this service guaranteed freshness. But with this commercial they give a non-sustainable signal because there is nothing wrong with a cauliflower with spots on it. A few spots does not say anything about the quality, freshness and safety of the cauliflower. So Plus is giving the signal that food with cosmetic imperfections are not fresh and should not be consumed (Kromkommer, 2015). They do not only give this signal through the tv-commercial, also in store you can find posters with the guaranteed freshness slogan on it. As mentioned before cosmetic standards increase food waste at farmers as well as at manufacturers, supermarkets and at household level. The TV-commercial and the posters are explicit communication methods (Lauritsen, Perk, 2015; Ravenstein, 2012). And they are both forms of non-interactive communication. However a lot of consumers complained about this TV-commercial and as a response of Plus the commercial is not broadcasted anymore (Kromkommer, 2015). The ability to complain about the commercial, and the response of Plus is a form of interactive communication, because there is two-way communication. So there is a contradiction between the communication about being the most sustainable Dutch supermarket and the communication of cosmetic standards. Plus is not the only Dutch supermarket chain that shows cosmetic standards in its TV-commercials, Lidl and Jumbo had a similar TV-commercial in which they stressed out that only good looking food is being sold in the supermarkets and that imperfect fruits and vegetables should not be consumed (Kromkommer, 2015). The links to the TV-commercials are added in the appendix.

In addition to that Plus does not sell fruit and vegetables that are labelled as imperfect due to their looks. As mentioned before, some pioneering supermarkets are selling imperfect fruits and vegetables to change consumers perception about quality and safety and to reduce household food waste. The decision not to sell imperfect food is a way of implicit communication according to Ravenstein (2012), because it is embedded in the way the supermarket behaves.

The promotions of Plus also contradict with the sustainable message. In the advertising brochure of plus there are a lot of buy-one-get-one-for free promotions. As previously mentioned this type of promotions without the option to pick the second item up later is one of the drivers for household food waste. Furthermore they also advertise with multiple products that get sold for a fixed price, like 2 product for €3,- while the product costs €2,- when you buy just one (Spotta, 2016). This type of advertisement is also a driver for household food waste (Buurman, Velghe, 2014). Promotions are, as mentioned before, explicit communication forms (Lauritsen, Perk, 2015; Ravenstein, 2012). This example shows that consumers get contradicting messages about food waste and that supermarkets are not always as sustainable as they communicate towards their consumers. This is a problem that addressed by Ravenstein (2012), which will cause reputation damage and negative feelings of consumers towards the supermarket (Lauritsen, Perk, 2015).

4.6 Example new store

As mentioned in section 3.5 new types of supermarkets are popping up in developed countries. In this example the Zero Waste Shop in Antwerp will be analysed. The shop opened its doors in June 2014, and all the food is being sold without a package. Consumers bring their own, bags, jugs, canister, container etc. to the store and can fill them with just the amount of food the customer needs. This new type of store is a specialized shop that tries to attract consumers' based on their sustainability (Kantamaturupoj, et al., 2012). The aim of this new store is to reduce packaging waste as well as household food waste. Consumers are not bounded to portion sizes in this store, which can be beneficial for the amount of household food waste.

The communication via the Zero Waste shops' website and social media accounts is all focused on reducing waste and being sustainable. There are short videos on the website and social media accounts that make consumers aware of the amount of household waste and its consequences. These messages are explicit when using both the definitions of Lauritsen and Perk (2015) and Ravenstein (2012). The Zero Waste Shop sends a message with the use of words (spoken and written), and they do not send the message because of their institutional environment, but because they really want to be more environmental friendly.

Furthermore, the Zero Waste Shop is also sending a sustainable message about the fact that they only sell biologic and local products. The textual message is another form of explicit communication (Lauritsen, Perk, 2015; Ravenstein, 2012). The fact that they only offer local food products shows that there is no inconsistency between the implicit and explicit communication of the Zero Waste Shop (Ravenstein, 2012). They send textual messages to their consumers and they do not contradict with their actual actions, behaviour and assortment.

Furthermore consumers are not seduced to buy more food than they actually need, there are no promotion offerings. So the fact that the supermarket does not have promotions is in line with their message that they try to reduce the amount of waste. This is a form of implicit communication based on the definitions of Ravenstein (2012), their decision not to offer any promotions is embedded in their everyday acts and behaviour. It is not communicated to consumers via text, but it is something that consumers can observe.

It is hard to find any contradicting message in the communication of this supermarket, while it was not that hard to find contradictions in the messages regular supermarkets send to their consumers (Zero waste shop, n.d.). The consumers of the new stores will more easily get the feeling that the supermarkets genuinely cares about the environment and the amount of packaging and food waste compared to the consumers in regular supermarkets. The messages they communicate give consumers the feeling that they want to do whatever they can to reduce waste. While it is possible that consumers of regular supermarkets are more skeptical about the motives for sustainable actions and policies, due to the fact that they have noticed the contradicting messages that regular supermarkets communicate. The difference between regular supermarkets and specialized shops like the Zero Waste Shop is that regular supermarkets offer sustainable products as one of the alternatives, and specialized shops often only sell sustainable products (Kantamarupoj et al., 2012). Therefore regular supermarkets are also communicating and promoting other alternative products such as imported food, functional food etc. (Kantamarupoj et al., 2012). The other products the regular supermarket promotes might not support the messages they send to reduce household food waste, but they will continue to promote those products because they want to sell them as well as the products that do support household food waste reduction.

Although this new type of stores are opening their doors more and more they are still a significant minority compared to the regular shops. These stores really need to scale-up before anyone is able to see the results of the messages the new stores communicate and to see whether or not these types of stores are really a solution to reduce household food waste.

4.7 Similar and dissimilar incentives for interaction

For consumers the main driver to reduce household food waste are the economic benefits of the reduction of household food waste (Aschemann-Witzel et al., 2015b). Consumers are most aware of the economic consequences of their food waste behaviour, and that is why it will have the strongest

influence on the decision on consumers to change their throw away habits (Aschemann-Witzel et al., 2015b). For supermarkets one of the drivers to reduce household food waste are the financial benefits household food waste reduction can possibly have on supermarkets (WRAP, 2015a). However supermarkets are most of the time not aware of the financial benefits of household food waste reduction (WRAP, 2011a). For more sustainable consumers and supermarkets the environmental benefits of household food waste reduction can also be an incentive for actions (Aschemann-Witzel et al., 2015b; WRAP, 2011a). And for consumers as well as supermarkets public pressure to reduce household food waste can also be a driver for action (WRAP, 2015a).

Supermarkets always try to improve their market position, one way to gain a better market position is by communicating about their social responsibility actions. They will only gain a better market position if the messages they communicate are being complied in the actions the supermarket takes (Lauritsen, Perk, 2015). It is extremely important that the implicit and explicit communication of the supermarkets are consistent (Ravenstein, 2012). When that is the case, taking actions to reduce household food waste can have commercial benefits for supermarkets (WRAP, 2011a), because supermarkets can gain a better market position with respect to their competitors when they communicate corresponding social responsibility messages (White et al., 2012; Campbell, 2007). They will also attract consumers that value the social reasonability of supermarkets. And because consumers will go shop elsewhere once they find contradicting messages (Campbell, 2007). Consumers can not gain a better market position and that is why this is no incentive for consumers to take actions.

4.8 Conclusion

When reducing household food waste consumers and supermarkets should especially focus on changing food related routines. To change this, interaction between supermarkets and consumers is needed. There is no existing research about the most effective way to interact in order to change food related routines, and which communication methods should be used during the interaction. In the literature different kind of communication methods which supermarkets and consumers can use are mentioned. They can interact on basis of implicit, explicit, interactive and non-interactive communication methods, and different combinations between these methods can be made. During interaction it is important that there are no contradictions between the messages and the actual actions supermarkets take, related to household food waste reduction. Once contradicting messages are being send consumers can become skeptical, which may lead to a decrease in market position. Besides the importance of the absence of contradicting messages it is also important that the messages are repeatedly communicated to the consumers. In this chapter, the messages of a regular supermarket, Plus, and a new type of store, Zero Waste Shop, were compared and analysed to see whether any contradictions could be found. It was not hard to find any contradicting messages sent by Plus, for the Zero Waste Shop no contradicting messages were found. The new type stores are currently only operating on small scale, and today no noticeable results in household food waste can be measured. Once regular supermarkets get fully engaged in the reduction of food waste at consumer level, the results of supermarkets' actions might become more noticeable. In the next chapter recommendations to increase the engagement of supermarkets as well as consumers will be given.

There are no clear guidelines about the best way for communication between supermarkets and consumers.
Consumers and supermarkets make use of implicit, explicit interactive and non-interactive communication methods.
Supermarkets can communicate messages about food waste in the following ways:
<ul style="list-style-type: none"> - Through the use of text on posters, flyers, displays and media platforms - Through concrete actions - Through the use of different promotion strategies - Through complaint handling - Through their employees
Supermarkets send contradicting sustainability messages which make consumers more sceptical.

Similar incentives for consumers and supermarkets to reduce household food waste:
<ul style="list-style-type: none">- Economic benefits- Public pressure- And to a less extent environmental benefits

Chapter 5 Conclusion & recommendations

5.1 Conclusion

The global amount of food waste is a big problem with huge environmental, economic and social consequences. Consumers are the biggest contributors to the amount of food wasted in developed countries. The food waste problem needs to be tackled, in order to reduce its negative consequences and to be able to provide enough food for the global growing world population more easily.

Reducing food waste at household level is a good start to tackle the food waste problem. Although many consumers have the intention not to waste food concrete actions to reduce household food waste are most of the time not forthcoming. Household food waste behaviour is embedded in food related routines. Routines come forth out of habits, trade-offs and conflicting goals that consumers face during the food provisioning process. Especially shopping and cooking routines influence the amount of household food waste. It is hard to change those routines, but it is definitely possible. Routines are dynamic and are therefore able to change. Once consumers are informed about the amount and impact of food waste, learn how to cook with leftover, relax cosmetic standards, are able to judge the shelf life of their own food and learn how to properly store food, they can start changing their behaviour and try to reduce their food waste.

Consumers are not the only ones responsible for food waste at consumer level. A lot of the drivers behind household food waste are outside the control of consumers. Those drivers are mainly in the control of supermarkets. That is why supermarkets are such an important food supply chain actor that can influence household food waste. Consumers and supermarkets have direct interaction in store, and communicate with each other. Pioneering supermarkets are trying to change consumers' food waste behaviour by making the date labels less confusing, providing proper storage advice, change their promotion strategies, make consumers aware of the food waste problem, offer different portion sizes and by relaxing cosmetic standards. They are communicating those actions with implicit, explicit, interactive and non-interactive messages through texts on posters, flyers, ads, websites, social media, TV-commercials etc., through visible actions, promotions and complaint handling. In a short analysis of a Dutch supermarket it is found that supermarkets communicate contradicting messages about food waste at consumer level. There is also a new type of supermarket popping up, stores without packages and promotions. Consumers can buy just the amount of food that they need in these kind of stores. It is way harder to find any contradiction message communicated by a new kind of shop.

Some pioneering supermarkets are indeed making an effort to tackle the household food waste problem. But it only happens on a small-scale, so it is hard to say whether or not those efforts are really beneficial in reducing the amount of household food waste. Most regular supermarkets are still reluctant to involve in household food waste reduction actions, they fear the consequences of household food waste reduction. They believe that their profit will decrease when the amount of household food waste is being reduced. The new kind of supermarkets are extremely involved in household food waste reduction. More supermarkets should follow the steps of the pioneering and the new type of supermarkets before the influences of supermarkets on the amount of household food waste can be identified.

Supermarkets function as role models to consumers, and as long as they are not involved in the reduction of household food waste, consumers would also be less involved in the reduction of their food waste (Payne, 2014). Supermarkets will only get involved in the reduction of household food waste if there are enough incentives for them to do so. And once they decide to get involved in the reduction of household food waste they need to understand how they can best influence consumers' food waste behaviour. Supermarkets have a good position to influence the throw away habits of consumers (Presswire, 2006) but, supermarkets and consumers will only start to reduce the amount of household food waste together if there is a win-win situation. So the biggest problem is that supermarkets as well as consumers need more incentives to become actively involved in the reduction of food waste at consumer level. With only some pioneering supermarkets that take action the negative consequences of household food waste cannot be driven back.

Combined action always have higher impacts than isolated actions (Aschemann-Witzel et al., 2015b). Supermarkets and consumers need some additional support before food waste at consumer level can be reduced. In the first part of this chapter recommendations to increase the incentives for consumers to reduce their food waste will be given. And in the second part recommendations to increase the incentives for supermarkets to become involved in the reduction of household food waste will be given.

Next recommendations will be given for:

Interaction
Intentions
Food provisioning process
Food related routines
Trade-offs
Segmentation
Supermarket support
Governmental support

5.2 Recommendations for interaction

The more supermarkets repeat their messages about household food waste reduction the more effect it will have on the actual consumers food waste behaviour (Aschemann-Witzel et al., 2015b). So it would be beneficial for household food waste reduction if supermarkets repeat their messages multiple times through preferable different channels.

The way supermarkets and consumers communicate about household food waste reduction is also extremely important (Lauritsen, Perk, 2015; Ravenstein, 2012; Coffaro, 2006). There needs to be a good balance between implicit and explicit communication and non-interactive and interactive communication (Lauritsen, Perk, 2015). Only using words to send messages about the actions of supermarkets to reduce household food waste will not be enough to convince consumers about the social responsibility of the supermarkets. The action of the supermarkets needs to prove that they live up to the messages they send (Ravenstein, 2012). It is impossible to reach all customers via interactive communication. This is due to the fact that some people have bad or no access to internet and e-mail, that is why non-interactive communication is still very important when communicating social responsible messages (Coffaro, 2006).

5.3 Recommendations regarding intentions not to waste food

Generally the intention of consumers to reduce their household food waste does not lead to actual household food waste reduction behaviour (Stancu et al., 2016; van Dam, 2016; Stefan et al., 2013). The intentions of consumers to reduce their amount of food waste are determined by consumers' attitudes towards the behaviour, subjective norms and the perceived behavioural control (Ajzen, 1991). Because intentions have no to little influences on the actual behaviours of consumers it will be unnecessary for supermarkets to focus their actions on the increase of consumers intentions to reduce household food waste.

It will have no or less effect when supermarkets try to generate favourable consumer attitudes towards household food waste reduction behaviour, by making consumers aware of the fact how much money they can save when they reduce their household food waste. Or by making consumers aware of the ethical issues behind household food waste (Aschemann-Witzel et al., 2015; Stancu et al., 2016).

Supermarket actions to increase the social pressure on consumers and increase the intentions to reduce household food waste will also have almost no effect on consumers actual food waste behaviour. So supermarkets should not waste their efforts to reduce household food waste by increasing the subjective norms of consumers (Thøgersen, 2006; Stefan et al., 2013).

If supermarkets decide that they want to reduce the amount of household food waste by increasing the intentions of consumers to reduce food waste they can best influence the perceived

behavioural control of consumers. Stancu et al. (2016) mentioned that the intention to reduce household food waste caused by perceived behavioural control will most likely have some influences on the actual household food waste behaviour. So supermarkets can try to increase the intentions by making consumers believe that they are capable of reducing food waste at household level. The more consumers believe that they are able to reduce the amount of household food waste, the higher their intentions to reduce household food waste will be and the more this will influence actual household food waste behaviour (Ajzen, 1991).

Supermarkets can better put effort in other things than in increasing consumers' intentions not to waste food. And if they still want to increase those intentions they can best do so by increasing the perceived behavioural control.

5.4 Recommendations regarding the food provisioning process

Wasting food is part of the food provisioning process (Jensen et al., 2012; Sobal, Bisogni, 2009). Supermarkets and consumers interact directly during the acquisition step of the food provisioning process (Bava et al., 2008). But supermarkets can also influence household food waste behaviour during other steps of the food provisioning process.

During the acquisition step consumers show little tolerance for food with visual imperfections (Aschemann-Witzel et al., 2015b). This shows that consumers do not serve food with visual imperfections at home, and would rather throw away food with visual imperfections. Supermarkets can influence this by communicating the message that visual imperfections have nothing to do with the food quality and safety. If the implicit and explicit messages they send about this are consistent with each other, when using the definition of Ravenstein (2012), consumers are likely to believe this and change their behaviour towards food with visual imperfection. In this case it is extremely important that the messages sent by supermarkets are not contradicting, so when supermarkets send this kind of messages it will have a bigger impact when supermarkets are selling food with visual imperfections (Ravenstein, 2012; Lauritsen, Perk, 2015).

Packaging factors also influence the actual food waste behaviour of consumers during the food provisioning process (Williams et al., 2012). Supermarkets are able to pressure their suppliers in order to change their packages, and are therefore able to influence household food waste behaviour caused by packaging factors. The portion sizes of food can lead to household food waste when consumers are forced to buy more food than they actually need simply because there is no smaller package available. Consumers can communicate this problem towards the supermarket which can decide to include a smaller portion size in its assortment. In this case it is necessary that consumers notify the supermarket about the problem, because otherwise the supermarket has no clue about the existence of this problem. This interaction will reduce the amount of household food waste when supermarkets decide to offer smaller portion sizes (Aschemann-Witzel et al., 2015b). When supermarkets start offering the smaller sizes they need to price those products such that it will become attractive for the consumer to actually buy the product, because otherwise it will not have any effect on the household food waste behaviour. Other packaging factors that lead to household food waste behaviour are the fact that it is difficult to completely empty some packages, packages that are not completely resealable and confusing date labels on packages (Williams et al., 2012; Neff et al., 2015). In order to adjust the household food waste behaviour of consumers supermarkets should also avoid food waste that is happening because of the way that food is packed. On the other hand consumers do not make optimal use of the packages when storing the food. Consumers simply do not have the knowledge about the best way to store food. So another recommendation is to inform consumers better about the correct usage of packages.

The lack of connection between consumers and the way their food is produced also influences the food waste behaviour of consumers (Aschemann-Witzel et al., 2015b). Consumers simply do not know the value of their food and that is why they throw away food more easily. Supermarkets can influence this by reconnect consumers and their food. They can do this by showing their consumers where their food comes from. But it will be hard for supermarkets to do this on their own, they can use some support of farmers, governments and other actors to actually reconnect consumers and food production.

Putting visual imperfect food products in the shelves, changing packages, offering different portion sizes, learn customers the optimal storage conditions and showing people where food comes

from costs money. Supermarkets fear that the environmental, financial and commercial benefits of these actions will not exceed the costs of all these actions (WRAP, 2015a). So supermarkets only start to influence consumers' food provisioning processes once they know for sure that they can also gain benefits from these actions. All these action will not cost consumers any money, they only need to make behavioural changes in order for these actions to work (Witzel et al., 2015a). So for consumers the benefits will exceed the costs. Whether there will be actual benefits for consumers will depend on the decision of supermarkets to start actions or not.

5.5 Recommendations regarding food related routines

The actual food waste behaviour is determined by food related routines, and is embedded in everyday household practices (Evans, 2011; Evans, 2012). Together with perceived behavioural control routines are important in explaining household food waste behaviour (Stancu et al., 2016). Trade-offs that consumers face during the entire food provisioning process and the level of management skills influence the food related routines (Aschemann-Witzel et al., 2015b). Due to the fact that the food related behaviour of consumers is routinized it is hard to change consumers food waste behaviour. Especially consumers' shopping and cooking routines directly influence the amount of household food waste (Jensen et al., 2012; Stancu et al., 2016).

Planning routines indirectly influence those shopping and cooking routines. Planning routines like checking the household inventory, making shopping lists and plan meals ahead will reduce the amount of household food waste (Evans, 2012). Supermarkets can support this kind of behaviour by providing shopping lists tools which makes it easier for consumers to decide on the amount of food they need to buy or by creating checking lists for consumers. Supermarkets that put effort in improving consumers' planning routines, will be more successful in the reduction of household food waste than supermarkets that try to increase consumers' intentions to reduce household food waste.

Frequently occurring shopping routines that lead to household food waste behaviour are buying too much food or purchasing too much unintended food products (Evans, 2012). These kind of shopping routines are mostly influenced by the volume promotions that supermarkets offer (Blanke, 2015). Supermarkets use volume promotions to seduce people to buy more food than they actually need, and so increase their profit. These kind of routines can be breached when consumers planning routines improve (Stancu et al., 2016; Evans, 2012) or when supermarkets stop offering volume promotions (Buurman, Velghe, 2014). It is very unlikely that supermarkets will just quit with offering volume promotions because this will lead to less profit, but they can adjust their volume promotions in such a way that will reduce consumers' food waste behaviour (Buurman, Velghe, 2014). They can change their buy-one-get-one-free promotion into buy-one-get-one-free-later promotion, it that case they will still keep the same problem and avoid household food waste (Buurman, Velghe, 2014). This will change the shopping routines of consumers in such a way that they will pick up the second item once they have consumed the first item.

During the cooking routines the reuse of leftovers is the biggest contributor to household food waste behaviour. Consumers lack confidence and skills to use leftovers in their cooking routines (Stancu et al., 2016; Halkier, 2009). Supermarkets can try to improve consumers' confidence and skills towards the reuse of leftover by for example developing a leftover cookbook.

Consumers do not fear costs when changing their routines it will at the most cost them more time. Checking inventory, making shopping lists and planning meals ahead simply costs more time than just go to the supermarket and buy food. But once these things becomes routinized consumers will forget that it costs more time (Aschemann-Witzel et al., 2015b). If supermarkets implement all the actions above it will be much easier for consumers to change their household food waste behaviour.

Furthermore, Toine Timmermans (2016) mentioned that consumers do not have an incentive to change their routines, due to the relative low food prices (VARA: groen licht, 2016). Based on his statement one could argue that supermarkets can raise the food prices to reduce the amount of food waste. Because the food prices will increase, the fear of supermarkets for an decrease in profit will be unnecessary. And when the food prices rise consumers will see the increased economic benefits of household food waste reduction. In this case reducing household food waste will cause a win-win situation for the supermarkets as well as the consumers. Supermarkets will not lose any profit and

consumers spare money, while at the same time the environmental, economic and social consequences of household food waste are being reduced.

5.6 Recommendations trade-offs

Consumers use their food related routines every time they face trade-offs, and the routines are based on previously made decisions during trade-offs (Jastran et al., 2009; Aschemann-Witzel et al., 2015a).

A frequently faced trade-off is the one of packaging waste versus food waste (Koivupro et al., 2012). Supermarkets can help consumers to choose for less food waste by informing people that food waste has more bad consequences than packaging waste (Aschemann-Witzel et al., 2015b). Once consumers are aware of this fact the decision they face will be less hard, and the choices they make after they gain this information will become embedded in their food related routines.

Another trade-off consumers face is the one between being a good food provider for the household members and reducing household food waste (Graham-Row et al., 2014; Evans, 2011). A good food provider wants to please all the household members, which occurs at the expense of purchasing and cooking too much food. This also allows household members to become picky. It is hard for supermarkets to help consumers that face this trade-off and steer them to choose to reduce household food waste.

When interpreting date labelling consumers make a trade-off between food safety and food waste reduction (Aschemann-Witzel, 2015b). Due to the confusing date labels consumers often choose for food safety and throw away food that is actually still safe to eat instead of eating the food. Supermarkets can change the date labels and make them easier to interpret. In this way consumers are more likely to classify food as unsafe when it is really unsafe, and are less likely to throw out food that is still safe. This will make the trade-off between food safety and food waste easier for consumers.

It is also hard for supermarkets to help consumers during the trade-off between reducing food waste and storing and eating leftovers. The same account for the trade-off between food waste and eating food that consumers dislike. Consumers tend to dislike eating the same meal twice and they disgust the thoughts of storing leftovers and they dislike to eat food that does not taste up to their expectations (Aschemann-Witzel et al., 2015b). The only thing that supermarkets can do is improving the confidence and skills of consumers with regard to cooking with leftovers. So consumers learn how to be creative with their leftovers and find it less problematic to eat leftovers. In that case consumers would choose to reduce their food waste sooner than just disposing their leftovers.

Furthermore the surrounding of the supermarkets also influences which choices consumers make during trade-offs (Aschemann-Witzel et al., 2015b). Surroundings are for example colours, lights and store lay-outs. Supermarkets can change the surrounding in such a way that consumers would easier choose for reducing food waste when they face one of the trade-offs.

5.7 recommendations segmentation

As mentioned in section 2.6 a few demographic factors also influence consumers' food waste behaviour. Supermarkets are not able to change the demographic factors of its customers. But it would be useful if supermarkets have different actions and communication methods to reduce household food waste for different target segments. The characteristics or backgrounds of the different segments will make it easier to predispose their behaviour responses towards supermarket actions (Aschemann-Witzel et al., 2015b).

The recommendation to change the food provisioning process, to change the food related routines, and to make the trade-offs easier will all make it easier for consumers to reduce their amount of food waste, which will make reducing their food waste more attractive for consumers.

However, the question remains whether or not supermarkets want to engage in changing consumers food waste behaviour. Supermarkets have many concerns about the impact of reduced household food waste (WRAP, 2015a), as described in chapter 3.4. Because it is the supermarkets' aim to sell as much food as possible (Buurman, Velghe, 2014), and to achieve optimal revenue (Aschemann-Witzel et al., 2015b). This is contradicting to the aim to reduce the amount of food waste at consumer level

(Buurman, Velghe, 2014). Changing the food related routines and food provisioning process means that consumers will generally buy less food. And when consumers buy less food supermarkets will fear a drop in their profit. This fear is an incentive for supermarkets to not take actions to reduce household food waste (WRAP, 2015a). But actually some researches prove that supermarkets profit will not decrease when consumers reduce their amount of household food waste (WRAP, 2014). And reluctance of supporting household food waste reduction can even lead to lower profits for supermarkets, because they are not as social responsible as their competitors (Klein et al., 2004). Supermarkets will only get involved in changing the food related behaviours of their customers if there is no win-win situation. So supermarkets will get involved in household food waste reductions once they become aware of the fact that the fear for decrease in profit is not valid. Next some recommendations to increase supermarkets involvement will be given.

5.8 Recommendation increasing supermarket support

The current numbers about household food waste are shocking, but reduction in the amount of household food waste is certainly possible (WRAP, 2015). Integrated actions will lead to more results than actions taken in isolation (WRAP, 2015). That is why multiple experts stress the importance of synergy in actions, explaining that the result of actions taken to reduce household food waste will be higher when the actions are combined (Aschemann-Witzel et al., 2015b). So it is important that the combined actions of supermarkets and consumers complement each other. The actions will only complement each other if supermarkets tackle the right drivers that determined household food waste behaviour. And when the actions taken to reduce household food waste are communicated the right way. Consumers need to appreciate the actions of supermarkets and vice versa, otherwise the actions will have no effect. Once consumers start to create attention and awareness towards their food waste behaviour a synergy can arise when retailers provide consumers practical storage tips while simultaneously working on consumers' food choice (Aschemann-Witzel et al., 2015b). The same happens when consumers start to plan their meals ahead and make shopping lists, and retailers offer different portion sizes and practical tools to improve shopping lists at the same time. Another synergy occurs when consumers improve their assessments skills regarding the food safety of food products reaching their expiration date while at the same time supermarkets provide information about how to interpret date labelling. Once consumers perceive the supermarket actions as beneficial for them they probably reward the supermarket with increasing loyalty (Morales, 2005; Reed et al., 2007), which will be beneficial for the supermarkets. So supermarkets need to become aware of the benefits of synergies. Once supermarkets notice that supporting the reduction of household food waste will be beneficial for them, and that synergies will more effectively reduce the amount of household food waste supermarkets have more incentives to get involved.

The effect of synergies will increase when other actors support household food waste reduction as well (Aschemann-Witzel et al., 2015b). Collaborative initiatives to reduce food waste at consumer level need to get more support (Lipinski, 2013). Collaborative initiatives bring together a wide range of food supply chain actors and other organisations. As mentioned before collaborative actions always have bigger impacts than isolated actions (WRAP, 2015). Collaborated initiatives provide a space for inspiring action, effective collaboration and sharing of best practices. Once other food supply chain actors become involved in the reduction of household food waste, they can motivate supermarkets to get involved as well will. Collaborative initiatives make it easier for supermarkets to step in the actions as well (Lipinski, 2013). And in this way the incentive of supermarkets to get involved in the reduction of household food waste will increase. Furthermore supermarkets and consumers can also motivate other supply chain actors to become involved in the reduction of food waste. The collaborated actions supermarkets and consumers take to reduce food waste at consumer level would have greater impacts if they were supported by the supermarkets' suppliers for example. Supermarkets do have some influences on their suppliers but there are not able to change all the package features for example. Once suppliers get involved as well they package features can be adjusted in such a way that it minimizes the drivers for food waste at consumer level. Together they are better able to tackle the drivers of household food waste behaviour. Governments have big influences on the food supply chain as well, so it is important that they are also involved in the reduction of household food waste.

5.9 Recommendations governmental support

Governments have big influences on consumers food waste behaviour and supermarkets support to reduce household food waste (Lipinski, 2013; Stancu et al., 2016). Governments can implement different policies in order to support the reduction of household food waste.

It is generally known that all that get measured gets managed (Lipinski, 2013). So it would be beneficial if governments establish a global food loss and waste protocol that could provide companies, consumers and countries with a standardized way to measure and monitor food loss and waste. When it becomes mandatory to measure the exact amounts of food waste, consumers and supermarkets become more aware of the scale and consequences of the problem. Once companies and countries stick to this protocol the food waste problem will get managed more properly, and better managing of problems will most likely lead to better solutions for the household food waste problem (Lipinski, 2013).

Setting food waste reduction targets will help to spur action on reducing food loss and waste. Setting targets inspires action by raising awareness, focusing attention, and mobilizing resources. Targets can be set of global, national, sub-national and business levels. Once consumers and supermarkets get a food waste reduction target they would be more motivated, and come with concrete and collaborated plans to reduce the amount of food waste at household level (Lipinski, 2013). Furthermore introducing penalties for creating household food waste will motivate supermarkets and consumers to get actively involved in the reduction of household food waste (WRAP,2015a).

Another recommendation for global governments is to establish organisations that are devoted to reduce food waste. Those organisations need to be independent of the national government, but needs to work closely with businesses and national government on waste reduction. Such organizations are able to put pressure on supermarkets to force them to involve in actions to reduce household food waste. As mentioned in section 3.3 pressure can be a driver for supermarkets to get involved in household food waste reduction. And public pressure is also a driver for consumers to reduce their food waste. Furthermore, the organisations can also create consumer awareness campaigns to educate consumers about household food waste. So entities can increase supermarkets involvement and increase consumers awareness about household food waste (Lipinski, 2013).

Recommendations interaction:
<ul style="list-style-type: none"> - Repeat messages - Good balance between implicit, explicit, interactive and non-interactive communication
Recommendation intentions not to waste food:
<ul style="list-style-type: none"> - Supermarket should not focus on increasing consumers' intentions not to waste food
Recommendations food provisioning process:
<ul style="list-style-type: none"> - Supermarkets should communicate that visual imperfection have nothing to do with food safety - Supermarkets should change the packaging features to make them resealable and offer different portion sizes. - Supermarkets should provide consumers with tips on how to properly store food
Recommendations food related routines:
<ul style="list-style-type: none"> - Supermarkets should change planning routines - Supermarkets should change shopping routines - Supermarkets should change cooking routines
Recommendations trade-offs:
<ul style="list-style-type: none"> - Inform consumers about impact of packaging waste and food waste - Make date labels more clear - Improve confidence and skills with regard to cooking with leftovers
Recommendations segmentation
<ul style="list-style-type: none"> - Actions of supermarkets to reduce food waste at consumer level will be more effective when they adjust their messages to their different market segments.
Recommendation increasing supermarket support:
<ul style="list-style-type: none"> - Creation of synergies

- Support of other supply chain actors
Recommendations governmental support
<ul style="list-style-type: none"> - Establish measurement protocol for companies, consumers and countries - Setting food waste reduction targets - Establish (global) organisations with the aim to reduce food waste

Discussion & future research

Due to the time constraint of this thesis, it was not possible to conduct another type of research besides the literature study. Conduction other types of research would make it possible to verify results found during the literature review. It would have been better to conduct an analyses in different supermarkets, to experience how different supermarkets communicate household food waste messages towards their consumers. And to see whether more regular supermarkets communicate contradicting messages to their consumers. And when there would have been more time to do this research the new type of stores would have been analysed in further detail, to see their impact on household food waste.

Furthermore it would also have been beneficial for this thesis to interview experts on the topic of food waste and communication between consumers and supermarkets. In that way it would be easier to bridge the gap in situations where literature is lacking. Information about the best communication method to reach different kind of markets segments can for example be obtained with the help of an interview. It would also have been beneficial to interview different supermarket managers and managers within a supermarket cooperation about what kind of actions they take to reduce household food waste, and whether or not they think it is their job to help reduce household food waste. Furthermore, it would also have been advantageous to interview consumers about their food waste behaviour, and ask them what they need from the supermarkets in order to reduce their household food waste. And to ask consumers whether actions taken by supermarkets work, and if they ever notice the communication of contradicting messages by supermarkets.

The drivers behind consumers' food waste behaviour are explained in this research, but more research needs to be done to see what is the best way to change that behaviour. And to see what is exactly needed to be able to break through the consumers' current throw away behaviour of consumers.

In the future, research needs to be done in order to see whether or not initiatives to tackle the household food waste problem paid off. The results of all taken initiatives need to be investigated. Currently it is not clear whether the initiatives have the desired result, because the initiatives started just recently and are only conducted on small scale. Also it is not sure whether the recommendations done in the last chapter will really have a positive effect on the reduction of household food waste.

Future research should also focus more on the best communication methods to stimulate the reduction of food waste at consumer level. This information is needed in order to reduce the amount of household food waste as effective and efficient as possible.

As mentioned throughout this research consumers are not the only ones that contribute to the global food loss and waste problem. Once consumer household food waste is reduced, the problem is still not solved. All actors that contribute to food loss and waste need to take action to reduce the global amount of food losses and waste, only then the negative consequences of food losses and waste will be reduced. Future research should focus on reducing the amount of food loss and waste through all stages of the food supply chain in order to create a more sustainable food supply chain.

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Appendix

Plus tv-commercial: <https://www.youtube.com/watch?v=Kbuqu7X6Sfs&feature=youtu.be>

Jumbo tv-commercial: <https://www.youtube.com/watch?v=UucbzCMfqPE&feature=youtu.be>

Lidl tv-commercial: <https://www.youtube.com/watch?v=MvaSUr1Nvzg&feature=youtu.be>