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# How to become a Food Waste-Fighter?

*An exploratory study into  
food waste-reducing business practices  
in the food service industry.*

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Master thesis in Strategy and Management

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This thesis was written as a part of the Master of Science in Economics and Business Administration at NHH. Please note that neither the institution nor the examiners are responsible – through the approval of this thesis – for the theories and methods used, or results and conclusions drawn in this work.

# Abstract

By the end of this century, global food production must increase by 70 per cent to feed the world's growing population. Currently, we waste one-third of all food produced for human consumption. This is major problem, affecting not only the environment, but also labour in the food value chain, waste management services, commodity prices, and global food security. If no action is taken, the current problem of food waste can soon develop into a global tragedy.

High income levels and lack of knowledge among people living in Western Europe has created an affluent society, where access to food is regarded as inexhaustible. To address this issue, we chose to target food waste in food service industry.

A sample of 45 Western European food service business were analysed to identify emerging food waste-reducing business practices and the benefits that follow adoption of such practices. The sample consisted of restaurants, hotels and canteens that do an exceptionally good effort in reducing food waste as well as other food waste experts.

After conducting several in-depth interviews and thorough online research, we created The Food Waste Fighter's Toolbox –a guide and inspiration for the food service industry to learn about and select business practices that suit their individual business. Presented in a business model perspective, these practices are easy to adopt, as leaders can focus their attention to specific parts of the business. To further simplify implementation, each practice is labelled according to requirements needed, and to the effectiveness of the practices.

In addition, we present reported monetary and non-monetary benefits. We offer practical recommendations on how operators can reduce food waste that can possibly lead to increased profit, improved reputation and quality, as well as reduced environmental externalities.

Hereby, our thesis contributes to the nearly non-existing literature of measures to fight food waste in the foodservice industry, and contribute in fighting a global problem that the Western world has yet to see the consequences of.

# Acknowledgement

The subject of this master thesis is food waste in the food service industry, a subject we truly enjoyed working with.

First of all, we would like to thank our excellent supervisor, Tina Saebi, who has helped and supported us throughout this whole process. We appreciate her sincere interest in our topic, her very high level of knowledge, and how she cared about us reaching our potential. The feedback has been specific, constructive, and quick as well as thorough. Another appreciation goes to Tina and the Institute of Strategy & Management at NHH for funding of our field trip to Copenhagen, a trip that contributed a lot to our research.

Second, we would like to thank all the kind contributors who took time to share their knowledge with us; they are listed on the next page.

Third, we would like to thank Peter Haugelund, CEO of Det Runde Bord, who welcomed us to join him on a day of packing and delivering surplus food to homeless people in Copenhagen. We will remember this day for the rest of our lives, giving us strong personal motivation to finish this thesis. Fourth is Avfall Norge and Silje Marie Rosenlund who invited us to present our findings at their Fall Conference. Participants showed great interest in our topic, something which continued to inspire us towards the end.

Further, we would like to thank former Head Chef and World Champion Øivind Wold, who gave us valuable understanding of how fine commercial kitchens were operated fifty years ago, and how much it has changed.

Lastly, our gratitude goes to our friends and family for their continuous support during the whole process of writing our Master Thesis, and especially to Lunsjgruppa, with whom we could share our joys and sorrows.

  
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## List of Acronyms

| <b>Acronym</b> | <b>Full name</b>  |
|----------------|---|
| EEA            | European Economic Area                                  |
| EU             | European Union  |
| FAO            | Food and Agriculture Organization of the United Nations |
| ISWA           | The International Solid Waste Association               |
| NGO            | Non-governmental organization                           |
| OECD           | Organization for Economic Co-operation and Development  |
| TGTG           | Too Good To Go  |
| UN             | United Nations  |
| UNEP           | United Nations Environment Programme                    |
| UNFPA          | United Nations Population Fund                          |
| USDA           | US Department of Agriculture                            |

# 1. Introduction

*Wasting food means you're also wasting all the energy it took to grow, harvest, transport, and cook it. In addition, food decomposing in landfills releases methane, the greenhouse gas that is 20 to 25 times more powerful than carbon dioxide.*

*Bon Appétit Management, 2016*

As this quote illustrates, food waste has widespread consequences, and the extent of the problem is large. Roughly one-third of all food produced for human consumption worldwide is lost or wasted (Stenmarck, Jensen, Quested, & Moates, 2016). This equals 1.3 billion tons of food waste annually, which is a major problem, as this food waste could feed every undernourished person on our planet – three times over (Juul, 2013). In addition, the enormous waste in scarce freshwater, limited land capacity and the diminishing non-renewable resources, create immense pressure on the earth's capacity to meet our demand (Stenmarck et al., 2016).

In Europe and North America, average per capita food waste is estimated to be around 179 kilograms annually, and one year's food waste from Europe could feed 200 million people (BIO Intelligence Service, 2016; FAO, 2016b). Food waste is generated at all stages in the food value chain, but in developed countries, the majority of waste occurs in the last parts of the value chain (FAO, 2016b). This includes distribution, preparation and consumption, involving retailers, restaurants, hotels and private consumers, among others.

Taking into consideration the 800 million undernourished people worldwide, the limited capacity of the earth to produce food, as well as the increasing world population (BIO Intelligence Service), we argue that there is an urgent need to find sustainable and adoptable solutions to prevent, reuse and recycle food waste. The challenge is also supported by the United Nations, where the problem of food waste is put high on the political agenda; the UN's Sustainable Development Goals state that food waste should be halved within 2030 (United Nations, 2015).

## 1.1 Research gaps: In search for food waste solutions

Although the problem is extensive and the consequences are devastating, the fight against food waste is still relatively young. The topic lacks research in many areas, such as measuring waste and waste generation in different industries (cf. section 2.9), but perhaps most alarming

is the lack of a common food waste-definition and methods to measure the extent of it (FAO, 2016a; BIO Intelligence Service, 2016). Despite this, research has come a long way in terms of food waste within the private household sector and the retail industry. However, the food service industry has to a large degree been overlooked. As 14 % of all food waste in Europe is generated here (BIO Intelligence Service), we argue this is a crucial area of future research.

Within the food service industry, current research leaves several gaps in the literature. Although there is no unified food waste measurement method, most research on this industry have aimed to quantify food waste (Beretta et al., 2013; Betz et al, 2015). This means that findings are not easily comparable. Furthermore, we have not been able to find relevant studies that go in-depth on food waste-reducing measures for the food service industry. To study a complex topic such as food waste, we believe research depth is essential, so that each element of food service businesses can be targeted in the most efficient way according to each firm's capabilities and characteristics.

Lastly, we did not identify research that presents food waste-reducing business practices in a business model perspective. We argue that a business model is a useful tool for presenting such practices, as it breaks a business into separate parts, so that managers can easily see *where* and *how* to change.

In sum, food waste-reducing business practices for the food service industry is largely unexplored, and to our knowledge, there is no research that adopts a business model perspective to target such goals. In the following section, we formulate a research question based on the extent of food waste and the above-mentioned gaps in literature.

## **1.2 Research question and contributions**

The extent of the problem indicates the urgent need for reducing food waste. This, we argue, means that it is necessary with easy understandable and applicable *business practices* at organizational level that reduce food waste. It is also important to highlight *benefits* related to food waste-reduction, to incentivize the adoption of such measures. As there is limited research conducted within the food service industry, we see the need for studies aimed at reducing food waste in this specific industry. Furthermore, this industry has a very close connection to its customers compared to the retail industry, and consequently, we argue that the synergy effects of targeting the food service industry can be large. The *purpose* of this thesis is to present a wide specter of measures to reduce food waste, in order to *inspire* and

*motivate* managers in the food service industry to take action. Although managers are the main target group, we believe that chefs and other employees working with food service, such as waiters, should also be addressed. This leads us to the following research question:

*What are the emerging types of food waste-reducing business practices in the Western European food service industry, and what monetary and non-monetary benefits can be seen in businesses applying such business practices?*

Because of the benefits of using a business model, our findings from the first part of the research question will be categorized in an informative table according to selected elements from a well-known and widely accepted business model. This table, which we have called ***“The Food Waste-Fighter’s Toolbox”***, has the potential of working as an inspiration and guide for food service businesses to adopt food waste-reducing practices. We aim for the last part of the research question to serve as motivation for those that are reluctant to change. We hence target both monetary and non-monetary benefits, where the latter also includes positive impacts for people and the planet. Consequently, this thesis will serve as a contribution to motivate change and ease the selection of new and efficient business practices.

The second contribution addresses the gap concerning lack of research within the food service industry. We aim at adding depth to the research by presenting a wide choice of business practices, along with real-life examples and guidance of finding solutions that fit individual businesses. The latter is very important, as there can be large differences between food service concepts, such as hotels and restaurants, or within one such concept. In sum, the Food Waste-Fighter’s Toolbox will contribute to easier adoption of food waste-reducing business practices, which in turn will hopefully lead to more food waste-reduction.

By raising attention towards the benefits of reducing food waste, we aim to motivate both managers and researchers to find universal measurement methods, and start measuring the amount of waste. Pointing at the benefits might increase awareness around the problem of food waste and make researchers and leaders engage in this problem.

Lastly, we contribute in collecting and compiling in-depth information about food waste-reduction in the food service industry. As existing literature appears as very fragmented, it required extensive work from our side to boil it down to the information presented in the literature of this thesis. After a period of intense research, we were able to narrowing down the scope of the thesis in terms of theoretical perspective, geographical area and industry.

### **1.3 Boundaries of the thesis**

This thesis targets the food service industry, which contributes to 14 % of all food waste in Europe (BIO Intelligence Service, 2016). We have further narrowed down the research to cover three concepts within this industry, namely *restaurants*, *hotels* and *canteens*. However, findings can be generalized to cover other concepts if necessary adaptations are made. The overall motivation for choosing this part of the value chain, is the extent of the problem, the need for research on how to fight it, and the great possibilities for food waste-reduction. Compared to the retail sector, reducing food waste in the food service industry seems to be more problematic, due to the larger extent of fresh food. The potential for reduction is huge, especially because of the characteristic of food in the food service industry, where employees often have close contact with its customers.

Furthermore, this thesis draws the boundaries to cover the food service industry in *Western Europe*. Western Europe was chosen as it complements the chosen industry in terms of where in the value chain food waste is generated. Another important factor is the current national and international goals on food waste-reduction in this area. Lastly, food service businesses within Western Europe operate in quite similar contexts, much due to the common food waste laws (Regjeringen, 2015a).

People in Western Europe have in general a high level of income compared to the rest of the world. This implies that people and companies can afford to throw away food. In addition, they can afford to buy more than they need. It appears as if food in Western Europe is to a larger degree taken for granted, compared to low-income countries.

### **1.4 Outline of the thesis**

In order to answer our research question, we start by presenting the concept, causes and effects of food waste, and characteristics of the food service industry. This discussion leads to the discovery of several gaps in the research. These gaps underline the need for a business model perspective, thus, we continue by presenting a business model framework to use when presenting our findings. We then move on to presenting and explaining methodological choices and steps made in this research process, and discuss the quality of our research design. After this, we present the findings from the data collection and data analysis process, structured in two sections representing the two parts of the research question. Finally, we discuss and sum up the major lines from our findings, and discuss what implications these

findings have for managers in the food service industry, theoretical development and future research. Figure 1 illustrates the outline of the thesis.

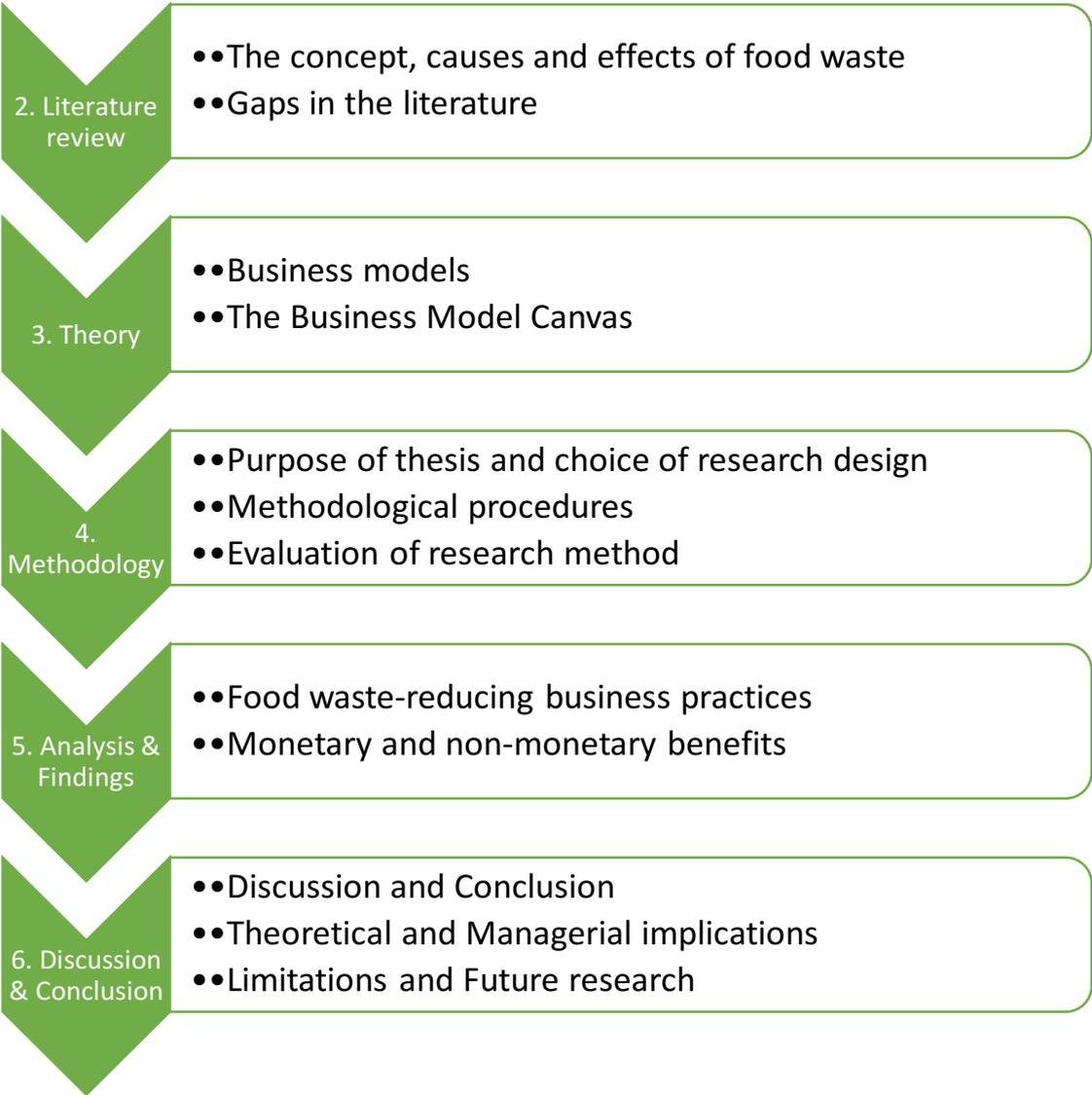


Figure 1: Outline of the thesis.

## **2. The Concept, Causes and Effects of Food Waste**

In order to identify food waste-reducing initiatives, it is necessary to review two of the main topics for this thesis: food waste and the food service industry. Firstly, the term food waste will be defined and the problem of food waste will be explained as thoroughly as possible within the scope of this thesis. We do this to underline the importance of reducing food waste which is the overall contribution of this thesis. We continue discussing food waste within the food service industry. While the food service industry produces a large share of total food waste, it is also a sector with a large potential to reduce food waste. However, our review of food waste and the food service industry will reveal that, to our knowledge, no research has been done on compiling food waste-reducing measures and presented them from a business model perspective.

In Appendix A, we have provided an overview of different actors working on the topic, as well as the approach each of these actors have taken. This is to give a broad picture of the great efforts that are done on the wide topic of food waste. However, as the table illustrates, not many organizations are targeting the food service industry specifically

### **2.1 Defining the concept of food waste**

*Food loss* and *food waste* are terms describing two different causes of food not reaching the stage of consumption, when human consumption was the original intention of the produced food (FAO, 2016b). In everyday language, the two terms are often used interchangeably. In academia, however, there is a distinction between food loss and food waste. According to the Food and Agriculture Organization of the United Nations (FAO), *food loss* refers to food that does not reach the stage of consumption because it is unintentionally lost at an earlier stage in the food supply chain. For instance, food loss can occur during transportation, when fruits fall off the transportation vehicle.

*Food waste* refers to food that does not reach the consumption stage because it is discarded by a food operator or consumer (FAO, 2016b). The food can be discarded because it has been forgotten and spoiled, or because of inefficient exploitation. Either way, the disposal is done deliberately. Food waste happens at all stages of the food supply chain, such as during processing, handling, storage, sales, preparation or serving, and is often a consequence of rigid regulations, inadequate facilities or suboptimal practices (FAO, 2016b; FWRA, 2015).

Furthermore, food waste is often categorized as avoidable, possibly avoidable and unavoidable (BIO Intelligence Service, 2010). *Unavoidable food waste* is waste of food that is not intended for human consumption, and it is not fit for human consumption unless it is processed. Such food waste includes e.g. egg shells, bones and pineapple skins. In contrast, *avoidable food waste* is food intended for human consumption, but because of various reasons (see section 2.5), it is not used for that purpose. *Possibly avoidable food* waste includes food that is fit for human consumption, however not everyone eats it. Examples of possibly avoidable food waste are potato skins and bread crusts. Consequently, the two latter categories of food waste are waste of edible food.

## **2.2 The extent of food waste**

Data states that on a global basis, about one-third of all food produced for human consumption is lost or turned into waste yearly (FAO, 2016b; FWRA, 2015). This equals around 1,3 billion ton of food each year. Narrowing this down to the EU, the per capita food waste is 179 kilos annually (BIO Intelligence Service, 2010). The paradox is that the total amount of food wasted in all of Europe could feed 200 million people annually (FAO, 2016a). Considering that 800 million people in the world are undernourished and that the world is expecting a fast population growth with 2 billion more people by 2050 (FAO, 2015; UNFPA, 2016), we argue that food waste-reducing initiatives have great potential of turning a global problem into a life-saving solution.

To further underline that the problem of food waste is a widespread issue, we point out that it affects many stakeholders besides those directly purchasing and wasting the food. Important stakeholders are governments, non-governmental organizations working with development or food security, certain public services such as those responsible of waste management and food safety, commercial and non-commercial food operators as well as private consumers in both developing and developed countries (BIO Intelligence Service, 2010).

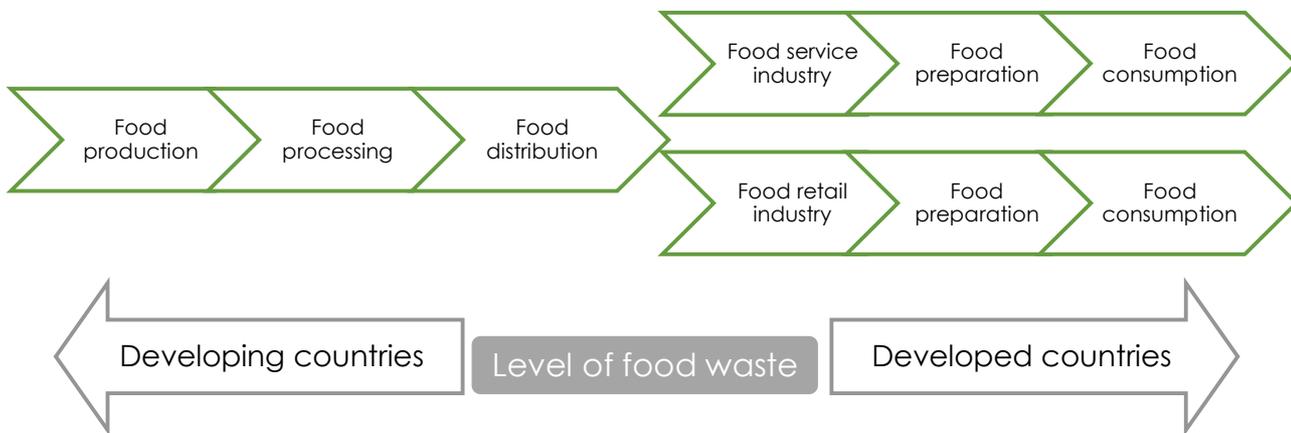
To sum up, food waste reduction is important, and the prevalent effect of this reduction may be large.

## 2.3 The food supply chain

In order to find successful food waste-reducing business practices that are suitable for individual businesses, we need to narrow down the scope of the thesis so that it covers a geographic area which our findings can be generalized to.

The food supply chain describes the process from production of food to the consumption of food. Characterized by a domino-like movement, changes made at one stage of the supply chain will affect the other parts, often manifested in price changes (Harvard TH Chan School of Public Health, 2016). A simple illustration of the food supply chain is shown in figure 2. The model shows the stages from production to consumption, commonly referred to as “*from farm to fork*”. After the food is produced and processed, it is distributed to downstream food operators either in the food service industry or in the food retail industry. At this stage, the food undergoes storage and preparation, before it is consumed, either at home or at restaurants, hotels or other food service businesses.

According to FAO, the distribution of food waste along the food supply chain differs (FAO, 2016a). In low income countries, food waste is mainly happening at the early stages of the food supply chain, and as much as 40 % is happening during post-harvest and processing, never reaching the consumer. In middle- and high-income countries, food waste is mainly happening at the later stages of the food supply chain. More than 40 % of food losses in these developed countries happen after distribution to the food service industry or the food retail industry (FAO, 2016a). Thus, selecting a research area within one of these two intersections is beneficial as it could potentially have a bigger impact.



*Figure 2: From farm to fork –an illustration of the stages in the food supply chain. Authors' own model, based on BIO Intelligence Service (2010).*

As explained in the introduction, the focus of this thesis is on the food service industry in Western Europe. By choosing this part of the industry and this geographical area, we target a sector with high food waste-reducing potential. To understand how food waste can be fought in this specific context, we now need to explore the food service industry.

## **2.4 The food service industry**

The food service industry is defined as businesses that prepare, serve and sell their meals outside of private homes, and is separated into commercial and non-commercial operators (USDA, 2014). The commercial segment is about 80 per cent of the industry and includes full-service restaurants, catering services, canteens, bakeries, fast-food restaurants and other business concepts preparing and selling meals to earn profit. The non-commercial segment includes hospitals, schools, non-governmental organizations (NGO) and other food operators that seek to break-even profit wise (USDA, 2014).

### ***Food waste within the food service industry***

We recall that the total quantity of food waste produced in the EU is estimated to be 179 kilograms per capita. As illustrated in figure 3, the same number in the EU food service industry is 25 kilograms per capita, making the industry account for 14 % of all EU food (BIO Intelligence Service, 2010). The food waste data per capita for the European non-EU countries Norway, Switzerland and Iceland are more or less similar (Miljøstatus.no, 2015; OECD.stat, 2016; Our Common Food, 2012). Finding data on food waste from the food service industry in these countries proved to be difficult, but due to homogenous characteristics regarding culture and laws, we assume that the data from the EU is representative enough for these countries as well.

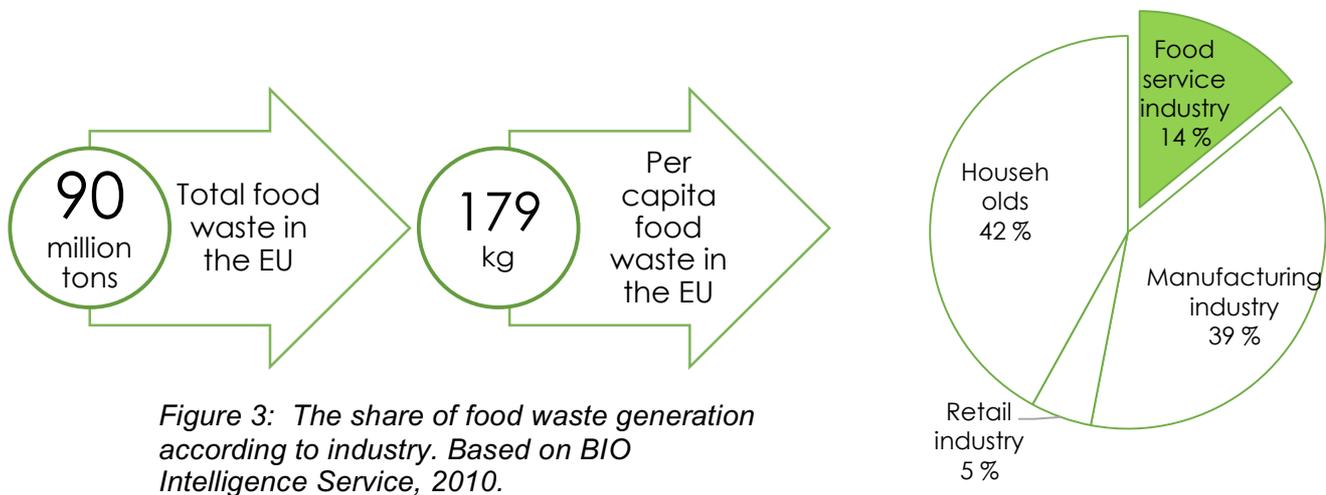


Figure 3: The share of food waste generation according to industry. Based on BIO Intelligence Service, 2010.

Within the EU countries, there are large differences. There is a trend that the high-income countries in the EU have more than double the amount of food waste per capita compared to middle-income countries<sup>1</sup>. The average per capita food waste within the food service industry in the two country groups is 28 kilograms and 12 kilograms, respectively. This large difference may be caused by differences in disposable income, consumption of services or practices in the services (BIO Intelligence Service, 2010).

Furthermore, there are big differences in food waste generation between the different business concepts in the food service industry (figure 4). For instance, fast-food restaurants' food waste makes up 9,55 % of their total amount of food purchased. The equivalent number for full-service restaurants is considerably lower; only 3,11 % (Jones, 2006).

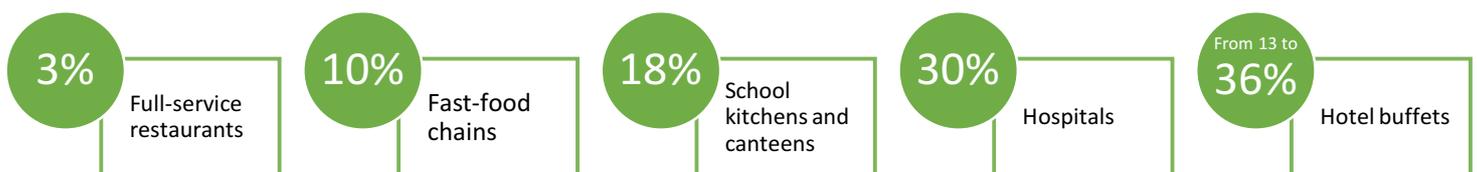


Figure 4: Percentage of food purchased that turns into waste (in weight) for 5 business concepts. Approximate numbers. (Boonyakiat, 2010; Kaysen, Kirkevaag, Marthinsen, & Sundt, 2012; Lephilibert, 2016; Recycling Works, 2015).

<sup>1</sup> EU high-income countries are Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and United Kingdom. EU middle-high-income countries are Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia. Please note that the selection of countries and income level is from 2010. (BIO Intelligence Service, 2010).

## **Food characteristics and waste**

In addition to waste varying between food services concepts, different *food types* also have different waste statistics. In general, fruits and vegetables have the highest wastage rate, due to their high perishability. Of all fruits and vegetables produced, processed and consumed in Europe, almost 50 % are wasted (Gustavsson et al., 2011). For meat, fish and seafood, and cereals, the wastage rate is ranging from 20 to 35 %. Dairy products have the lowest wastage rate at 10 % of all dairy production.

## **2.5 Causes of food waste**

In order to find effective measures to fight the problem at its roots, it is necessary to identify what is causing it. By reviewing reports from national and regional organizations and associations, we have identified eight main causes of food waste generation in the food service industry, and *grouped them according to their characteristics* (see figure 5). Each of the eight causes will be discussed in turn:



*Figure 5: Eight main causes of food waste in the food service industry.*

### **Suppliers**

Although suppliers are not directly part of the food service industry, they are closely connected, thus important to consider. It is important to acknowledge the fact that the food service industry receives a cost-advantage when buying in scale (BIO Intelligence Service, 2010). This is especially relevant for chain restaurants, and creates an incentive to buy large quantities as the cost of disposing excess products often will be lower than buying at smaller scale.

### **Channels**

BIO Intelligence Service (2010) further identifies the lack of adequate channels to distribute excess food as a cause of food waste. Although BIO Intelligence Service refers to this cause as “Knowledge”, we choose to label it “Channels” to avoid confusion with the below-

mentioned “Industry awareness”. The lack of suitable channels to handover edible food from the food service industry to individuals and organizations that can distribute the food, creates a strong impact on the amount of edible food waste going to landfills.

### ***Storage***

Inappropriate storage conditions contribute to the generation of food waste in all parts of the value chain, also at the preparation stage within the food service industry (BIO Intelligence Service, 2010). Although regulated by food safety authorities, not all storage conditions are optimal to maintain the quality and prolong the lifetime of food. Closely related to storage is packaging of food, which, if done correctly, may also prolong the lifetime of the food. With regard to packaging, food operators must make a decision of the trade-off between consequences of food waste and packaging waste.

### ***Logistics***

Planning and estimating the need of resources can be difficult in the food service industry as the number of guests may vary drastically from day to day, depending on a variety of causes such as weather, season, events, tourism and many others (BIO Intelligence Service, 2010). Furthermore, when offering a menu, all items are expected to be available for ordering. This creates difficulties in estimating the quantity of food needed, particularly when reservations are not required, as food service companies often must purchase and prepare more food than what will be bought and eaten.

Another logistical problem arises with the use of buffets. Consumers often expect a buffet to not run out of any of the food items. In bakeries, this problem arises as the different bakery products are displayed at the counter to tempt their potential customers. From a business perspective, it is desirable with a high product pressure, meaning that counters are bursting with a variety of products at all times. A small amount of food on display will attract less people to the bakery.

### ***Portion sizes***

Studies show that when serving themselves, consumers eat 92 % of the food on the plate (BIO Intelligence Service, 2010). When being served and imposed a portion size, as when serving meals in a restaurant, food waste is generated due to the fact that different people have different portion size-needs. The standard portion size is usually made big enough to serve the majority of consumers, thus those who need less food will leave their plate with leftovers.

Besides portion sizes of meals, the single serving items of for instance jam, cereals and milk, served by many hotels and catering facilities, impose the same food waste generation by giving the consumer a standard size that might not suit the individual consumer's need.

### ***Freshness requirements***

One of the biggest challenges in this industry is the fact that most food must be fresh in order to cook meals people are willing to pay for. The consumers' high expectations concerning looks, freshness and variety are among the reasons good products are thrown away. These "standards" are partly developed according to the customers preferences, and to change these preferences, it is required that several actors collaborate (Priefer, Jorissen & Brautigam, 2016). Although freshness requirements are important, there are differences within the industry, depending on the quality and type of the food served. For instance, a cafeteria will have better possibilities to reuse leftovers than a Michelin star restaurant, as consumers have lower expectations of freshness and quality. Furthermore, it is necessary to comment on the regulatory constraints that national governments put on food operators. The harmonized laws in the European Union and Norway regarding temperature, preparation method and hygiene, are created to protect the health of people (Regjeringen, 2015). However, it is possible that these restrictions force food operators to throw away *edible* food, just to comply with food safety laws.

### ***Industry awareness***

Although awareness of the problem of food waste in the industry is growing, the overall level of awareness is still low. One reason is that many food operators do not engage in recycling and sorting food waste, thus they are not aware of the amounts of food waste they create. There is evidence of higher awareness in companies that are physically confronted with the amount of food waste they have created, and consequently recycling of food waste may create higher awareness. (BIO Intelligence Service, 2010).

### ***Consumer attitudes***

Although very common and mostly taken for granted in the United States, taking home restaurant leftovers is not a common practice in many European countries (BIO Intelligence Service, 2010). This means that large amounts of edible food from customers' plates are disposed, rather than being taken home by the customer to eat at later occasion. As for self-service options, such as all-you-can-eat buffets, the lack of awareness among customers often leads to food waste-generating behaviour, where too much food is taken from the buffets.

## 2.6 Consequences of food waste

Having reviewed the causes of food waste, we will now move on to discuss the consequences. Food waste-generation causes negative consequences on several levels. As stated in section 2.2, individuals, organizations, governments and the global society are affected, either directly through their own food waste generation or indirectly through the food waste generation of others. We will now present more specifically how different stakeholders are affected.

### ***Resources and earth capacity***

The direct consequence of food waste, meaning the loss of purchased nutrition and the cost and efforts to dispose it, are easy to see and understand. However, food waste also represents a major use of many of the planet's limited resources. Production, processing and transportation of food intended for human consumption that ends up not being consumed, results in unnecessary use of land capacity, fresh water, energy and labor (FAO, 2015; Stenmarck et al., 2016). For instance, waste treatment capacities are required double within 2020 if food waste-generation follows current estimates (BIO Intelligence Service).

To further underline the problem, it is important to note that the current production level and the distribution of food contributes to *food insecurity*. Globally, we produce more than enough food to feed the entire planet's population. However, this food is highly unevenly distributed, and nearly 800 million people across the world are undernourished, and an additional 1 billion people go hungry (FAO, 2015; United Nations, 2015). At the same time, more than 2 billion people worldwide are overweight or obese. The implications of this are that a reduction of food waste would release the pressure on earth production capacity, so that the less fortunate also could benefit from it.

### ***Environmental consequences***

Further, the excess production leads to an unnecessary emission of greenhouse gases, which in turn contributes to climate changes (FAO, 2015). In the EU, food waste generates 170 million tons of CO<sub>2</sub> equivalents annually (BIO Intelligence Service, 2010). This is equal to the yearly CO<sub>2</sub> emissions from more than 16 million homes<sup>2</sup> –roughly all the households in Sweden, Belgium, Greece and Finland<sup>3</sup>, or approximately 3 % of total EU emissions in 2008

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<sup>2</sup> According to the Greenhouse Gas Equivalencies Calculator provided by the US Environmental Protection Agency (EPA, 2016).

<sup>3</sup> Number of households in brackets, in thousands: Sweden (4 590), Belgium (4 651), Greece (4 344) and Finland (2 595) (Eurostat, 2014).

(BIO Intelligence Service, 2010). Without additional measures to prevent food waste-generation, the quantity of food waste is expected to grow by more than 40 % within 2020, creating additional emissions to impact the planet.

### **Financial consequences**

The financial impact of food waste in the food service industry has rarely been studied. One study conducted by Eriksson (2012) detected a marginal benefit of €1,30 per kg. reduction of food waste in the sector of restaurants and catering in Sweden. This marginal benefit would result in noticeable amounts if every business managed to reduce food waste by a few kilograms each month. With most of the food waste being avoidable, we see that there are possibilities for great monetary benefits if managing to reduce food waste.

Another study, performed on the hospitality and food service sector in the United Kingdom, identified the breakdown of waste-costs. It found that food procurement costs and labour (time spent preparing the food) accounted for the vast majority of the costs, at 52 and 37 %, respectively (Wrap, 2013). Energy and water use, for instance, only make up 4 and 0,6 % of the total costs. The implications of these findings are important. Implicitly, with the high labour costs and commodity prices of Europe, great profits can be made if food waste is reduced.

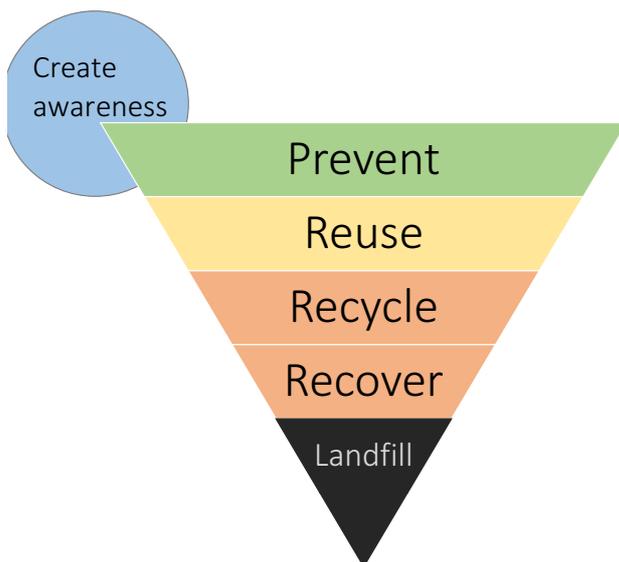


Figure 6: The food waste hierarchy. Authors' own model, based on European Commission, (2016b) UNEP and ISWA (2015)

## **2.7 The food waste hierarchy**

Based on the consequences mentioned in the previous section, we have created a *food waste hierarchy* (figure 6), based on the waste hierarchy of the European Commission (2016b) and UNEP and ISWA (2015). This reversed pyramid illustrates how different strategies to reduce food waste have different levels of efficiency, according to how they treat food waste. Our contribution to the hierarchy, is the “*Create awareness*”, which we consider equally important as to *prevent* food waste. Consequently, these two strategies are placed at the top of the pyramid, illustrating that they are the most effective options.

When we compile business practices into a business model, we will use this hierarchy to label them. Each practice will be color-coded to whether it builds awareness around food waste, prevents food waste, reuses food waste, recycles or recovers food waste, or sends food waste to landfill. As one of the goals of this thesis is to present food waste-reducing practices, we will use this hierarchy to encourage the most efficient practices. The traffic light colors are visual effects that we believe will cater for our target group; managers in the food service industry.

On the top of the hierarchy, we find the most efficient actions, i.e. those business practices that *prevent* food waste. Preventive business measures are the best options, as they avoid all the negative consequences by not producing any excess food that goes to waste. In addition, we have placed *create awareness* at the top, as we believe knowledge-sharing is also an instrument to prevent food waste.

At the second level, we have placed *reuse*. Reusing food waste for human consumption, or alternatively as animal feed, is the best option if the excess food has already been created. As these actions mean that the food will still be eaten, they are considered more preferable than actions from further down in the hierarchy. At the third and fourth level, we have placed such actions, which include practices that *recycle* food waste, and practices that *recover* energy from food waste. Even though these actions are marked in red, they are still better than sending food waste to the *landfill*, as this causes the highest emission of greenhouse gases. If the food waste reaches the landfill, it does not result in any utility, but all the negative consequences are still present.

## **2.8 Trends, tendencies and global goals**

In 2014, the food service industry grew by 5,7 % on a global basis (Statista, 2016). Along with this growth, certain trends are developing, which are important for actors in the food service industry to consider. Furthermore, these trends underline the importance of the thesis, as they demonstrate the future need for reducing food waste.

### ***Demands from societies***

As illustrated in figure 2, the household sector is a major source of food waste. However, people's eating habits are constantly changing, and over several generations, preferences for homemade meals have been replaced with quick and cheap processed food from the grocery stores. Along with growing disposable incomes in several parts of the world comes a higher

demand for services offered to save time and effort. For the first time in history, the American people are spending more money on dining out than they spend on groceries (Bloomberg Markets, 2015).

In Europe, people still spend more on grocery than on dining, although the tendency is that people dine out more often, especially young people (Statista, 2016). In the UK, researchers have found that young people spend more money on food than any other age group, and especially food from the food service industry (Independent, 2015). The researchers explain this by lack of cooking skills and a busy lifestyle. Research conducted in Norway shows that people with residence in the cities spend more money in restaurants and cafés, compared to people in more sparsely populated areas, due to easier access and a more hectic lifestyle (Statistics Norway, 2012). All these trends are important to consider, as they implicate that more of the planet's resources are to run through the food service industry. Consequently, the industry will have an even bigger responsibility than before to ensure sustainability. The idea of a circular economy has drawn more attention to the possibility of eliminating all waste, and instead adopting an approach where everything is reused or returned to the earth to create further resources. A similar goal would be desirable also in the food service industry (Jurgilevich et al., 2016).

There is also a general tendency that societies demand more sustainably produced food, both from retailers and from the food service industry. What is “hot” in the food world changes constantly, and several nutritionists, food operators and industry associations forecasted *food waste management* to be one of the top emerging food trends in 2016 (Duron, 2016; National Restaurant Association, 2015; Webb, 2015; Zegler, 2015). Keywords such as *waste management*, *waste-based cooking* and *zero waste-policy* are flourishing among food operators, and the popularity among consumers is growing. For the commercial segment, this implies that there are financial opportunities in the reduction of food waste if this is communicated well to the consumers.

### ***From food waste to food by-products***

We recall from section 2.1 that food waste is often categorized as unavoidable or avoidable. Certain scholars, however, have chosen to reject this view, as they do not wish to accept any organic material to be wasted. Instead, these scholars refer to unavoidable food waste as *food by-products*, pressing their view that the organic material, although not edible in its current state, is not waste but rather a different product that can serve other purposes and fulfill a

demand (Olsen, Toppe, & Karunasagar, 2014; Rustad, Storro, & Slizyte, 2011; Schieber, Stintzing, & Carle, 2001). In the food service industry, this is usually practiced by using the whole product, rather than just the traditionally used parts, which often creates by-products such as peelings, skin, bones and liver, among others. Although unconventional for human consumption, such “unavoidable” food waste is often a great source of nutritional value (Sharma et al., 2016). If the trend of using food by-products keep growing, it would mean that a larger share of the food produced is consumed. This would relieve some of the pressure today’s production levels create.

### ***Regional and global goals***

Consumers, the industry and researches are not the only parts of society that start to gain awareness of the food waste problem. International organizations and cooperations are also starting to develop and pursue goals to decrease the amounts of food waste generated.

All UN member states have committed to reach the UN Sustainable Development Goals by 2030. Goal number 12 “Responsible production and consumption” says that by 2030, we are going to “...*halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chain, including post-harvest losses.*” (United Nations, 2015). This new goal targets food waste directly and puts sustainable food production and consumption patterns as one of the top important areas of work. The UN Sustainable Development Goals are intertwined with one another, meaning that several of the other goals are dependent on the reduction of food waste to reach their individual goals, such as goal number 2 “Zero hunger” and goal number 11 “Sustainable cities and communities”. A characteristic of the UN goals is that cooperation across boundaries and industries is needed to achieve them. This accentuates the need for the food service industry to take responsibility, which confirms the need of research to add depth to this topic. By presenting food waste-reducing measures for the food service industry, this thesis contributes to this need.

There are also political efforts that can be seen on country-level. For instance, France recently adopted a food waste ban for their food retail industry, following the government’s plan on halving food waste before 2025 (Rixon, 2015). A similar goal is being pursued in Italy, although financial incentives are being used instead of financial punishment. Here, retailers will pay less waste taxes the more food they donate to those in need, and farmers will be able to donate unsold food to charities without facing transaction costs (BBC News, 2016). However, it is not only political efforts that can reduce food waste. In Denmark, great results

have been accomplished due to volunteer work. For instance, the Danish society has managed to reduce its food waste by 25 % the past five years, partly due to big efforts on voluntarily campaigning (Stop Spild af Mad, 2016).

## **2.9 Gaps in the literature**

The literature review reveals several gaps in existing research, which can be explained by the fact that food waste-reduction is a rather new phenomenon and thus lacks harmonization on definitions and measurement methods. Furthermore, the food service industry lacks attention, and we could not find research that target food waste-reducing measures from a business model perspective. These gaps will now be discussed thoroughly to underline the need of our research. A full list of the relevant academic research papers mentioned here can be found in Appendix B.

Although most existing research on food waste aim to quantify food waste, we still lack a universal definition and methods to measure food waste on national and international levels. To keep up with the developments in society and to contribute in achieving the UN Sustainable Development Goals, it is necessary with a common understanding of what food waste is, as well as a unified method of measuring food waste. This is important in order to develop efficient methods to fight food waste, and to show credible results. Politicians and other stakeholders have started to see the benefits of collaboration in this area. FUSIONS (Food Use for Social Innovation by Optimising Waste Prevention Strategies) is a EU-funded project with 21 project partners from 13 European countries that have worked together on reaching three main goals; harmonizing food waste definitions and measurement methods, understanding how social innovations can contribute to fighting the problem, and developing a common food waste policy (EU-FUSIONS, 2016; Hanssen & Møller 2013). However, these very recent efforts have not yet had time to influence new research. Although we believe a common definition and measurement methods will result in better comparable data in the future, such information is currently lacking. This is a problem, as different definitions of food waste can create confusion when examining the extent of food waste. Furthermore, it means that data cannot be compared between countries and over time, which puts a limit to measuring the progress on reaching food waste reduction.

In addition to the lack of a unified definition, existing literature has little focus on the food service industry. Most researchers target the household sector, for instance Bernstad & Jansen

(2011), Dai et al. (2016), Refsgaard & Magnussen (2009), Williams et al. (2012) and Xu et al. (2016)<sup>4</sup>. Although this is important, such findings do not apply to the food service industry. Other researchers take a broad approach, aiming to study the whole value chain, such as (Beretta et al., 2013; Buzby & Hyman, 2012; Ridoutt, Juliano, Sanguansri & Sellahewa, 2010). The problem of these papers is that such breadth is done at the expense of *depth*. With a complex topic such as food waste, we argue research depth is essential, so that each element of the business can be targeted in the best way.

We found ten academic papers that have focused on solely the food service industry, or specific concepts within the food service industry. Although they target the industry in question, these papers still leave research gaps that are important to cover. The majority focus on quantifying food waste or identifying causes of food waste, which both are important topics. However, these topics can be regarded as the first step in a process where food waste firstly needs to be identified and measured, then targeted with suitable measures, and finally evaluated. Although these papers contribute to our increased knowledge of the topic, they are not contributing in an actual reduction of food waste.

Two of the ten papers go in-depth on a specific measure to reduce food waste, namely energy recovery and thermal processing (Franchetti, 2016; Vakalis et al., 2016). Although these papers provide detailed research on the topic(s) in question, we argue that only two measures are not sufficient to reduce food waste within the industry. In addition, the scope of the researches is only covering households and restaurants, and hotels, respectively, which makes us question if such a narrow view limits the generalization to other food service concepts.

Finally, there are two research studies that deal with identifying measures to reduce food waste within the entire food service industry; Pirani and Arafat (2016) and Papargyropoulou et al. (2016). Although these papers target food waste reduction, their approach is different than ours. Firstly, Pirani and Arafat choose to make only three recommendations which are derived from the causes of food waste that they identify. These recommendations are to switch from buffet to à la carte menu, to improve food waste management strategies and to increase guest involvement. Pirani and Arafat's recommendations are treated as mere additional parts rather than as the main goal of the research, which is reflected in the highly limited quantity of suggested measures and the depth of their descriptions. We argue that the

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<sup>4</sup> Not listed in Appendix B, as private households are not related to the food service industry.

lack of depth will put limits to implementing measures, as the three measures Pirani and Arafat suggest may not be suitable for all businesses. Secondly, Papargyropoulou et al. provides a conceptual framework for how to identify and explain drivers of food waste generation, which can be used to develop prevention strategies. However, no specific measures are given. Lastly, Pirani and Arafat (2016) and Papargyropoulou et al. (2016) draw the boundaries of their research to the United Arab Emirates and Malaysia, respectively. This can limit the possibilities to generalize findings to Western Europe due to cultural, administrative, geographic and economic distance (Ghemawat, 2001).

Only two research papers were identified to apply a business model perspective (Beitzen-Heineke, Balta-Ozkan & Reefke, 2017; Franchetti, 2016). Beitzen-Heineke et al.'s findings are not relevant for our thesis, as they cover packaging materials in the retail sector. Franchetti (2016) (as described above) adopts a business model perspective, but rather than presenting easily adoptable business model elements, he describes a holistic business model that is limited to a food waste collection kiosk. This standardized business model makes little room for incremental changes, which makes us believe that fewer food operators will implement the model.

It surprises us that so few researchers use business models when they target food waste, as a business models perspective can make it easier for the business to find and implement new solutions (cf. chapter 3). For instance, companies that actively use a business model are able to explore new and important issues (Teece, 2010). Furthermore, companies that have broken down their business into a business model are more successful, as they are able to change parts of their business model to leverage existing business opportunities (Johnson, Christensen & Kagermann, 2008). As food waste reduction in the food service industry is a highly unexplored topic which needs new thinking and innovative solutions, these business model characteristics highlight the need for adopting a business model perspective.

To summarize the gaps in existing literature, we find a strong need for research that aims to identify food waste-reducing business practices in the food service industry, that are presented in an easy-applicable way. A business model perspective allows for new ways of thinking and for businesses to select practices that fit their existing business model. From our literature search, we found no research that has categorized business practices according to business model elements. The gaps illustrated in this section show that our thesis will be an innovative contribution to existing literature, as well as a highly needed guide for the food service

industry. Furthermore, targeting the Western European food service industry will result in useful information for countries that up until now have targeted their research on primarily private households.

### **3. Business models: A framework for organizing food waste-reducing measures**

Business models are useful because they present a systematic overview of how a firm is put together, where the business model describes everything that is necessary to deliver the final product or service. Although there are numerous definitions of business models (Jørgensen & Pedersen, 2013; Magretta, 2002; Osterwalder & Pigneur, 2010), extant literature has converged on the understanding that business models answer the questions; who are the customers, what do they want and how can the firm organize to deliver that value and make profit? (Seinfeld, Calder, McConnell, & Colsen, 2012; Teece, 2010). Thus, business models describe how a company creates, delivers and captures value.

A business *creates value* through offering a value proposition (Jørgensen & Pedersen, 2013). The value proposition is the business' offering to help the customers solve a problem more efficiently, reliable, conveniently or economically. *Value is delivered* to the customer through a set of resources and activities, which the business uses to create the value proposition. Lastly, *value capture* is the logic that ensures higher revenues than costs, e.g. capturing producer surplus.

#### ***The purpose of a business model***

In general, a business model perspective better allows for innovation in a business. Firstly, business models may represent a new dimension of innovation that complements traditional ones, such as product, process, and organizational innovation (Casadesus-Masanell & Zhu 2013) This was also confirmed by Zott and Amit (2008) when explaining how business models may introduce nuances that have escaped the traditional strategy. In addition, Teece (2010) finds that business models have the potential to shed light on important issues that have remained relatively unexplored. Lastly, research finds that firms that seek to change or reshape their business model, experience higher growth compared to those who do not implement such changes (Johnsen et al. 2008; Sosna, Trevinyo-Rodriquez & Velamuri, 2010).

In sum, these findings make business models highly relevant for firms to explore new solutions to adapt to current developments. Economists believe that the world is about to move towards what they call the 4<sup>th</sup> industrial revolution, resulting in changes in consumer trends. These new trends will create new demands making ideas and innovation more important to meet the new demands (Saebi, 2016). Among these trends is the shift towards

more sustainable business solutions. Business models additionally become an increasingly important concept in the field of environmental sustainability (Zott & Amit, 2008).

Because of these business model characteristics, it becomes easier to see new solutions for solving the problem of food waste when thinking in terms of business models. Johnson et al. explain how businesses see the need of a new business model, among others, if there exists an opportunity to “bring a job-to-be-done focus where it doesn’t exist” (Johnson et al., 2008, p. 58). This job-to-be-done focus is what this thesis aims to bring to the food waste issue. By doing this, we argue that food waste reducing business practices are contributing to the shift to meet future demands. As established in section 2.9, food waste reduction in the food service industry is a relatively unexplored theme, which is why it could benefit from being looked at from a business model perspective. Firms, especially large firms, can have difficulties in evaluating their existing business model (Teece, 2010), we argue that this evaluation will be even more difficult if the management lacks the systematic review presented by business model theory.

This thesis collects relatively unexplored measures to reduce food waste, and compile them in new ways. As the aim is to present easily applicable and practical business practices, we choose to use elements of a business model that has already been thoroughly tested and is in use in a number of organizations worldwide. This, we argue, ensures the practicability of the business practices we present. Creating business models that only work on paper has no value for our purpose; the actual use of the business models is important and of high utility. The business model we choose to apply elements from is the *business model canvas*, first presented by Alexander Osterwalder in 2008, and later redefined in Osterwalder & Pigneur (2011) and others.

### 3.1 The business model canvas

Osterwalder and Pigneur’s definition of the concept is that “a business model describes the rationale of how an organization creates, delivers and captures value” (Osterwalder & Pigneur, 2010, p. 14). In their view, a business model consists of nine main building blocks that, when filled with company specific information, together describes how the organization creates, delivers and captures value. The nine building blocks are presented in figure 7. By changing one or more of these building blocks, a company can create new strategic alternatives in a structured matter.

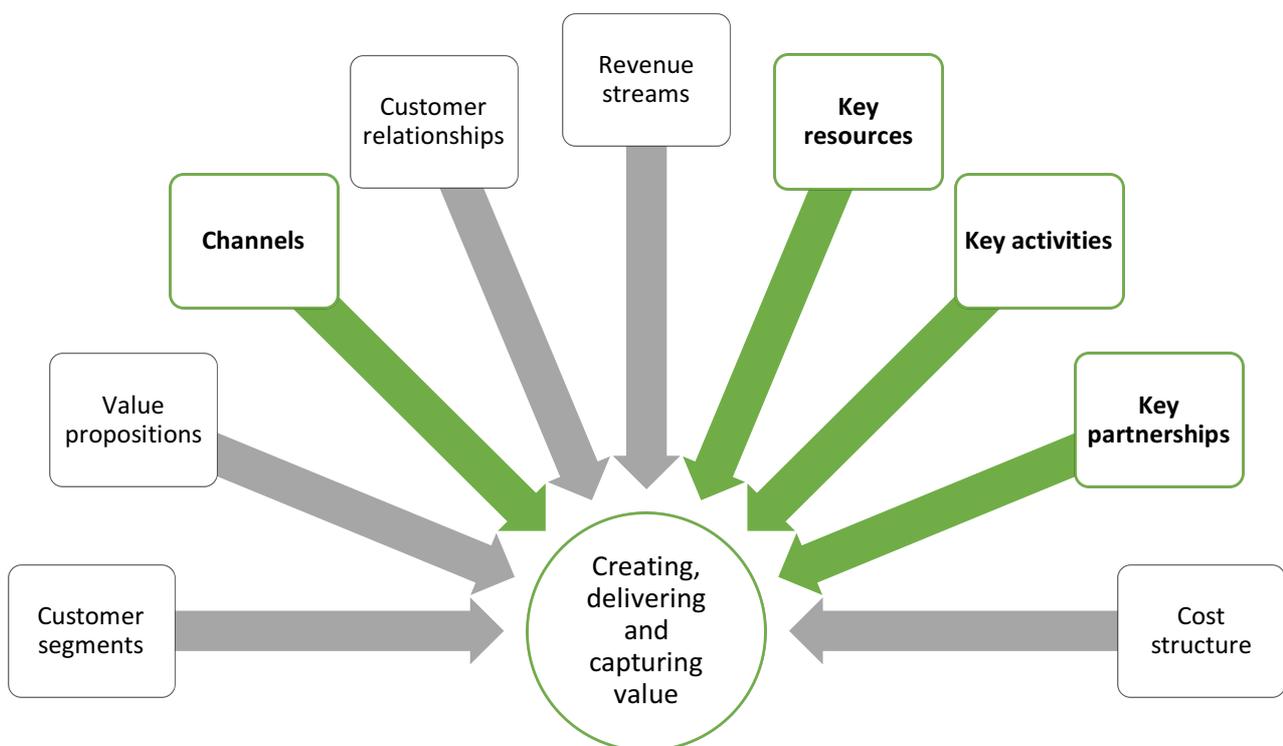


Figure 7: The business model canvas and the four business model elements relevant for food waste-reduction.

In this thesis, we choose to focus on four of these nine building blocks: channels, key resources, key activities and key partnerships. These four building blocks represent two different parts of the business; the front-end and the back-end. The *front-end* is the part facing the market, and includes customer segments, value proposition, channels, customer relationships and revenue streams. Thus, this is the visible part of the company. The *back-end* refers to how the value proposition is created and delivered, and includes key resources, key activities, key partnerships and the cost structure. Our selection of the four building blocks can be explained in terms of the front-end and the back-end. We see that the causes of food waste (cf. section 2.5) can (mostly) be targeted best by changing or implementing business

practices at the back-end of a business. For instance, dealing with problems with the logistics of guests or the portion sizes require a change of the activities performed in the business, and dealing with suppliers require key partnerships to be targeted. The lack of appropriate channels is an individual cause of food waste, thus the building block “Channels” was necessary to include. Furthermore, our literature review revealed that in food service businesses that already have a food waste-reducing business model, the four mentioned building blocks were found to be the elements that most often had been altered.

### **Key Resources**

Key resources represent the most important assets required to make a business model work. According to Osterwalder and Pigneur, physical, intellectual, human and financial resources are the most important resources a company has. These resources can be owned by the company or leased from a partner. *Physical resources* are physical assets, such as sales points, machines and IT systems. *Intellectual resources* can be the company brand, knowledge and partnerships, among others. A characteristic of such resources is that they are difficult to develop, but in return they can create considerable value to the company. *Human resources* refer to the company staff, and in certain industries, such as knowledge-intensive industries, human resources are particularly important. Finally, *financial resources* include cash, stocks and other financial instruments.

Several causes of food waste are associated with lack of knowledge. By addressing key resources, we seek to find solutions that can increase knowledge about storage, logistics and portion sizes, freshness requirements, and consumer attitudes. Focusing on increased knowledge of these matters will smoothen and simplify the job to deliver the value proposition of serving meals that create the least possible food waste.

### **Key activities**

The key activities are the most important activities a company must perform to create and deliver the value proposition, and to make the other business model elements work, such as reaching markets and customers and earning revenues (Osterwalder & Pigneur, 2010).

Depending on the type of business model and the industry the company is operating in, the activities will differ. For most food service businesses, the key activities will be related to preparing and serving food, but also related to solving problems for the customers, such as catering to individual needs. The latter is a common key activity in service organizations.

In terms of food waste, key activities play an important role because these activities provide concrete examples of what to do to decrease food waste. Without addressing changes in key activities there would be no way that food waste could either be prevented or reused.

### ***Key partnerships***

Key partnerships constitute the network of partners and suppliers needed to deliver the value proposition and make the business model work. Osterwalder and Pigneur (2010) categorize partnerships into four types: strategic alliances, cooptation, joint ventures and buyer-supplier relationships. The reason for forming partnerships is to perform the business model better or cheaper than without them, reduce risk, or get access to and acquire or lease resources or services.

Partnerships are very important when trying to redistribute surplus food. Without partners, it would often be costly and time-consuming to do these activities in-house. For instance, if a hotel would have to distribute their surplus food to homeless people across the city every evening, it would require extra people, more time, and not to mention more knowledge. Although this would create awareness and a good reputation, having to pay for transportation and salary to their employees would be costly. Furthermore, due to health issues and freshness requirements, the job could not be postponed. In this way, partnerships can be valuable parts of a business.

### ***Channels***

There are three broad categories of channels; communication, sales and distribution channels, and together they comprise the company's means of interaction with the customer segments (Osterwalder & Pigneur, 2010). Different customer segments may be reached through different channels, and it can happen through the organization's own channels, through the channels of a partner or through a mix of both.

A channel's functions, or the phases that a channel can cover, are to raise awareness about what the company is offering, to help customers evaluate that offering, to sell and deliver the offering, and/or to provide customer support. Lack of awareness at both the supplier and consumer level is a major cause of food waste. The majority does neither have enough knowledge about the quantity of food waste, nor the extent of the problem. Creating appropriate channels can largely contribute to make both customers and suppliers aware of this problem. The food service industry facilitates the use of channels because these

businesses are in close contact with their customers, and therefore have the opportunity to inform, encourage and guide customers to tackle this problem. This close contact should be exploited the best way possible, and by searching for ways to use channels, we contribute to find important measures. Besides, communicating food waste-reducing efforts to the customers can serve as positive marketing.

In the following parts of the thesis, we will use the most relevant building blocks to address the causes of food waste. By using each of these four components we will collect and present various measures to reduce food waste. Each measure will be explained carefully and presented with examples from our sample.

## 4. Methodology

Divided into three main sections, we will now (1) describe the main elements of our research design and, based on the purpose of this thesis, present the logic behind those choices, (2) provide an overview of the main steps in performing the literature review, the data collection process and the data analysis, and (3) evaluate the research method.

### 4.1 Purpose of thesis and choice of research design

#### ***Purpose***

This thesis has a two-fold purpose. Firstly, we will examine and compile information about food waste-reducing initiatives from individual food operators, which will be used to construct *generic categories of food waste-reducing business practices*, presented from a business model perspective. Secondly, a variety of *monetary and non-monetary benefits* will be identified, so as to enhance strategic motivation to implement such practices. We believe that together, these findings will help illustrate both the need and the ability of the food service industry to take one step further into the area of sustainability.

#### ***Research approach and methodological choice***

Our research on food waste-reducing business practices will particularly need to take the context into consideration, that is, viewing business practices as a part of the food waste-generating society. This is because the context will contribute in developing an understanding of the business practices, and consequently an inductive approach is preferable (Saunders, Lewis, & Thornhill, 2012). Furthermore, as this thesis will be a contribution to a research topic that is still at a very early stage, it is necessary with an inductive approach to add more pieces into its theoretical foundation (Yin, 2003).

As illustrated by the literature review, there exists several gaps in the food waste literature. In sum, there is no research on food waste-reducing business models for the food service industry. Thus, a qualitative research method is needed to obtain and present the depth and understanding around the issue of the combination of these concepts (Saunders et al., 2012). A second factor pushing towards a qualitative research method is the nature of our research question. Using the wordings “*What are the emerging types of*” and “*what benefits can be seen*” reflects a need of exploring options and discussing findings, as there is not one correct answer to these questions. In contrast, a quantitative method would demand the data analysis

process to meet certain requirements, limiting the solution to be found in only one way (Saunders et al., 2012).

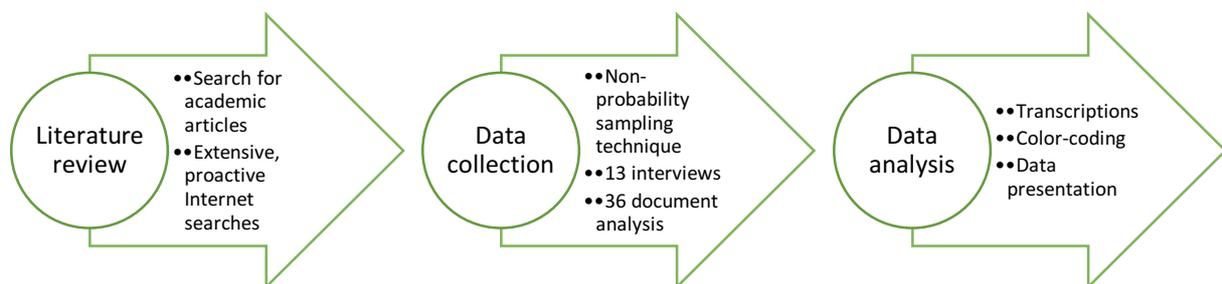
### **Research strategy**

This takes us to the second methodological choice that has been made, that is, choosing between a descriptive, exploratory and explanatory design. As argued above, this thesis will best be formed through a deep dive into the topic to gain understanding. For this purpose, an exploratory design is the best choice (Saunders et al., 2012). Further, an exploratory design allows us to change and shape the design and strategy along the way. This is a useful characteristic for us, as the limited extant research might force us to change direction during the data collection process, if new insights are revealed.

As mentioned earlier, we need to include the context of our study. In an experiment, the external environment is seen as a threat to validity and needs to be controlled (Saunders et al., 2012). In a case study, however, the context is largely taken into consideration, as a case study diminishes the boundary between the phenomenon (the food waste-reducing business practices) and the context (the food waste-producing industry). In this way, a case study is a very suitable strategy to answer our exploratory research question. More specifically, we will adopt a holistic single-case design, where the contexts will refer to three selected actors within the food service industry: restaurants, hotels and canteens.

## **4.2 Methodological procedures**

In this section, we provide a detailed description of the three main steps taken in order to write the thesis. These three steps are (1) the research and writing of the literature review, (2) the data collection process, and finally (3) the data analysis. Figure 8 summarizes the main procedures within each step.



*Figure 8: Illustration of the main methodological steps of this thesis.*

In a qualitative approach, describing the process is an important element, as it strengthens external validity (Saunders et al., 2012). Consequently, we present the methodological procedures in a thorough manner.

### ***Literature review***

Any research project is built on existing theories or literature (Saunders et al., 2012). As there is no unified theory on neither food waste nor business models, the purpose of our literature review was to explore the concepts so that the authors and the reader develop a common understanding of the topics. As shown in chapter 2, this uncovered current research gaps. Furthermore, these gaps were used to define the contributions of the current thesis (cf. section 1.2). This is an important step in the research process, especially due to the exploratory nature of the research question. The latter implies an inside-out approach where we explore existing literature to contribute to the development of new theory, with the aim of gaining insight and understanding (Saunders et al., 2012).

We first started our search in the EBSCO Business Source Complete database and the Web of Science database. Using a variety of search terms in a structured way, we browsed for academic articles that were related to our research question. Searching for common concepts individually, such as either “*Business models*” or “*Food waste*”, gave us hundreds of hits, proving that it was necessary to refine the searches. Using two or more search terms combined, for instance “*Food waste AND Food service industry*”, we managed to narrow down the search. Although some searches gave relevant hits, this step proved that there are deep gaps in existing literature. The results from this search can be found in Appendix B. An interesting observation is that all except two articles are from the year 2013 or later. This supports our previous findings that food waste reduction in the food service-industry is a new and unexplored topic.

The results from the initial literature review made us realize that this topic is at such an early stage of theoretical development, that we had to move away from the academic databases and rather perform a more proactive search in less academic sources. We started our search at some major and well-known international organizations that are working on food waste (such as the FAO and research financed by the EU), and as one good source led us to another, this snow-ball effect turned out to be a fruitful way to perform our literature review. Although not as structured as a search in the academic databases would be, this process led to a great variety of statistics, plans and current efforts on the issue, from both governments,

governmental agencies, organizations, industry alliances and food waste experts. As previously mentioned, Appendix A provides an overview of some of these actors.

## ***Data collection***

### ***Sampling technique***

The first step of the data collection process was to select which cases to study. As we wanted to explore the atypical cases of the food service industry –i.e. the ones that are fighting food waste more than the average food operator, we could not rely on random sampling. Our selection of case companies was based on an initial research process, thus a non-probability sampling technique. On a more detailed level, we mainly used a heterogeneous purposive sampling technique, as we aimed to sample businesses with a wide range of food waste-reducing business practices. To ensure variation within the sample (Patton, 2002, referred to in Saunders et al., 2012, p. 288), we developed sample criteria, such as sampling from three different food service concepts within the industry, and sampling from different countries within our geographical boundary. Both these selection criteria are also steps to ensure that other food operators can easily find and adopt business practices that suit their business. The result from the sample collection can be found in Appendix C. In total, 45 companies have been subject to our case study.

### ***The interview process and documentary analysis***

As given by the research question and the limited existing research, the data needed for this thesis is non-numeric data. The majority of the data was collected as primary data, obtained through 13 in-depth interviews. Eight of these interview objects are with food service businesses, while the other three are expert interviews with organizations working with the issue. The interviews were semi-structured, as we aimed to have a free conversation that develops as it goes on, i.e. a “guided conversation” Yin (2003). Many of the questions were based on pre-research on the companies, but in order to create the desired conversation-like feeling, we also asked more open-ended questions (Yin, 2003). However, certain topics had to be covered, and these topics were written in each interview guide together with suggestions for follow-up questions in case the interview did not flow easily and to remember to cover all the necessities. An example of such an interview guide can be found in Appendix D. Sticking to an interview guide helped reduce the negative side-effect of using semi-structured interviews, namely that the interviewer might lose track of the purpose and progress of the interview.

As doing interviews is time-consuming and is subject to suffer from biases (as discussed later in this chapter), we supplemented with data obtained from documentary analysis of 32 other food service companies. These heterogeneous data sources comprised news articles, reports from organizations and industry alliances, company websites, sustainability reports, sustainability rankings and expertise blogs, among others. Using interviews alone would not be sufficient, as they rarely paint the correct and/or whole picture (Saunders et al., 2012). However, combined with documentary analysis, we argue that this multi-method approach (i.e. triangulation) can, to a certain extent, confirm and complement each other.

### ***Data analysis***

The data was analyzed in a two-step process. Based on a systematic approach to business model classification (Lambert, 2015), we first identified all food waste-reducing business practices according to industry concept and secondly, we compiled them according the business model elements presented in chapter 3.1. Both steps will be described more in detail below.

### ***Processing the data***

In order to identify all the food waste-reducing business practices, we needed a systematic method to process all of our data. Each step of this data analysis process is illustrated in Appendix D. Firstly; interviews were transcribed by using the recordings from the interview. All except one agreed to be recorded, so data from this one interview was coded based on notes taken during and after the interview. Before all interviews started, we also made sure to get approval to use the company's and the interviewee's name as a source in the thesis.

After transcribing the interviews, we needed to obtain a more detailed overview of what information we had collected. Here, we used a simple, but effective color-coding method, where each analysis element (e.g. key resources, partnerships, benefits and so on) was marked in a different color.

### ***Data presentation***

After coding the data, we had to present them in a structured and persuasive manner (see chapter 5). We chose to present detailed findings from the three concepts together, as several practices were found to overlap. After presenting them, we summarized our findings in an informative table, using the food waste hierarchy, illustrations for different requirements and

labels showing which business concept(s) the practice was suitable for. In sum, this was a way to consider both the similarities and differences between the three concepts.

### **4.3 Evaluation of research method**

A research study can be logically tested to establish its quality (Yin, 2003). These four tests include construct validity, internal validity, external validity and reliability, and Yin (2003) presents several case study approaches to deal with these four tests. Each of these tests will now be discussed.

#### ***Construct validity***

The construct validity test is about creating the correct operational measures for the concepts that are being studied, and tactics to ensure this in case studies include using multiple sources, creating a case study database and maintaining a chain of evidence (Yin, 2003). In an effort to use the first tactic, we have triangulated our data sources, using both interviews and document analysis to explore the phenomenon of food waste reduction. Both sources have both strengths and weaknesses (Yin, 2003), however, one source's strengths can reduce the other source's weaknesses. In particular, we believe that the threat of interviewee bias, discussed below, can be reduced when using documents as an additional source. Furthermore, we had a generous use of follow up questions, as well as clarification questions, as we argue that this increases the potential of obtaining access to knowledge and experience. Secondly, we have aimed at creating a database of all our findings; all case evidence sources are gathered in one place in Appendix C, and transcriptions of the interviews are made available. Finally, we aim to maintain a chain of evidence by providing the reader with thorough descriptions of the methodological procedures (section 4.2), and examples of these procedures, as shown in Appendix D. Maintaining a chain of evidence also strengthens the reliability of the research.

#### ***Internal validity***

The internal validity refers to which extent the findings in a research study can be attributed to the interventions done in that study, i.e. creating a causal relationship (Saunders et al., 2012). According to Yin (2003), internal validity is only a relevant test when studying causal effects, as in experiments. Thus, the internal validity will not be evaluated here.

#### ***External validity***

As for the external validity, it is preferable to strive for *analytical* generalization, where the goal is to “generalize a particular set of results to some broader theory” (Yin, 2003, p. 37). In

our case, the analytical generalization would mean to generalize our findings into theory on food waste reduction and business models. To achieve such generalization, it is important to select observations with similarities (Yin, 2003). This was done by carefully choosing observations based on similarities, such as concept (i.e. selecting several restaurants, several hotels and several canteens) and drawing a geographical boundary.

Furthermore, there are possibilities of interview biases and errors that threatens the validity of our findings. The interviewees could have guessed what answers we were looking for, and adapt their answers accordingly to “please” us, hence creating a **participant bias**. We also had to be very aware that as interviewers looking for specific answers, such as benefits of reducing food waste, we could suffer from confirmation bias or halo-effect when talking with our interview objects. This could lead to a **researcher bias**. Thus, we tried to stay neutral and not act too positive, so that the interviewees did not exaggerate good results. Furthermore, interpreting the information correctly and presenting it accurately so that the reader interprets the data in the right way, is an important issue regarding interviews. To overcome this potential problem of **researcher error**, we asked confirmation questions during the interview, and we recorded the interviews so we could double check all statements. However, the relevance of interpretation problems is limited, as we were mostly looking for hard facts as opposed to thoughts and feelings.

### ***Reliability***

Simons (2009) claims that many conventional procedures for assuring quality, such as reliability, are less applicable to qualitative research. Thus, reliability will not be discussed.

## **4.4 Ethical considerations**

Although anonymity and confidentiality is an important issue when conducting a research project, this was not a concern in this thesis. We asked all interviewees for approval to use their name, title and the name of their company as sources of our findings, and all interviewees gave us this approval. Furthermore, as we were not collecting any personal information, we were also not face with any restrictions regarding data collection and data presentation. However, the project is still approved by the Norwegian Center for Research Data (NSD). According to Yin (2003), it is most desirable to not keep interview objects and cases (the companies) anonymous, so this was also beneficial for the quality of the research.

A second ethical issue to consider, is the accuracy and honesty in data collection and presentation. We have actively worked to avoid these problems, partly by collecting data from several sources, and partly by adding to the appendix the interview guides, interview transcripts and an example of how we coded the interview, together with a table of findings, illustrating company, topic and reference from the transcripts.

## 5. Analysis and Findings

In the following two sections, we present our analysis and findings. Firstly, we present the business practices that we identified in the interviews and document analysis. In total, 36 food waste-reducing business practices are compiled in an informative table, serving as a toolbox for food service businesses that aim to engage in food waste-reduction. This table, called *The Food Waste-Fighter's Toolbox*, is presented in figure 10 at the end of section 5.1. Secondly, we discuss what monetary and non-monetary benefits can be seen when adopting these business practices. The aim is that these benefits incentivize businesses to change towards food waste-reducing business models.

A presentation of the sample is provided in Appendix C. When using information from the interviews, we have referred to the name of the business rather than the name of the interviewee. Appendix C can be used if the reader wish to learn more about the business and the interviewee.

### 5.1 Food waste-reducing business practices

In total, we found 36 food waste-reducing measures. A simple overview of these is presented in figure 9. This overview shows how we categorized each of the business practices according to the business model presented in chapter 3. All information presented in this section is obtained through interviews or document analysis. Description of the sample is provided in Appendix C).

In the continuation, we will provide a description of all measures, combined with real-life examples, so that adoption of these initiatives becomes easier. We will also comment on what is required for successful implementation and who the measure is suitable for. Many of the measures will be applicable for all three concepts, that is, both *restaurants*, *hotels* and *canteens*.

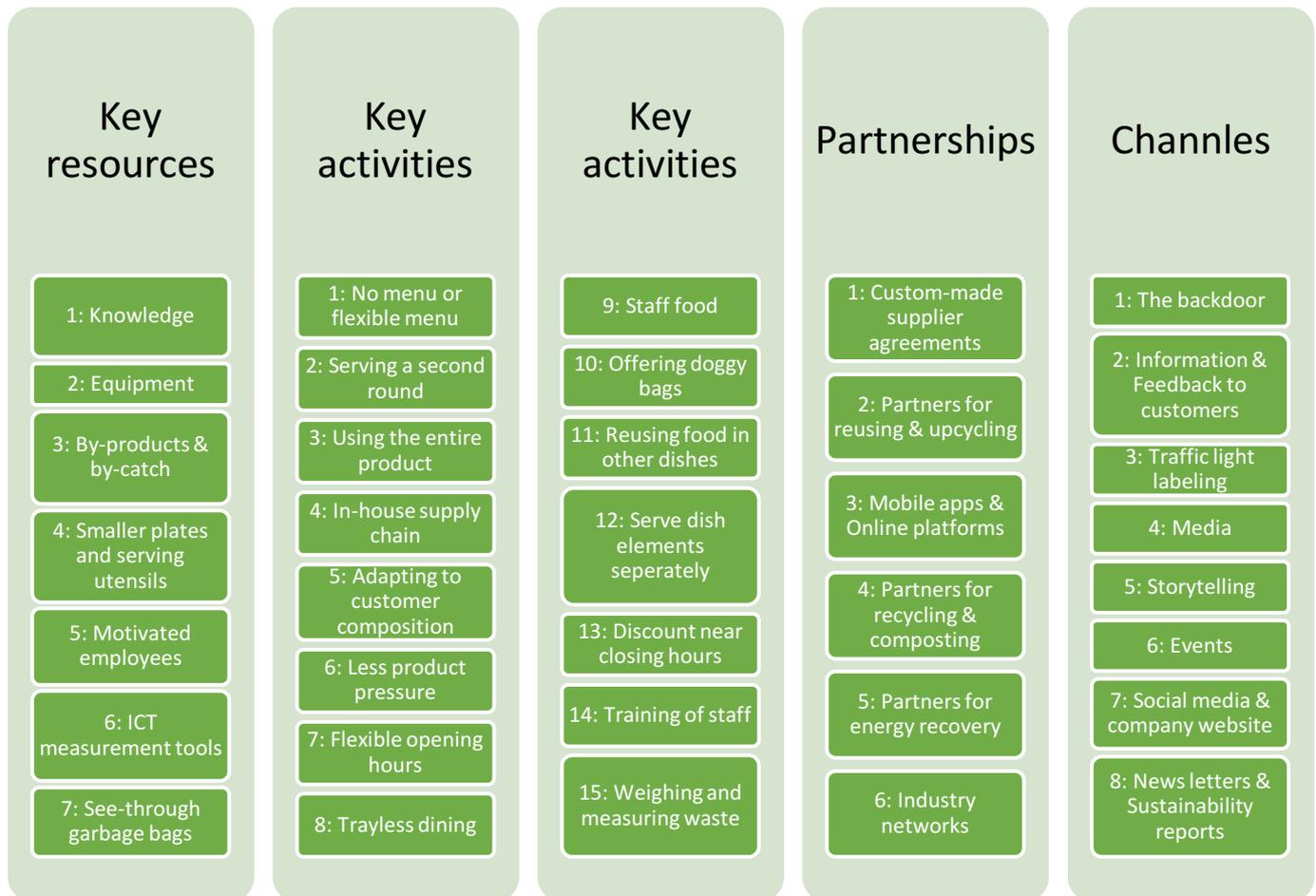


Figure 9: A simple overview of the 36 identified food waste-reducing business practices that are discussed in section 5.1.

### Key resources

Key resources in the food service industry are the most important assets required to make a food waste-reducing business model work. In total, we present seven key resources. Our findings show that *knowledge* is by far the most important resource to reduce food waste. Not only do we consider knowledge as a separate key resource, but for most business practices presented in this thesis, such human capital is required or beneficial. Consequently, knowledge is given much attention.

#### Key resource #1: Knowledge

“The more professional the chef is, the less food waste the restaurant generates”

The key resource that was recurring throughout all interviews was *knowledge*. All interview objects claim that knowledge, in the form of education and experience, was the key to prevent food waste

generation and to reuse food. Ché Fè says there is a lack of professionalism in the industry, and that too many kitchen employees are not familiar with the techniques needed to reduce food waste. Thus, the more professional a chef is, the less food waste is created. Ché Fè's head chef is a former Michelin restaurant chef, and is thus highly qualified and experienced. Furthermore, he continuously seeks to develop his knowledge, such as through literature on cooking techniques. This is reflected in Ché Fè's ability to reuse food for different purposes, such as many of the key activities mentioned below.

### “It's a knowledge thing”

KITA also claims knowledge is the key. “It is a knowledge thing to understand how to use and - KITA utilize these products” (KITA). At KITA, the head chef is teaching the rest of the staff new techniques, and he must constantly develop his own knowledge. As presented in the section “By-products and by-catch” below, KITA receives different species every day. In order to utilize these unexpected deliveries, high efforts and creativity are required. “However, after a year of doing this kind of work, you start to realize which species are caught throughout the different seasons, and how to work on these species” (KITA). This statement supports our statement that *work experience* is highly valuable.

We see that the best restaurants have specialized in exploiting the raw materials to the fullest, and it is truly culinary art when chefs are able to make delicious food out of food waste, such as fish bones. The same goes for finding new ways to utilize leftovers. For instance, the student union SiO's canteen Kutt Gourmet, does not have one fixed menu, but changes the menu according to what leftover products their suppliers deliver. Consequently, the kitchen staff need knowledge on how to reuse such ingredients.

In addition to having knowledge about food preparation techniques, DEAS says it is also useful to know about food storage. Different types of food require different storage conditions, and if food is stored correctly, it can last long beyond the expiration date. A knowledge issue related to expiration date, is the experience to see, smell and taste if food is good or bad, both before and after its expiration date. This is a resource that cannot be acquired, but it has to be accumulated over time.

### *Key resource #2: Equipment*

### “You have to know these technical things”

The right equipment and the correct use of it is also identified as a key resource for reducing food waste.

At Ché Fè, a large investment in a sous vide machine has been made, which helps reduce food waste tremendously. The sous vide machine is a vacuum cooker machine, which allows fish and meat to be slow-cooked at a low temperature inside a vacuum packaging. The latter seals all liquids, vitamins and minerals that would disappear if cooked in the pan or oven. Thus, such a cooking method prevents the nutritional food waste. The sous vide machine also prevents more physical food waste, as food prepared in this machine has a shelf life of about a month. In this way, Ché Fè does not have to throw away any fish or meat that is prepared but not needed on the same evening, and the freshness of the food will be kept throughout that month. One of the benefits gained from the sous vide machine, is that it increases Ché Fè's flexibility, and decreases the need of planning and preparing food for a certain number of guests. Further, as it can run during night, Ché Fè spends less money on electricity, as the prices are lower at off-peak times. Although not related to food waste, this benefit does reduce the restaurant's costs, which is a favorable side-effect. The sous vide machine required a considerable investment, however Ché Fè claims that money is saved through less food waste and lower electricity bills. This kitchen appliance can create the same effect in all food service businesses.

*Key resource #3: By-products and by-catch*

“It is like pumping up the oil, but then throwing away half of it”

- KITA

KITA uses by-catch that fishermen catch when they are trawling for shrimps. Consequently, KITA is using seafood that otherwise would be thrown away. Throwing away edible fish is bad business in KITA's eyes. In fact, the restaurant compares it to

pumping up oil and then throwing half of it back into the ocean just because we do not need it. A second positive characteristic of using by-catch is that many of those species are regarded as high-quality food in Asia, thus priced accordingly. KITA, on the other hand, can buy these species much cheaper, as they are not commonly used in Europe.

Such practices can be implemented in all restaurants, hotels and canteens, and is not limited to by-catch of fish. Most by-products from processing food can be used. More such methods can be found in the key activity number 3: *Using the entire product*.

*Key resource #4: Smaller plates and serving utensils*

Using smaller plates in buffets is one of the few measures that have been tested for causality. In a research project performed by CICERO and GreeNudge, hotels were found to reduce

food waste by as much as 20 % by reducing the plate size (Kallbekken & Saelen, 2013). Scandic and Nordic Choice Hotels are among the hotels that have successfully implemented this simple measure (Nordic Choice Hotels, 2016). We argue that the same effect can be achieved by providing guests with smaller serving utensils in buffets.

Scandic underlines that a similar effect can be achieved if the kitchen staff prepare smaller portion sizes, such as smaller cheese slices or smaller yoghurt cups. All three measures mentioned in this section are relevant in food services where guests serve themselves.

#### *Key resource #5: Motivated employees*

“Everyone is an opponent of change”

- Scandic

As many of the food waste-reducing initiatives mentioned in this thesis require much effort from employees, we argue for the importance of motivated staff. Engaged employees can achieve food waste reduction themselves, and they are also necessary to achieve other measures. During our interviews, we discovered that the food waste efforts were often driven by highly engaged people within that company. These efforts went beyond what was initially expected from them. This is important, as Scandic points out: “Initially, everyone is an opponent of change”. Consequently, these highly dedicated people are important for preventing food waste and creating awareness.

We argue that if a firm is lucky enough to have one or two dedicated employees, they should be in charge of the food waste-reduction process. It takes motivated people to motivate others, and we also believe that knowledge-sharing will function better if motivated people take the lead.

#### *Key resource #6: ICT measurement tools*

Winnow is currently the most famous food waste ICT measurement tool on the market. This computer program simplifies the process of measuring food waste, as well as assigning waste to the category it belongs to, such as vegetables or meat. By using this tool, the user can map *when* and *what* food waste is generated, resulting in a better understanding of *why* the food waste is generated.

Scandic is currently using this tool, and states that it is intuitive and easy to use. This could help reduce the problems of measuring food waste, namely that it takes up too much time. Scandic also notes that after locating where waste was generated, they managed to find

targeted solutions to reduce their waste significantly. This is a good, but expensive tool. High investment costs indicate that the user needs to be of a certain size in order to make profit from the investment.

#### *Key resource #7: See-through garbage bags*

Another effective measure reported by Scandic is the use of see-through garbage bags. The see-through bags create awareness among the staff, because seeing all their food waste gathered in the bin is more overwhelming than throwing away small portions bit by bit. It makes the staff realize the actual quantity those small portions create. This simple, yet effective measure can be implemented in all types of food service businesses. We argue that it is most effective if waste is recycled separately, so that the amount of food waste is visualized.

#### **Key activities**

Key activities in the food service industry concerns how to purchase, store, prepare and serve food to prevent food waste, and how to reuse any leftovers from these processes. During the interviews and document analysis, 15 key activities were identified. Most target the prevention in the food waste-hierarchy, while others focus on reusing food or awareness raising.

#### *Key activity #1: No menu or flexible menu*

“We have no menus for our guests, they don’t know what they are served”

- KITA

A particular trait found in the restaurants we interviewed, is that they offer a very limited menu, or they offer no menu at all. At Ché Fè, the customers may choose between a fixed five-course or ten-course menu. The rest is up to the kitchen. This means that the restaurant is not committed to serving a specific dish with specified ingredients, but the chefs can rather choose relatively freely from whichever ingredients they have available. This activity reduces the problem of ordering large quantities from suppliers, which is a big cause of food waste. In turn, this increases the flexibility of the restaurant. Restaurants that offer a big menu, are required to have a wide range of ingredients to be able to offer all the dishes at their menu. This is also done at KITA, who says that their guests do not have a menu to choose from.

SiO argued that each part of the value chain often takes responsibility of their own operations only. As a result, supply does not always equal demand. To correct this error, SiO established

Kutt Gourmet, a student cafeteria that prepare all their meals with food that otherwise would have been thrown away. To make this work, no fixed menu is offered, so the products change every day. This way, SiO has managed to create demand for the excess supply of food.

A successful removal of the menu, requires chefs with high knowledge, who can create delicate food from whatever is delivered from suppliers. This precludes long planning time of the meals, and the chef must be creative and passionate to make it possible. We argue that this measure is suitable for both restaurants and canteens, but less suitable for hotels because their breakfast buffet is valuable in the fierce quality competition with other hotels. Although we have categorized this as a key activity, it is useful to understand that this also involves key resources such as the chef's abilities, who enables this form of serving method.

*Key activity #2: Serving a second round*

One of the causes of food waste that we presented in section 2.5, is the size of the portions served in restaurants. It is challenging to decide on a standard portion size that will be served to all customers, as people need different amounts of food. This results in a trade-off between serving a dish that satisfy even the hungriest, but creates food waste, and having smaller portions that leave some people less full, but that reduces food waste.

Kiin Kiin has found a practice that targets this problem. In general, they do not serve big portions, but as argued above, this may lead to dissatisfaction among some guests. However, if the staff at Kiin Kiin sees that a customer is not quite full after finishing his meal, they offer to make the guest a second plate. Although it takes some time to prepare a new dish, the avoided food waste from leftovers on the plate compensates for the extra work.

*Key activity #3: Using the entire product*

“The problem is that we are too well off: we have the luxury of choosing”

- Kiin Kiin

As income rises and we can afford to only eat the “best” parts of the food, this causes the food waste mountain is grow. All food waste-focused restaurants we have interviewed state that they have started to use the entire product, instead of only the

more popular parts, such as the fillets. KITA, for instance, uses the fillets of the fish for one of the courses, while another course may comprise the tail and the trimmings, or roe, liver and skin. For certain species, KITA even fries the fish bones, and serve them as a tasty snack.

Although it is categorized as an activity here, all the techniques KITA use reflect the need of knowledge and experience, i.e. key resources. Using the entire product has the obvious advantage that the restaurant is able to serve additional meals while purchase the same quantity of food as before, hence more value is captured. Further, KITA says that the customers are skeptical at first, but after having tried the not-so common types of food, they are happy and amazed about the possibilities of using the entire products. Using the entire product seems to work well at KITA, due to their no-menu concept. This means that the guests cannot choose which dish they wish to eat, but they are rather served the fixed menu that is planned according to availability of food as explained above.

Using the entire product seems to be a popular activity. In addition to being done by all restaurants we have interviewed, this is done at several other restaurants with a food waste-focus, such as Azurmendi, Silo, Café Retro, the farm restaurant Steensgaard and the two eateries of the restaurant group Nose2Tail (Azurmendi, 2013; GreenMatch, 2015; Nose2Tail, 2016; Silo, 2016; Steensgaard, 2016).

#### *Key activity #4: In-house supply chain*

### “Reuse-reduce-share-repeat”

A second cause of food waste is the suppliers that incentivize restaurants to buy in large quantities.

- Silo (2016) Relæ admits that purchasing large scale increases the amount of food waste, and one of their solutions

to this has been to start growing their own vegetables at a farm outside of Copenhagen. By internalizing some of the production, Relæ avoids being tempted to purchase large quantities of food, just because this would give them at a lower price per unit. The Spanish restaurant Azurmendi also produces its own vegetables. However, instead of locating the production at a separate facility, Azurmendi has placed vegetable gardens and a greenhouse on the rooftop (Azurmendi, 2013). If located in a sunny and warm environment, and if space is limited, we argue this could be a smart way to solve the supplier problem.

A zero-waste restaurant in England called Silo has dedicated resources to produce even more of its products in-house. The combined restaurant, bakery and coffee house churns its own butter, grind grain in its own mill, and operates its own brewery, which produces fermented drinks from ingredients such as herbs and fruits (Silo, 2016).

Challenges of this measure are that it takes time, requires high investment costs and extensive knowledge of how to run this in-house supply chain in a successful manner. Furthermore, these efforts will not be worth the work unless the restaurant has a certain size with enough customers.

*Key activity #5: Adapting to customer composition*

“When the nurses’ association of 90 % woman check in, we know that they eat more fruit and muesli, and less bacon”

Adapting food to customer composition can contribute to capturing value.

Scandic points out that hotels over time can collect information about guests’ eating habits that can be transferred to

- Scandic the kitchen, and used wisely. Customer composition matters, because different customers prefer different types of food. Scandic discovered that business travelers during weekdays, prefer to eat healthier than those who rarely stay at a hotel. In the weekend or on vacation, people have more time to enjoy the food, and can treat themselves with a heavier breakfast. Scandic has made similar discoveries of differences between men and women. For instance, when the large nurses’ association check in for a seminar, they can reduce food waste by adapting the breakfast buffet to fit a customer composition with a majority of females. That indicates that more healthy food will be demanded, like fruit and muesli. For this to work, it is important to facilitate communication between administration and kitchen staff.

This measure has no specific requirements other than communication between the reception and the kitchen. Currently, it is only seen as a suitable measure for hotels, as they are the only actor in this industry who gathers this type of information.

*Key activity #6: Less product pressure*

In hotels and canteens, guests expect buffets to burst with food. Such abundance of food is in the industry referred to as *product pressure*. However, as revealed in the literature review, such abundance is a source of food waste. A practice to reduce food waste in buffets is to reduce the product pressure, which is done by waiting to refill the buffet until it is empty or almost empty. Although this may look less tempting to the customers, it can dramatically reduce buffet waste.

The canteens DEAS and SiO both practice this. DEAS says they always try to wait as long as possible before they refill the serving plates, because it does not really affect the customer

other than the visual experience. At SiO, the mentality is that it is okay to run out of certain products, and they tolerate having only a few pieces of for instance baked goods left, despite losing the temptation and pull factor that abundance gives. This is more difficult at hotels where they compete against each other about having the greatest breakfast or lunch. Thus, we argue that this is a measure mostly suitable for canteens.

#### *Key activity #7: Flexible opening hours*

The most common way to run a restaurant is to operate with specific opening and closing hours. As shown in the literature review, this would often result in food waste generation, as chefs must prepare food for an unknown number of guests for several different meals. This could be avoided by not having fixed opening hours. This is done at the fast-food restaurant Burger & Bun. Before opening the restaurant, a certain number of hamburgers are produced. After the doors open at a specific time each day, they are open until all the burgers are sold out, regardless of whether this is early or late in the evening (GreenMatch, 2015). This way, the chefs at Burger & Bun do not have to produce extra food in case there are more people coming, and consequently, food waste is avoided. Due to the characteristics of hotels and canteens, we consider this a suitable measure for restaurants only.

One requirement to make this work, is that the staff must be willing to sacrifice fixed working hours. The restaurant could close early or late, thus it is necessary with engaged workers that understand and accept this concept. A second requirement, or rather a consideration, is that owners must evaluate the trade-off between increased costs due to food waste and loss of income due to loss of potential customer

#### *Key activity #8: Trayless dining*

Trayless dining is a practice in canteens and other buffets where trays are removed. Such practices are helping to reduce food waste, as it hinders customers of loading the tray with food. People 'eat with the eyes', so a half-empty tray is not satisfying (Levin, 2012). Removing the trays removes the possibility of the guest to bring more food than he can manage to eat, and therefore preventing food waste generation. Trayless dining is done at DEAS, and we argue this is a practice that works in all food service businesses that operate with buffets or other all-you-can-eat concepts.

### *Key activity #9: Staff food*

“Our staff only eat leftovers from the day before”

- Ché Fè

Due to the inconvenient working hours, it is common that a restaurant serve dinner to its staff members. At Ché Fè, this staff food is solely made from food that was not used in the kitchen the day before. This practice reuses leftover food that would otherwise be thrown away. In addition, it ensures quality food for the employees, which is likely to lead to both happy, healthy and hard-working employees. Using food waste as staff food is also done at the restaurants Kiin Kiin and Relæ, and it is also possible to see how this practice can easily be implemented at hotels and canteens as well.

### *Key activity #9: Offering doggy bags*

“It helps to give the guests an idea of what they can use the leftovers for”

- Ché Fè

Although a restaurant might be exceptionally good at preventing or reducing food waste generation in the kitchen, food waste might still occur in large amounts at the consumption stage, i.e. at the plate of the customer. When being served a dish, guests often leave leftover food on their plates, simply because they cannot finish it all. At Ché Fè, which only serves five- or ten-course dinners, this is a common, yet understandable problem. Consequently, the staff often offers doggy bags to their customers. At first, most guests answer “no” if they are offered a doggy bag. However, if the staff kindly preaches to the guests that the leftovers are not waste, but rather food of good quality, and suggests that the customers could eat the leftovers as lunch the next day, most guests admit to this point and accept the doggy bag.

This kind of proactive approach is working very well at Ché Fè, and it would also work at most canteens. At hotel buffets, however, one can imagine that offering doggy bags could create losses for the hotels, as the buffet concept means people are free to eat as much as they want. A solution for hotels in terms of doggy bags could be to develop a new revenue stream, for instance paying both a fixed price for the buffet, as well as a lower price per hectogram for leftovers if the guest wishes to get a doggy bag.

### *Key activity #11: Reusing food in other dishes*

“They are served something that we used to prepare another dish”

A second option for reusing kitchen leftovers is to use it as ingredients in other dishes. At Ché Fè,

fillets of veal are often served as one of the main courses in their 5- or 10-course meals. If the kitchen happens to prepare too much veal, they cannot serve this as fillets the next day, due to quality issues. Instead, they often use this as the main ingredient in their cannelloni, which results in tasty, high-quality dishes.

At Relæ, food is also reused in other dishes. For instance, the broth they serve in one dish, is cooked from the vegetable cut-offs that were generated in the preparation of another dish. Similarly, Relæ uses apple peelings and apple cores to make apple juice. At Tiny Leaf, vegetable peelings are processed into crisps or dried and used in curries (Graves, 2016).

This approach may also be used for liquid leftovers. Serving wine by the glass and leaving many bottles open at the same time, often generates wine leftovers. Relæ uses such wine leftovers to create vinegar. Through a re-fermentation process, they are able to produce their own vinegar from wine waste, which is both money saved and a good story to tell.

“Hygiene is the most difficult thing”

- DEAS

Compared to restaurants which serve meals on plates, hotels and certain canteens serve food from a buffet, which leads to less control of hygiene. Consequently, it is not straight forward to reuse food from buffets, and strict precautions must be followed to avoid transmission of bacteria if food is to be reused. DEAS says that it requires much knowledge to know how to follow the health requirements regarding maximum time in room temperature, reheating, how to kill bacteria and so on.

If the kitchen usually cooks food from scratch, most of these practices do not require any additional labor time. However, firms mostly depend on semi-finished and processed products, such practices will therefore require both additional time and knowledge from the staff.

#### *Key activity #12: Serve dish elements separately*

This practice is relevant for those who offer self-service, such as buffets in many in hotels and canteens. Here, a dish is often served in one casserole. However, this limits the possibilities for reusing the ingredients, as bread, vegetables and meat have different treatment requirements. To overcome this problem, DEAS serves the dish elements separately. For instance, instead of serving a casserole with meat, vegetables and gravy mixed together, these three elements are served in separate bowls. DEAS admits this requires somewhat more work for their staff, however the possibilities for reusing the food are largely increased. The

relevance for others than self-serving alternatives, could be to remind chefs in all kitchen to keep ingredients separated as far as possible.

#### *Key activity #13: Discount near closing hours*

One way to prevent food waste is to sell food at a discounted price when closing hours are approaching. SiO for instance, sells remaining food at 50 % discount during the last 30 minutes before it closes. SiO, which serves students, found this measure to be very effective. Other student canteens, such as SiB, also reports saved costs when selling leftover food at discounted prices (T. Tvedt, SiB, e-mail, December 15, 2016). SiB sells yesterday's sandwiches at discounted prices, which would be classified as *reusing* food in the food waste hierarchy. As these discounts mostly involve prepacked food, this practice is most convenient for canteens.

#### *Key activity #14: Training of staff*

In the process of preventing food waste, training of staff is essential. Both Scandic and Sodexo could confirm that they put serious efforts into training and informing their employees. As argued above, knowledge is essential to exploit raw materials, reuse leftovers, and to use the optimal storing and preparation techniques.

SiO admits that before a business practice is incorporated into the daily routines, the employees see this as extra work. This proves that it is necessary to inform the staff about underlying reason for new measures as well as the positive outcomes they will create, so that employees can maintain their motivation. Consequently, staff training can be regarded as both a preventative measure and a measure to create awareness. This measure requires both time, money and knowledge, however, as it both prevents food waste and creates awareness, it should be considered a valuable investment.

#### *Key activity #15: Weighing and measuring waste*

“Nobody feels good about throwing away food”

- Too Good To Go

SiO, Sodexo and Scandic emphasize the importance of measuring their food waste.

Although it requires extra time, this is important for two reasons. Firstly, measuring the food waste

is the only way to know for sure that reduction was successfully achieved. Secondly, awareness is created when staff realizes the amounts of food waste the business is generating.

Too Good To Go (TGTG) explains that many of their partners have no idea how much food

they waste. For instance, some food operators can explain to the TGTG staff that they have almost no waste. However, when they show the amount of waste, TGTG easily sees that the waste could have been used to serve almost 10 portions of dinner. Throwing away 10 dinners every day quickly results in significant loss of income. This measure is suitable for all actors in the food service industry regardless of size or commitment. Even if an actor is not engaged in this matter, this is an excellent tool to map where most of the waste is generated.

### ***Key Partnerships***

This section presents food waste-reducing practices that can be performed by a partner, as well as networks and relations necessary for reducing food waste. The reader should be aware that many of these measures could also be performed in-house, however, using partnerships can be a smart solution if the restaurant does not have the capacity or knowledge to do it. In total, six business practices are presented.

#### ***Partnership option #1: Custom-made supplier agreements***

By cooperating closely with the suppliers, a restaurant can reduce its food waste by ordering more custom-made products. When Relæ uses leek in their dishes, they only need the white part of the vegetable. If they purchase the whole leek, they must pay three additional costs; for the green part of the leek that they know they will not use, the labor it takes to remove the green parts as well as the waste management services required to dispose of the green parts. Instead of spending money on all these processes, Relæ has made an agreement with their supplier to only purchase the white parts of the leek. The process of cutting the leek is done at the farm, and the green parts are sold to a restaurant which needs those parts. Any leftover parts of the leek are left at the farm and used for composting. It requires some time to make these contracts, as well as some staff engagement. However, after the agreement is settled, no further efforts are needed.

#### ***Partnership option #2: Partners for reusing & upcycling***

“Many guests want our coffee grounds”

- Ché Fè

There is a wealth of possibilities to reuse and upcycle food. Such initiatives do not have to be done by a partner, however, as this section will show, a partner can increase the possibilities and ease the work. In the following paragraphs, we will present examples of some of these partnerships. It is important to note that this list is far from complete, and should be used as an inspiration to find partners.

Relæ has partnered up with a newly established company called BeyondCoffee, which works in innovative ways to use coffee grounds to produce other products. At the moment, this company is using coffee grounds to grow mushrooms, which later can be used as ingredients in Relæ's kitchen. They are also experimenting with how coffee grounds can be upcycled to make high-protein chicken feed.

We recognize the potential barriers of such a partnership, one of them being that one cannot be located far from the partner, and most likely need to be located in a larger city where such partners exist. However, there are solutions that are more low-scale and that do not require a partner *company*. At Ché Fè, coffee grounds are given to customers, who use them as fertilizers for their flowers and plants. Another restaurant using coffee grounds in an innovative way, without relying on a partnership, is Amass. Here, coffee grounds are used to bake crackers that are served to the guests (Amass, 2016b).

Another seemingly useless food waste are bread crumbs. Relæ has partnered up with its chicken supplier, and have started sending leftover (organic) bread to feed the chickens. This way, Relæ is reusing its food waste, while also feeding the chickens that they will be input at a later stage.

**“Guilt-free gastronomy”** It is possible to take the reusing of food one step further. A London-based restaurant called Tiny Leaf - Tiny Leaf (2016) is solely basing their commodity supplies on surplus food stocks (Tiny Leaf, 2016). This surplus is donated from partners across the city, such as local farms and retailers. Even though Tiny Leaf's inputs are (traditionally) considered waste, the place is in fact referred to as a gourmet restaurant which serves “sustainable luxury and guilt-free gastronomy” (Parker, 2016; Tiny Leaf, 2016). The same is done at the consultancy firm and restaurant-event business Rub & Stub, which holds different food waste events on a regular basis. For instance, in cooperation with the restaurant Amass, held a surplus brunch in November 2016 (Rub & Stub, 2016).

Another important food waste partner are the food banks all around Europe. Food banks collect or receive food waste from the food service industry (and the retail industry), then prepare and offer this to disadvantaged people. Some countries, such as England, has more than 440 food banks (The Trussell Trust, 2016). Others, such as Norway, only have one

(Matsentralen, 2016). However, in all European countries, the number of food banks is growing, proving the immediate need of such partners to facilitate food distribution.

### *Partnership option #3: Mobile apps & Online platforms*

“Like Match.com for food waste”

- Food Cowboy (2016)

In many cases, leftover food does not need any re-processing to be reused. However, what food service businesses often need is a channel to reach new customers and to sell and re-distribute leftover food. Such channels are what the American food waste distributor Food Cowboy refers to as Match.com for the food service industry (Food Cowboy, 2016).

One such partner is the mobile application Too Good To Go (TGTG). This international service serves as a meeting point for the food service industry and consumers (Kolås, 2016). When a business has food that it realizes it will not be able to sell at full price before the end of the day, it can sell the food to a reduced price in the TGTG application. Customers select and purchase the food in the application, and pick up the food at closing hours (Kolås, 2016). In a business model-perspective, such a partner helps the business to sell products that would otherwise go to waste, by matching them with customers that are willing to pay a lower price for these products.

There are numerous similar mobile applications, working at local, national or international levels. For instance, there is the Parisian app OptiMiam (French Food in the USA, 2015), the Finish app Lunchie (Jenkins, 2016), and the international app ResQ Club (ResQ Club, 2016), which all connect the food service industry to private consumers. The online platform Spoiler Alert is based on the same principal, although its end consumers are non-profit organizations rather than private consumers (Spoiler Alert, 2016). These are just a few of the current services that are available, and as most of these were started within the last two years, we believe it is very likely that even more such apps will keep popping up the next few years.

“I often feel like we run an awareness campaign”

- Too Good To Go

Such partners can also function as a way of showing customers that the firm takes responsibility. TGTG will create awareness among employees, but equally important is that the customers become aware that the hotel or restaurant makes an effort in preventing food

waste. In addition, employees are given information that they might not have before, such as how much food they are actually throwing away.

#### *Partnership option #4: Partners for recycling and composting*

Although recycling and composting are widespread and common measures to reduce food waste and to take responsibility, these practices are in fact marked with the red color in the food waste hierarchy. However, it is still important to discuss such practices, as we believe it is impossible to prevent or reuse all food waste.

At Relæ, food waste such as vegetable peelings are used for composting. This is facilitated through a partnership, where the partner is collecting the waste (on bicycle). After the composting-process has turned this into soil, the soil is used for growing new vegetables. Composting can be facilitated through a partnership such as the one Relæ has entered into, or it may be a key activity in-house. The latter requires some space and regular attention, which can be avoided by sending the food waste to a composting partner.

#### *Partnership option #5: Partners for energy recovery*

Organic waste can be transformed into renewable products like biofuels, biogas and electricity via various industrial processes (e.g. involving feedstock preparation, gasification, purification) (European Commission, 2016a). The Danish café and restaurant BioMio Organic Bistro does not send any waste to the landfill. Instead, all organic waste is delivered to a partner who transforms it into biofuels (GreenMatch, 2015). All non-organic waste, such as paper, plastic and wood, is returned to the supplier for reuse. Another Danish restaurant, called Runes Mad, focuses on the energy recovery of used oils and fats, which is picked up by a recycling partner (Runes Mad, 2016). This is also done at Café Kaffegal and the vegetarian eatery Botaniq Food & Juice (GreenMatch, 2015).

#### *Partnership option #6: Industry networks*

“If we are going to get better, we need a platform”

- KITA

Knowledge-sharing through networks is a useful tool in accumulating knowledge and making initiatives more effective. Both former and current kitchen staff at Ché Fè seem to value the food waste-reducing focus at the restaurant, as former employees often contact current staff at Ché Fè to discuss details about the food waste-reducing initiatives, so that the same initiatives can be properly implemented at former staff’s new workplace.

At KITA, the management plans to take knowledge-sharing to the next level, by arranging a *regional conference*. The goal is that this conference will serve as a meeting point and a springboard for cooperation across different industries, including fishermen, suppliers and chefs. Such industry networks require both time and engagement, however, as they can result in increased knowledge and efficient cooperations, we argue they are worth the investment.

NorgesGruppen, the Norwegian market leader within the grocery sector, has initiated a cooperation project across industries. The goal of the cooperation is to gather actors so that they can share knowledge and experience, in search of new solutions to reduce food waste. Among participants we find the competitors Scandic and Nordic Choice Hotels. Despite being competitors, they see the benefit of sharing knowledge to overcome the complex problem of food waste.

### **Channels**

Channels in the food service industry include sales and distribution channels for reused food, and communication channels for creating awareness among customers. In our data analysis, we identified eight communication and sales channels that focus on reducing food waste or build knowledge. Most channels are communication channels, used to work on awareness-raising directed towards the customer. We believe this is particularly effective in restaurants due to the direct contact, and level of communication with customers, compared to for instance canteens. One way to succeed when communicating with the customers, is to adapt to the customer composition.

As a channel can be either partner-owned channel or self-owned, it could sometimes be difficult to categorize a business practice as either a channel or a partnership. Thus, when reading this section, the reader must be aware that many of these channels can be offered by a potential partner.

#### **Channel #1: The backdoor**

“In fine-dining, we only use the best parts. But what about the rest?”

- Kiin Kiin

Closely connected to the above-mentioned activity of *Using the entire product*, is using a so-called *backdoor*. Kiin Kiin is mainly a Michelin star restaurant; however, its opening was financed through the income of a sister-take-away restaurant.

Although the sole purpose of this take-away restaurant when it opened was to secure enough

revenues to operate the Michelin restaurant, the take-away restaurant now serves as a *second sales channel*. Because of the fine-dining image of the Michelin restaurant, Kiin Kiin only uses the best pieces of meat and vegetables, which generates a large quantity of leftover food of good quality. Instead, the Michelin restaurant sells this food at the take-away restaurant. This activity requires only one extra chef and a small sales point next-door, with one employee behind the counter. By using the same kitchen facilities, Kiin Kiin avoids any large additional costs.

Relæ has taken a similar approach as Kiin Kiin, and although it is not a take-away restaurant, Relæ's subsidiary Manfreds is cheaper and has a more casual atmosphere than its Michelin star mother restaurant. The ingredients Relæ do not use, are sent across the street to Manfreds, which then must find creative ways to make use of Relæ's food "waste". Based on the same reasoning, KITA has established itself as a two-fold concept; restaurant during the evening, but café and catering service at daytime.

Restaurants that do not have the facilities to establish a second sales channel, will experience relatively high investment costs in implementing this measure. The size of these costs will depend on several factors, such as if they need to hire a new chef, if they can use the same kitchen, and how many physical changes are needed in the restaurant to start selling the take away.

#### *Channel #2: Information & Feedback to customers*

**“We want our customers to be a part of it”**

- Scandic

According to a consumer trend report by NorgesGruppen, more and more customer surveys show how consumers value *sustainable alternatives* more highly now than before. This indicates that customers might appreciate being involved in sustainability matters.

We believe that a person who visits the same canteen every day is likely to become motivated when being informed about how much the canteen waste each week. From our research, we see that there are different possibilities of informing customers about food waste. As observed by the authors, the DNB canteen in Bergen, Norway, has a small information board next to where the food is served, showing how much waste each customer generates on average each week. In some of its hotels, Scandic informs its guests by putting up signs supposed to make their customers more aware of the problem of food waste.

“The quiz is popular”

- Sodexo

Sodexo has a week in October every year which they call WasteLESS Week, where they focus the attention on the issue of food waste. During this week, they put up posters in the cafeterias, they arrange quizzes, and they put out information on the tables to increase awareness about food waste.

### *Channel #3: Traffic light labelling*

SiO calculates the CO2 footprint of each dish, and marks their dishes according to the colors of a traffic light. A “red” dish indicates the highest emissions of CO2, “yellow dishes” causes fewer emissions, while “green” dishes are the best alternative for the environment. The goal of this practice is to sell more vegetarian dishes that have a smaller CO2 footprint, and lower commodity cost. Guiding customers to eat more vegetarian dishes, could reduce the amount of wasted food because vegetables are the commodities people most often throw away. It is additionally a good channel to communicate that this company makes an effort to improve the environment.

This measure is suitable regardless of type of food service business, although it does require knowledge and time to calculate the amount of CO2 emissions for each dish.

### *Channel #4: Media*

The most effective channel, simply because it reaches so many people, is the *media*. SiO received a lot attention from the media after starting their cafeteria Kutt Gourmet. An innovative concept with positive impacts on the society, is the kind of story media is interesting in. If food waste-reducing practices lead to attention from media, this will help reach out to a broad audience and potential new customers very quickly.

### *Channel #5: Storytelling*

“Almost every dish has a story”

- KITA

At KITA, they tell a background story to almost all the dishes. One such story can be to explain to the customer how a dish is made from by-catch, as described in the chapter on by-products and by-catch. KITA says that both employees and guests think this storytelling is interesting and a lot of fun. As this communication channel is not directly reducing food waste, we choose to regard it as a mean of awareness-raising. Thus, this storytelling could help customers see the food as more valuable than before, and consequently it can increase the customers’ reservation price and

increase value creation. This measure is more suitable for restaurants because they have more face-to-face contact with their customers.

### *Channel #6: Events*

At the inclusive Café Nutid, awareness-raising work is part of the concept. Among many cultural events, the café holds food waste events in cooperation with a local charity organization (Café Nutid, 2016). Events require planning as well as money, which is why one must be passionate about this problem to be willing to fulfill the requirements. Thus, if arranging a successful event, it is likely that guests learn more about the problem of food waste.

### *Channel #7: Social media and company website*

Social media provides a good platform to reach out to customers, especially the younger generation. If customers follow the company's Facebook page, the information that is posted here will also pop up on the customer's news feed. This makes it easy and quick for companies to share information. Amass uses Facebook actively to share pictures and videos of the food they serve (Amass, 2016a). They also use this platform to show customers what they do for the environment. Among others, they donate surplus food to the Danish "Fødevarebanken" (a foodbank) who arranges the "surplus brunch" (cf. Partnership option number 2). Other social media channels that could work well for this purpose are Instagram and Snapchat.

The company website is also an important platform to communicate information to customers. Those customers who seek information on a website are important customers, as they are already interested in the company. They might seek information for that exact reason to know what kind of social responsibility the company is taking. Consequently, this information must be easy to locate.

### *Channel #8: Newsletters and Sustainability reports*

**"I don't believe our customers know everything we do"**

- Ché Fè

Ché Fè admits that its customers might not be aware of all the food waste-reducing initiatives the restaurant has put in place. Although it is not a current goal to inform customers, Ché Fè says that the newsletter can be used as a communication channel. For instance, in one of the newsletters, Ché Fè informed its customers about the newly purchased sous vide oven, as

described in Key resource number 2. This illustrates how newsletters can be used as an awareness-rising communication channel. Although it is time-consuming to write such newsletters, it serves as a convincing tool to communicate to customers the restaurant's passion about food waste reduction.

Relæ has implemented numerous measures to ensure that they operate towards being increasingly sustainable. Consequently, a newsletter will be too short to explain all their efforts. Instead, publishing a yearly sustainability report is a good way to present all this information in one place. Relæ's sustainability report is presented with less text and many pictures so that the content is simple and clear (Relæ & Manfreds, 2016).

### ***The Food Waste-Fighter's Toolbox***

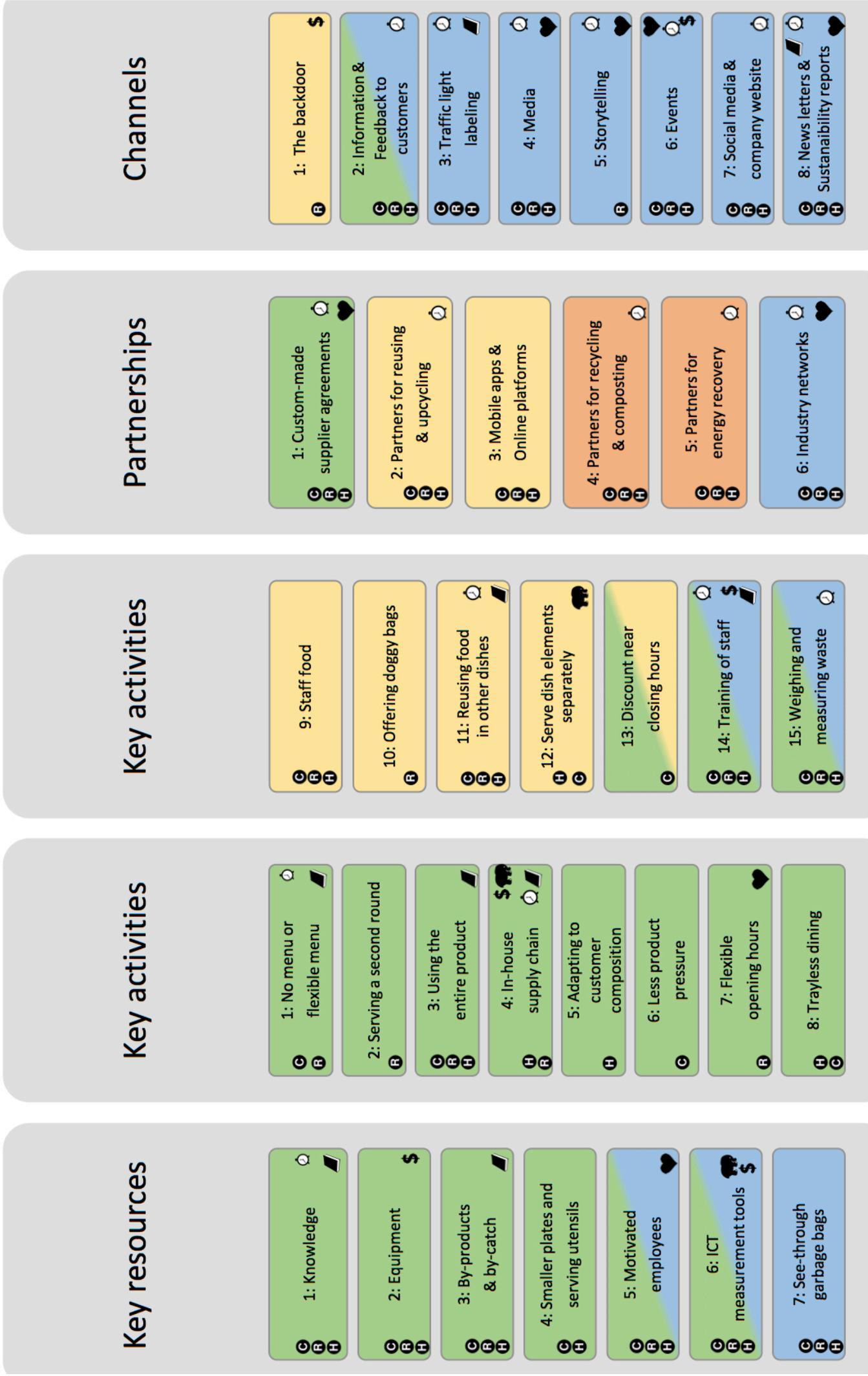
All food waste-reducing business practices that were identified in our interviews and document analysis are now presented. We have also provided information about requirements necessary to implement certain practices, discussed what business concept each measure is relevant for.

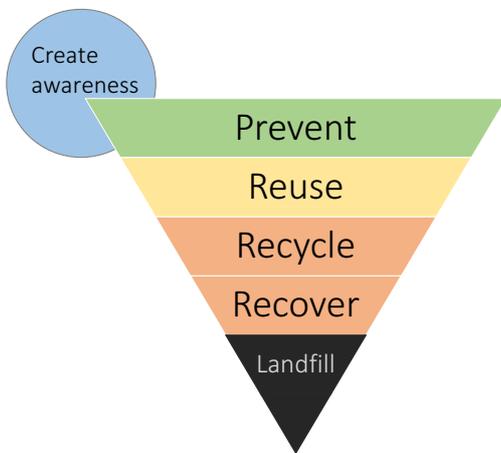
Now we compile this detailed information into our innovative guide to food waste-reduction; *The Food Waste-Fighter's Toolbox*. In the Toolbox, we group all 36 measures into the elements selected from the business model canvas in chapter 3. Further, we colour-code each measure according to the food waste-hierarchy we developed in section 2.7. To the reader's convenience, the hierarchy is also presented in figure 11. Lastly, we have labelled each measure with icons, indicating if certain requirements are necessary for a successful implementation. Icons are also illustrating which food service concept the measure is mostly suitable for. In the Toolbox, some measures have two colours, for instance, both green and blue. This indicates that the measure is both preventing food waste *and* creating awareness.

The Food Waste-Fighter's Toolbox can be used as a guide to select food waste-reducing business practices to implement in a food service business. Although a lot of information can be obtained by looking at the table in figure 10, we emphasize the importance of reading the detailed information about each measure that is provided in section 5.1. This section describes real-life examples and important considerations, and by using this, we argue the implementation will be even more successful. The results will be discussed more in detail in section 6.1, and derive managerial and theoretical implications.

# The Food Waste-Fighter's Toolbox

Figure 10





|   |  |
|---|--|
|    | The R indicates that this business practice is best suitable for <b>restaurants</b> , but it can be successfully adapted to other food service businesses.   |
|    | The H indicates that this business practice is best suitable for <b>hotels</b> , but it can be successfully adapted to other food service businesses.  |
|    | The H indicates that this business practice is best suitable for <b>canteens</b> , but it can be successfully adapted to other food service businesses.  |
|    | This Watch indicates that this measure requires more <b>time</b> than the others if being able to implement it successfully.   |
|   | This heart is given to those measures that requires more <b>engagement</b> and passion from the people that will implement it, compared to the others, in example because its more time consuming without necessarily increase profit in a short term. |
|  | This dollar sign is given to those measures that require higher <b>investments costs</b> than the other measures.  |
|  | The book sign is given to measures that requires more <b>knowledge</b> from the people that will implement it., compared to the other measures.  |
|  | The elephant is given to those measures that could benefit from being a certain <b>size</b> if implementing this measure, more than the others.  |

Figure 11: Explanation to The Food Waste-Fighter's Toolbox.

## 5.2 Benefits from food waste-reducing business practices

In traditional economic theory, a firm's goal is to earn profit (Pindyck & Rubinfeld, 2012). Consequently, we have chosen to identify *monetary benefits* that the companies experience after implementing food waste-reducing business practices. We believe that this is a useful way of motivating managers to change their business, and for certain companies, this might be the only way to incentivize change. In addition, many businesses experience *non-monetary benefits* after implementing such practices. As there is a close relation between non-monetary benefits and actual profits, we argue that these benefits are equally important to incentivize change.

However, food waste-reduction is not just about benefits for businesses. The triple bottom line-perspective is gaining increased recognition (The Economist, 2009). Thus, in addition to presenting the above-mentioned benefits, we also identify the positive impacts the food waste-reducing measures have on the *society and the environment*.

### ***Monetary benefits***

There are few businesses that have implemented food waste-reducing measures throughout their entire business model. However, as our analysis points at, the ones that do work on reducing food waste in every aspect of their operations (such as Relæ), have no doubt when they claim they have experienced large monetary benefits from this work.

In this section, we will start off by presenting an important challenge regarding the calculation of profits. This is important, as our study does not establish a causal relationship between food waste-reduction and profit. Secondly, we present real-life examples of monetary benefits from food waste-reducing businesses.

### ***Calculation challenges***

Although all members of our sample reported monetary benefits, it can be challenging to measure the precise savings, and more importantly, if those savings are caused by the food waste-reduction itself. As this is an explorative, qualitative study, identifying a causal relationship is not our aim. Nevertheless, it is important to gain an understanding of what benefits that *can* arise, as this can increase motivation to change.

Firstly, the problem of measuring exact saved costs is complex. In addition to loss of money in food that is thrown away, there will be costs due to *transport* and *labor* used for preparation. Furthermore, *waste management services* require money to dispose a company's waste. Some of these variable costs can be difficult to identify, such as calculating how much *electricity* was spent in preparation of 1 kilo of meat, where 200 grams were wasted. On an even more detailed level, it can be difficult to know if *wear of equipment* should be included, or to know the exact cost of the implementation of a measure, such as "Weighing and measuring waste". These are choices each food service business must consider individually, until standard measurement methods have been designed. The point is that savings could be different than expected. Thus, the following examples should be read with an open, yet critical mind.

### Examples of monetary benefits

In figure 12, we have presented examples of cost reduction and increased income that companies claim they have achieved.

| COMPANY/TOOL         | TYPE OF MEASURE                 | SAVINGS/EARNINGS   |
|----------------------|---------------------------------|--|
| TOO GOOD TO GO       | Resale                          | A hypothetical example from a bakery using the Too Good To Go app (Bakke, 2016):<br><br>A TGTG bag is sold for approximately NOK 30. NOK 10 goes directly to TGTG as administration cost. Net profit per bag is NOK 20. If the bakery sells 10 bags each day, they can earn a daily extra profit of NOK 200.                     |
| RESQ                 | Resale                          | 10 portions of leftovers from a restaurant can be sold at 5 € each after closing hours, which results in a yearly extra profit of 7 500 € (ResQ Club, 2016).   |
| KIIN KIIN            | Backdoor                        | Higher revenues than other Michelin star restaurants in the area (confirmed by their annual reports), which they claim is because of the backdoor sales channel; the take away restaurant.   |
| NORDIC CHOICE HOTELS | Plate size                      | Reduced the plate size in the breakfast buffet. After this change, food waste was reduced by 19,5 %. Implementing this measure in all their 170 hotels would lead to potential saved costs of NOK 31 million per year, and 1166 tons of reduced CO2 emissions (Nordic Choice Hotels, 2016).                                      |
| KÄHLER VILLA DINING  | Recycle                         | Partnered up with a recycling firm to convert their food waste into green energy. In one year, this resulted in 4 285 kWh with green energy, which leads to reduced costs in purchasing electricity. In addition, the food waste lead to the creation of 5 tons of fertilizer and saved 3 tons of CO2 emissions. (Refood, 2016). |
| RADISSON BLUE        | Anerobic digestion <sup>5</sup> | Started to convert their food waste to “local” electricity and hot water. Expected savings are around 7500 pounds annually (Burgess et al., 2016)  |

<sup>5</sup> Anaerobe digestion is defined as a series of biological process in which microorganisms break down to biodegradable material in the absence of oxygen (American Biogas Council, 2016).

|          |                          |   |
|----------|--------------------------|---|
| WINNOWER | Locate and measure waste | Help calculate the cost of what is thrown away. Winnow presents a case study of a restaurant called "Friends House", which experienced that waste as a % of sales fell from 4,8 % to 2,6 % after using Winnow (Winnow, 2016). |
|----------|--------------------------|---|

Figure 12: Examples of monetary benefits obtained from food waste-reducing business practices.

This table illustrates the calculation challenge, proving that some profits are easy to calculate, others are not. For instance, the money earned from using TGTG are easy to calculate. There are two costs associated with this practice: purchasing bags or take-away boxes, and paying the fee to TGTG. Using the app does not require additional working hours, or high investments. The additional income is also easy to keep track of, and consequently, the profitability of this food waste-reducing business practice can be calculated.

Monetary benefits from other practices, such as reducing the plate size, can be more challenging to measure. It requires thorough studies into quantity of food waste and origin of food waste both before and after the implementation, and the context must be controlled, meaning, there should not be any changes in food preparation methods, customer compositions and so on.

Next, we will discuss non-monetary benefits that have occurred from implementing food waste-reducing practices. We will show how such non-monetary benefits indirectly can lead to increased profits, which we believe underlines the importance of also promoting these non-monetary benefits to managers.

### **Non-monetary benefits**

Among the sample group, we identified six non-monetary benefits. These are increased flexibility, motivated employees, positive reputation, increased quality of food, changes in bargaining power, as well as receiving awards and classifications. These benefits are placed within the non-monetary category, as they are not a direct source of revenue. However, in a long-term perspective, we argue that these benefits could result in monetary value, thus increasing the companies' profits. We will present each of these six non-monetary benefits.

#### **Flexibility**

Regarding flexibility, two food waste-reducing initiatives stood out as a source of increased flexibility. The first is the use of technical equipment, such as Ché Fè's sous vide oven.

According to the restaurant staff, this dramatically increased their flexibility, as the kitchen is no longer dependent on knowing the exact number of guests before preparing food. Instead, the chefs can now prepare a large quantity of meat in small packages in the sous vide machine, which can be cooked as guests arrive.

The second initiative that increases flexibility is the absence of menus. In the literature review, we identified large menus as a source of food waste in restaurants, as this requires the restaurant to purchase large quantities of all ingredients. However, by not promising certain dishes in a menu card, the restaurant is not required to place these large orders. By rather offering one or two menus consisting of “the chef’s choices”, these restaurants will be free to use the ingredients they have available. Consequently, food waste generated from large purchase orders can be reduced.

### *Motivated employees*

The organizational psychology researcher Edgar Schein states that people want to be a part of something bigger than themselves, and that they want to know that their contribution has a positive impact (Schein, 2010). Joining forces to fight food waste will fulfil both these needs. By contributing to solving the problem of food waste, leaders can give their employees tasks that make a positive change, which, according to Schein, can work as a motivational factor. Although KITA acknowledges that the food waste-focus requires large efforts from its employees, it also argues that they become more motivated. The employees regard the food waste-work as fun, and are highly engaged in learning more and developing practices. SiO also experienced more motivated employees. People from across the organization were sent to the surplus canteen Kutt Gourmet to do volunteer work, to learn and see how this surplus canteen functions.

A motivated employee has several positive repercussions for the firm, although two of the most important factors are that employees tend to be more effective, as well as contributing to retention. Thus, motivated employees could lead to both increased income and saved costs.

### *Reputation*

A third non-monetary benefit is the positive reputation many food service operators build when working on reducing food waste. For instance, Ché Fè claims that when the customers are informed about the food waste-reducing initiatives that are implemented, they give positive feedback and state that they like what Ché Fè is doing. At KITA, where the guests

cannot choose between dishes on a menu, the customers say that they enjoy the experience of trying these new ingredients. This is particularly the case *after* the customers have eaten the food. KITA has also experienced that people randomly knock on the kitchen door, bringing the chefs peculiar and unfamiliar fish species that they have caught, and challenge the kitchen staff to make something out of it. They do this because they have learned that KITA has this food waste-focus.

### *Quality of food*

A common denominator that was revealed during the interviews was how the interviewees stressed that all food are precious commodities with great value. In search of reducing the food waste, new ways of how to preserve the commodities even further were explored.

Such initiatives may increase the quality of food, as storing conditions and preparation techniques can be improved. One example is the sous vide machine at Ché Fè, which prepares the product in a way that reduces any nutritional waste and weight loss of the product. This way of cooking the product at a lower temperature over many hours also means that the texture of the product is better saved. If communicated to the customers, we argue that such non-monetary benefits can lead to better reputation and higher willingness to pay.

### *Changes in bargaining power*

During the interviews, we also asked the food service businesses if the food waste-focus was a source of increased bargaining power with their suppliers. Although none of the interviewees could confirm this, we got some indicators that they experienced above-average flexibility regarding supplier agreements.

In Partnership option number 1, we discussed how Relæ's custom-made supplier agreement helped reduce food waste. This practice could potentially increase Relæ's bargaining power towards the supplier. As only some parts of the leek are needed, Relæ could request a lower price, as the supplier can sell the other parts of the leek to a different restaurant, which in sum could leave the supplier with a higher income.

Another example indicating that dealing with a social problem such as food waste could be important for the bargaining power, was reported by Sodexo. Sodexo explains how its suppliers expect that the canteen does an effort to improve the environment. By answering to these requirements to the extent that Sodexo does, the canteen might stand out in the competition of making the best supplier agreements.

As the industry keeps shifting towards a more sustainable way of operating, we argue that the bargaining power of these businesses will be of even higher importance.

### ***Awards and certifications***

Many food service businesses have been awarded for their focus on food waste-reduction. If communicated properly, this could be a basis for building a good reputation among customers and in the society. For instance, thanks to its thorough and constant work on sustainability, including efforts on reducing food waste, Relæ has been awarded the *Sustainable Restaurant Award 2016*, while also currently holding a spot as the world's 40<sup>th</sup> best restaurant (The World's 50 Best Restaurants, 2016). Furthermore, both Ché Fè, Kiin Kiin and Relæ have been granted the *Green Award 2015*, a Danish award for being among the 50 greenest eateries in Denmark (GreenMatch, 2015). Both these awards can be used in communication with the customers, thus creating a positive reputation. For instance, Green Award allows the awarded restaurants to place the diploma on their webpage or to print it out and place it on the door. Hotels working on food waste-reduction (as well as other sustainability initiatives) can be awarded *TripAdvisor's Green Leader badge* (TripAdvisor, 2016). This could be beneficial for the awarded hotels, as it is possible for customers to filter the search to only include such green hotels.

A fast-growing sustainability label in Denmark, is the *REFOOD label* (REFOOD, 2016). The certification requirements include the implementation of minimum three food waste-reducing initiatives as well as engaging in work to reuse food waste. The REFOOD label is particularly well designed to be communicated to and marketed towards customers, as a new member will receive stickers to put on the door, an electronic sticker to put on the website, a diploma to place in the restaurant and brochures and postcards to put out on the tables. This makes us believe that the potential for reputational benefits from this certification is high. In addition to the above-mentioned awards and certifications, there are numerous of national and international awards that could have been relevant to discuss here. Some of these are the *Footprint Award* in the UK (Footprint Award, 2016); the famous Scandinavian *EAT awards* (EAT Forum, 2016); and the Norwegian award *Matprisen* (Matprisen, 2016).

### ***People and the planet***

The result of throwing away one-third of all food produced, is creating 33 billion tons of greenhouse gases yearly, in vain emitted to the atmosphere. Although the causes of global warming is a much-debated topic, scientists agree that these greenhouse gases will retain heat

from the sun, resulting in increased temperatures. This illustrates how food waste-reduction can contribute positively to the environment. For instance, in Denmark, where Too Good To Go (TGTG) was first established, the redistribution of food is estimated to have saved 649 tons of CO<sub>2</sub> emissions getting emitted (TGTG-Denmark, 2016) Furthermore, 358 719 meals have been redistributed, thus “saving” the planet from producing an equal number of meals with *new* resources. In the UK, where TGTG is a relatively new service, the same number is 17 tons of CO<sub>2</sub> emissions saved and 8 500 meals redistributed (TGTG-UK, 2016). TGTG also has a service where private customers can donate an amount of money that will be used to redistribute leftover food to homeless people. In addition, TGTG Norway and Denmark have together donated more than 6 300 meals to homeless people (TGTG-Denmark, 2016; TGTG-Norway, 2016).

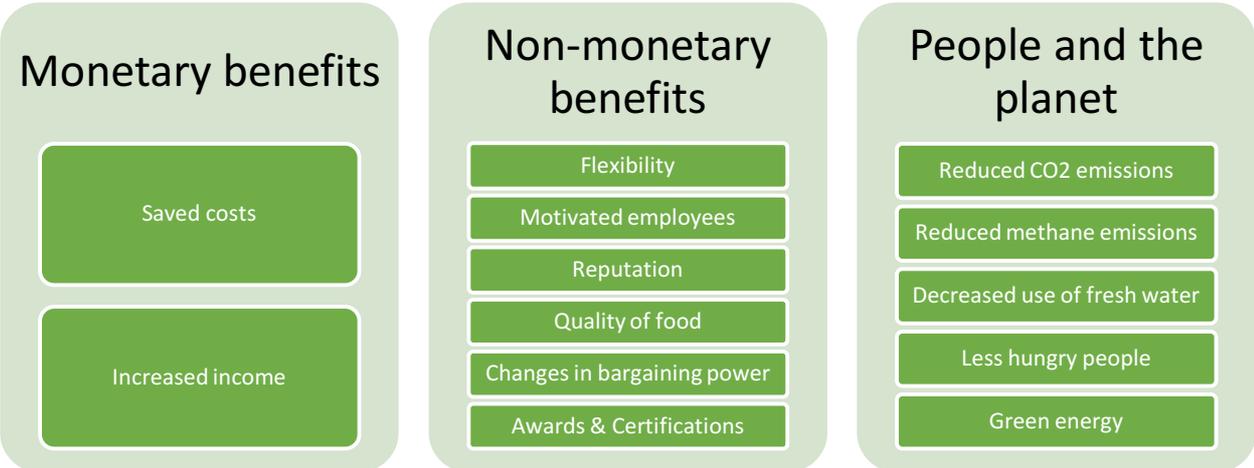
Food production requires use of our planet and its limited resources. Water is a scarce resource in many parts of the world. Reducing food waste is highly relevant to this issue. For instance, producing only one hamburger from farm to fork requires the same amount of water as taking a 90-minute long shower (TGTG-Norway, 2016).

Besides reduced CO<sub>2</sub> emissions, another environmental benefit is transformation of food waste into fertilizers and green energy. Although preventing food waste is the best alternative according to the food waste hierarchy, once the food waste exists, transforming this waste to for instance, green energy represents a much smaller CO<sub>2</sub> footprint compared to the process of rotting in a landfill. At the Danish restaurant Kähler Villa Dining, recycling of waste has resulted in 5 tons of fertilizer and 4285 kWh of green energy (REFOOD, 2016)

### ***Summary of benefits***

In the previous sections, we have presented and discussed what monetary and non-monetary benefits that businesses experience after implementing some of the food waste-reducing business practices from section 5.1. We have also touched upon what benefits these practices create for the society and the environment.

A summary of these findings is seen in figure 13. As stated before, many of the monetary benefits are not a result from studying causality, but rather subjective statements from the food service businesses. However, when combined with the non-monetary benefits, we argue that there is a very strong possibility of increasing profits when engaging in food waste-reduction, as the non-monetary benefits are indirectly linked with increased income or lower costs. Lastly, we have also identified several benefits for the society and the environment. In sum, all these benefits should be used as motivation for changing towards a more food waste-reducing business model. In section 6.2, we discuss these findings more in detail, and present managerial and theoretical implications.



*Figure 13: Summary of identified benefits from food waste-reducing business practices.*

## 6. Discussion & Conclusion

Wasting food is quite a paradox. As explained by food waste-guru Selina Juul (2016b), current levels of food waste and current population growth, means that by the end of this century, we must produce 70 percent more food to feed the world. This made us realize that food waste is one of the biggest problems humanity is facing, and it needs to be targeted in all societies and all parts of the value chain.

The purpose of this thesis was to explore the problem of food waste in terms of food waste-reduction in the food service industry. In particular, there were two characteristics –or challenges- of the Western European society and the food service industry that motivated us to formulate our research question. First, in Western countries, food waste occurs predominantly in the last stages of the value chain. This is also connected to the affluent society that follows the high level of income in these countries (cf. section 2.2). As our literature review indicated (cf. chapter 2), to our knowledge, there is no prior study that has systematically explored the types of food-waste reducing practices for the food-service industry. Thus, we saw the need to address this research gap and to generate a comprehensive overview of practical solutions to fight food waste in the food service industry. We also saw the need to present these from a business model perspective to ease implementation of these solutions. Our second thesis-motivation is that the food service industry is characterized as a profit-maximizing industry with increasing demand for food prepared outside of home (cf. section 2.4). This spurred us to find ways to motivate food operators to change towards more food waste-reducing business models. Consequently, the second part of our research question dealt with describing monetary and non-monetary benefits that food operators had experienced after reducing their food waste. We also aimed at identifying societal and environmental benefits, as the society and the environment are the important victims of the consequences of food waste (cf. section 2.6).

In the following two sections, we will discuss our findings from the two parts of our research question, and provide theoretical and managerial implications as we go along. We end this chapter by discussing the limitations of our study and highlighting promising research avenues for future research.

## 6.1 What are the emerging types of food waste-reducing business practices in the Western European food service industry?

Based on interviews and document analysis of 45 food service businesses and food service experts, we identified 36 food waste-reducing business practices. These are presented in figure 10; The Food Waste Fighter's Toolbox (section 5.1). We will summarize the features of the Toolbox, before we discuss our findings.

### ***The Food Waste Fighter's Toolbox***

In order to identify types of food waste-reducing business practices, we chose four business model elements as our starting point; a food operator's (1) key resources, (2) key activities, (3) key partnerships and (4) channels. Our selection of these four building blocks can be explained in terms of the front-end and the back-end of a business model (cf. chapter 3). The causes of food waste (cf. section 2.5) can (mostly) best be targeted by changing or implementing business practices at the back-end of a business model, where both key activities, key resources and key partnerships are located. In addition, our literature review revealed that these elements were most often changed to reduce food waste.

In addition to categorizing business practices as a resource, activity, partnership or channel, we labelled the them in three different ways: (1) color codes according to the food waste hierarchy, (2) illustrative labels to indicate where specific characteristics could be beneficial, and (3) letter-labels to illustrate applicability for restaurants, hotels and canteens, respectively (cf. section 5.1). The Food Waste Fighter's Toolbox is a simple, yet very informative table that can be used to make sound choices that suit different types of food service businesses.

Among the 36 food waste-reducing practices, 18 measures are ***preventing*** food waste. As these are practices that can be categorized at the top of the food waste-hierarchy, they can be regarded as the best options, or the most efficient ones. Furthermore, 7 measures are ***creating awareness*** about the problem. Such business practices are also preventing food waste, but in a more *indirect way*. Either way, these two categories are juxtaposed as equally efficient in our food waste-hierarchy. We found that some practices overlap between these two categories, such as *Motivated staff*, which suggests that sometimes, it is not possible to distinguish the two. Furthermore, we found 7 measures for ***reusing*** food, and lastly, only 2 measures for ***recycling*** or ***recovering energy***.

Although preventive measures and awareness-creating measures are regarded as most efficient, the practices that were most commonly used were in fact *recycling* and *energy recovery*. This might indicate two things. Firstly, recycling and energy recovery could be the practices that are easiest to implement as they are more *available* than the prevent-options, as the latter often require more time and effort to implement. It could also indicate that these businesses are not doing these practices because they see the need of reducing food waste, but rather they wish to dispose the food waste in a more environmental-friendly way than sending it to the landfill.

We also found that the preventive and awareness-creating practices were the only ones that require a *high engagement*, i.e. they are marked with a *heart* in the Toolbox. This can be related to the above-mentioned argumentation; practices that prevent or create awareness are less frequently used than others, as they require more effort.

Lastly, we note from the business model categorization that nearly all measures within key partnerships and channels require more *time* than the other measures. The food waste-reducing *partnerships* take time to implement, as research, communication and negotiations are needed in the implementation phase. However, when these partnerships are in place, they do not require significant extra time to maintain. The food waste-reducing *channels*, however, may not take much time to implement, but they require labour to be maintained.

The food-waste reducing business practices have one important trait in common; they all require some level of *knowledge*. Most practices require knowledge of the problem of food waste, so that the importance of the problem can be communicated to staff, customers and society in general. Others require knowledge about equipment, tools or partners that can contribute in reducing food waste. We regard these as *minimum requirements of knowledge*. In addition, some business practices require *extensive knowledge and experience*, and these are the ones that are labeled with the knowledge icon. In total, there are eight such practices, and these require a high level of knowledge due to the need to act quickly, be creative and consider health requirements while at the same time prepare a quality product for the customer.

### ***Managerial implications***

Our research revealed several implications for managers in the food service industry. Firstly, our findings show that the key to success is *knowledge*, in all stages of the food waste-

reducing process. Knowledge is necessary to explore new solutions, motivate employees to implement new practices and to evaluate the success of those practices. This means that it is crucial for the management to engage in training and knowledge-sharing. Leaders must be able to communicate the possible benefits such changes will make, to develop understanding and make a basis for further knowledge-sharing. As we found experience to be highly important, learning is important also *after* measures have been implemented.

Secondly, managers must be aware of certain *challenges* when implementing food waste-reducing measures. Before these practices have become a part of an employee's daily routine, many new tasks can be seen as an extra job without payoff. In addition to engaging in training and knowledge-sharing, we further suggest that *a person or a team* should be appointed the driver of change. For instance, Relæ has one person dedicated to all its sustainability work, which has been given the prominent title "Queen of Sustainability". Such a person or team should be responsible for answering questions, collecting suggestions of new practices and arrange implementation of those, as well as keep the motivation strong.

Furthermore, we need to remind leaders that even though competitors will always compete, this does not mean they cannot serve the role as *valuable partners* as well. We see partnerships as a necessary tool to deal with this enormous problem. Between competitors, such *coopetition* can make certain food waste-reducing practices even more profitable, for instance by the network effects that arise if more businesses sell food through mobile apps, by sharing the cost of expensive machines and tools, or by creating platforms for discussion and knowledge-sharing.

Lastly, drivers for change reveals that that firms are more likely to adapt their business model under conditions of perceived threats rather than opportunities (Saebi, Lien, & Foss, 2016). This indicates that in terms of food waste-reduction, leaders could end up *changing their business models too late*. Many leaders seem to not realize the potential value of sustainability, both for the business and for the customers. Paul Polman, the CEO of Unilever, supports this: "I am convinced that the firms who do not take responsibility in the future, will be wiped out" (BBC Radio, 2016). As Unilever is a large international company that has found it highly valuable to engage in sustainability, we believe they should lead as an example. When seeing leadership in a wider perspective, these statements on sustainability and business model adaptation could indicate that in addition to the "*carrot*" (i.e. the opportunity to earn increased revenues), firms might need a "*stick*" to make the necessary

changes. Such sticks must come from the outside, and we discuss possible policies in the final section of this thesis.

### ***Theoretical implications***

As described in Chapter 2, prior research has mostly focused on food waste in private households (Refsgaard & Magnussen, 2009; Williams et al., 2012) or broad studies of the entire food supply chain (Pirani & Arafat, 2016), hereby neglecting research depth in other sectors. Furthermore, research has mostly dealt with quantification or causes of food waste (Beretta et al., 2013; Betz, Buchli, Goebel & Muller, 2015), but to our knowledge, there is no study that researches food waste-reduction by changing business model elements. This highlights the importance of adopting a business model perspective to understand how companies can integrate food-waste reducing business practices into their existing business model. Hence, our study contributes to the literature on food waste-reduction, by providing an in-depth study of the food service industry, and by providing practical guidance on food waste-reduction.

While some companies have been using these food waste-reducing solutions, the contribution and novelty of our *Food Waste-Fighter's Toolbox* is that it provides the first, comprehensive overview of food waste-reducing business practices, providing detailed guidance for interested practitioners. This guidance is crucial, because certain measures have financial or knowledge-based requirements, or they are more suitable for businesses with certain characteristics as explained above. As we have applied visual and easy-understandable colours and symbols, we argue this will make the Toolbox a more applicable tool.

Furthermore, we contribute to the theoretical approach of food waste-reduction by presenting an adapted version of a much-used *waste hierarchy* (European Commission, 2016). Traditionally, the waste hierarchy consists of five strategies to reduce food waste; prevent, reuse, recycle, recover and dispose. However, as we studied food waste-characteristics, we realized that *knowledge* is an essential requirement to reduce food waste. We saw the need for a more food waste-related hierarchy, thus, we adapted the traditional hierarchy by adding a strategy called ***Create awareness***. For future research on food waste, we recommend that our version of the food waste hierarchy should be used when targeting food waste-reduction, as this provides the opportunity to present a detailed distinction of the effectiveness of different strategies.

A similar adaption has been done to the Business Model Canvas. As argued in chapter 2, we have revealed that four business model elements are more relevant when aiming to reduce food waste. These four business model elements are key resources, key activities, channels and key partnerships. Consequently, we advise researchers to apply the same business model elements when approaching the food waste problem.

Lastly, this thesis contributes to one of the major research gaps in current literature, namely the lack of attention to the food service industry. Firstly, we have collected and presented information from very fragmented sources, so that future research will require less extensive searches. Secondly, from our data collection process, we have presented a valuable insight into the endless possibilities of food waste-reducing practices, and discussed challenges and possibilities, such as knowledge-requirements and synergies.

## **6.2 What monetary and non-monetary benefits can be seen in businesses applying food waste-reducing business practices?**

In total, we identified seven examples of saved costs or increased income (figure 12), six examples of non-monetary benefits, and five benefits concerning people and the planet. A summary of the monetary and non-monetary benefits is shown in figure 13 (section 5.2). These findings will now be discussed more thoroughly, before we present the managerial and theoretical implications.

First and foremost, we believe that the possibility of obtaining *monetary benefits* is an important driver for implementing food waste-reducing business practices. All interviewees reported *increased income* or *saved costs* from their food waste reduction. Although some were quite subjective statements, others could say with high certainty that they had saved money on reducing food waste. It is important to note the *calculation challenge* related to identifying monetary benefits. For instance, certain measures require a high investment cost, which makes it easy to verify when this cost is saved. Other monetary benefits are difficult to estimate, such as the saved costs from *Using the entire product*. When calculating such savings, it is not sufficient to only account for the commodity costs. The business will also save substantial money on storage, electricity, transportation, waste management services and labor. The latter is especially important in Western Europe, where labor represents the largest share of the costs in services.

The interviewees from our sample reported that they had experienced six different **non-monetary benefits**. The first is increased *flexibility*, with regard to planning and logistics of guests. The second non-monetary benefit is *motivated employees* were claimed to be related to food waste-reduction. Third, the *improved reputation*, for instance from guests that value sustainable initiatives. Furthermore, increased *quality of food* was identified in some businesses. Fifth, there is the potential of increased *bargaining power*, and lastly, many businesses are granted *awards* and *certifications*.

Occasionally, it was not straight-forward to separate the non-monetary benefits from the monetary benefits. A good example is *motivated employees*. This benefit could logically fit into both categories of benefits; a motivated employee is a non-monetary benefit itself, however, if the higher motivation cause him or her to do a more efficient job, it is also the source of a monetary benefit. Over a longer time-horizon, we argue that all the non-monetary benefits eventually can lead to a monetary benefit.

Included in the non-monetary benefits are benefits for the **people and the planet**, and we identified five such benefits: *reduced CO2 emissions*, *reduced methane emissions*, *decreased use of fresh water*, *less hungry people* and *more green energy*. Although these are not directly benefits for an individual business, we argue that the triple bottom line-perspective is important to maintain. These benefits contribute to take a step in the right direction of the UN Sustainable Development Goals, and they consider ethical issues of the affluent society in Western Europe and deals with food insecurity that affects starving and malnourished parts of the world's population.

### **Managerial implications**

It is likely that many leaders will regard implementation of food waste-reducing measures as inconvenient, extra working hours or too expensive investments. By presenting reported benefits together with the food waste-reducing measures, we have aimed to convince leaders of the opposite. Leaders should be aware that although the initial cost of some measures might be high, it is likely that the long-term benefits pay back the costs several times. In relation to this, it is especially important to remember that food waste-reducing measures could reduce the cost of the business' *second most expensive resource*; commodities.

Third, we advice managers to use the guiding that the Toolbox provides. By actively using the labels to navigate through the Toolbox, we argue it becomes easier to implement measures

and the possibility of maximizing subsequent benefits might be higher. This is because all businesses are different, and not all solutions are suitable for everyone.

Lastly, thesis wants to discard the perception of a trade-off between profits and sustainability. In the debate concerning how to run business today, we see a shift toward increased focus on sustainability. Large, international brands such as Coca Cola, Walmart, Nike and Apple strive to reduce energy and water consumption, and the CEO of Unilever, Paul Polman, stated that he only wants shareholders who share his view on sustainability, proving that it is possible to earn money while operating sustainable (BBC Radio, 2016). Polman, among others, believes that the business world has no choice but to undergo a shift towards a circular economy. The circular economy is built on the idea that all waste has value and can be transformed to something useful after its prior function is not sufficient anymore. In light of these trends, we saw the need to highlight both monetary and non-monetary benefits that may arise from shifting towards more food waste-reducing business models. Supported by this perspective, we urge the need to make customers aware of the good job a firm is doing for the environment or the society. In order to build a good reputation and achieve other benefits, leaders should be proud to promote their food waste-reducing efforts.

### ***Theoretical implications***

Although we cannot state that there is causality between implementation of the food waste-reducing measures and the reported benefits, this thesis has contributed to food waste literature by *indicating that there is a possibility* of causality between measures and benefits. If we are going to reach the UN Sustainable Development Goals by 2030, we need to act, but this requires motivation and incentives for the industry. Consequently, we recommend that future research builds on our revealed indications, and try to establish causality between food waste-reduction and monetary and non-monetary benefits. To establish causality to monetary benefits, we believe that a *standard calculation process* should be developed. This is to overcome the calculation challenges discussed in section 5.2, which states that calculating monetary benefits is a highly complex and unstructured task.

As stated above, we believe that in the long-run, non-monetary benefits are likely to become monetary benefits. We recommend scholars to study *what it takes* to make this transformation possible, and *how long* this will take. This could for instance be done by testing how long it takes to build a better reputation that attracts new customers. This is closely related to the

need for *incentives* for the industry, and as discussed above, this is a much-needed research-area.

### 6.3 Limitations and future research

Although we have worked on making the best possible methodological and practical choices throughout the planning and writing of this thesis, there are four areas of improvement that we wish to highlight. This can also serve as point of departure for future research topics.

Firstly, we need to comment on the relatively *small sample size*. Ideally, we would have identified many more food waste-reducing businesses, especially since we cover such a large geographic area. However, the sample is small due to two reasons. The first is the *language barrier*, which became apparent as we performed extensive research online. The second reason is that we realized that many businesses in the food service industry are *not good at promoting* their food waste-reducing efforts online, thus limiting our ability to identifying them. To overcome these two issues, we believe it would be beneficial for future researchers to focus on geographic areas where they know the language and are familiar with the industry.

A second limitation regarding our sample is that most of the observations are located in the Nordic countries Norway and Denmark. Furthermore, almost all observations are from large cities. Optimally, we would have chosen a more *geographically diverse sample*. However, due to reasons mentioned above, this proved to be challenging. Nevertheless, we believe that our findings are generalizable to other Western European countries, as due to the EU and EEA agreements, Western Europe has harmonized food laws. Consequently, what is allowed in terms of reuse of food and food safety in one country, is also allowed in other countries as well. Thus, companies throughout Europe can implement the food waste-reducing business practices, without facing major legal constrictions.

Third, in a discussion about benefits, it is important to be aware that our findings are not based on experiments, thus *causality* cannot be established. Our findings are rather subjective descriptions from a selection of the sample. As a result, we cannot know with certainty that the identified benefits were caused by the implementation of the food waste-reducing measures.

A fourth limitation is the *lack of focus on challenges* regarding implementing food waste-reduction. First and foremost, the aim of this thesis was to identify food waste-reducing

measures in the food service industry. During the interviews, the focus was set on identifying these measures, while less attention was brought to challenges of implementing those measures. Relatedly, it is important to note the possibilities for researcher bias, as discussed in chapter 4. When searching for “what we wanted to find”, we aimed to find businesses that are good at food waste-reduction. This means that we might have missed food waste-reducing practices that are done in traditional restaurants and the challenges that these food providers might face.

Working on this thesis, we argue there are in particular four topics that need further research. Firstly, we need more statistics and numbers on food waste and food waste reduction. As emphasized throughout the thesis, the lack of a unified definition and measurement method is the reason there is not enough data available. More and better food waste data would allow for cross-country comparison and comparison across time. Only after obtaining such data, can we say with certainty which businesses and which countries have reduced their food waste, and if we are reaching international goals.

Secondly, we urge the need for field experiments that can establish causalities. Most research conducted up until today compares their findings with before and after implementing measures. The problem however, is that we rarely find only one measure implemented at a time, and consequently, causality cannot be established.

Furthermore, we see the need for further research about *how* to implement changes in a business model. Our findings will guide the reader through a presentation of different measures, information about requirements for using them, as well as which part of the business model the measure belong to. It will also explain possible problems along with managerial recommendations for a successful implementation. Still, it does not provide managers with details on *how* to make changes in their business model. Here, we argue, more field research is needed.

Lastly, we believe there is a need to explore how public policies can be used to reduce food waste. If we are going to reach the UN Sustainable Development Goals, the responsibility cannot be left with individual businesses. As stated in Saebi et al. (2016), businesses will more likely change their business model when confronted with a *threat* rather than an *opportunity*. We believe such threats should come from a national level, as many business model changes could be done easier if certain systems and infrastructures are provided. Such

“sticks” could be regulations from the governments, for instance a *food waste law* like France and Italy recently have introduced (BBC News, 2016; Rixon, 2015). Other policies that target private consumers, can be pursued also in the industry. For instance, the state of Portland has introduced a tax for households food waste, a measure that immediately reduced the amount of waste significantly (FutureThink, 2016). These examples illustrate how public policies such as taxes served as a “stick” to become more sustainable, and similar approaches can easily be created for the food service industry.

In order to be able to deal with this problem we need innovative ideas, and new ways of delivering the value proposition of a meal. One such idea is the company called Lunchfarm, who serve as a “canteen on wheels” for companies that are too small to have their own canteen (Lunchfarm, 2016). Another idea was initiated from private households in Trondheim, are outdoor fridges placed on the street where anyone can share their surplus food with those in need (Bull-Engelstad, 2016). The future also brings technological inventions. Scientist have managed to use 3D printers to print food, which in the future could enable people to print exactly what they need, whenever they need it. In addition, scientist believes that we will be able to use food waste as input in these printers (Wasteless Future, 2016).

In sum, research on food waste is believed to help managers understand the threats and opportunities of food waste, and hereby contribute to find ways to fight the problem. The food service industry must change its business practices, in line with the demand of the growing world population.

*“Abundance is the success story of the human species. You look back at the creation of agriculture - 12,000 years ago - that was all about creating surplus... The problem is now that all rich countries in the world (in North America & Northern Europe) have between 150 - 200% of the food that they actually need.”*

- Stuart, 2016

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## Appendix A – Organizations working on food waste

List of non-academic resources used in this thesis. There are great many non-governmental organizations, businesses, alliances and other actors that work on food waste-reduction, and even more that has food waste as one of their many areas of work. Consequently, it required extensive work to search for good sources to use in this thesis.

| Organization   | Description of work area  | Geographical boundary |
|--|---|-----------------------|
| <b>BIO Intelligence Service</b>                                      | A leading environmental and policy analysis consultancy firm.   | Europe                |
| <b>Food and Agriculture Organization of the United Nations (FAO)</b> | UN organization with a primary goal of achieving food security. Takes a broad approach, touching upon topics such as forestry, fisheries and agriculture. Has launched the global initiative Save Food to develop and implement a food waste-reduction program. | Worldwide             |
| <b>Food Waste Reduction Alliance (FWRA)</b>                          | Cross-industry alliance (manufacturers, retailers and restaurants) that aims to reduce food waste, distribute food and recycle unavoidable food waste.  | USA                   |
| <b>FUSIONS</b>   | European Union food waste-reduction project completed June 2016. Developed a strategy to reduce food waste in the food value chain through social innovation.   | EU                    |
| <b>International Solid Waste Association (ISWA)</b>                  | International association for the development and promotion of sustainable waste management strategies.   | Worldwide             |
| <b>Mintel</b>  | Market intelligence agency with food and food services as one of its expertise.   | Worldwide             |
| <b>Østfoldforskning</b>  | Research institute for sustainable development.   | Norway                |
| <b>Our Common Food</b>   | Competition to find and promote practical ideas to reduce food waste in Switzerland and developing countries.   | Switzerland           |

|                           |  |  |                |
|---------------------------|--|--|----------------|
| <b>Recycling Works</b>    |  | Program assisting businesses and institutions in optimizing recycling.   | USA            |
| <b>Stop Spild af Mad</b>  |  | Volunteer organization and movement for the end of food waste-reduction. Provides tools and shares knowledge to reduce food waste. | Denmark        |
| <b>Sustainable Brands</b> |  | Innovation community for sustainable products.   | Worldwide      |
| <b>Wrap</b>               |  | Consultancy and cross-industry platform for sustainable resource management.   | United Kingdom |

## Appendix B – Overview of previous academic research

Results from literature review in Web of Science database and EBSCO Business Source Complete database. If the same article shows up in two different search terms, this article is only written down once. Some searches gave more hits, however to ensure the reliability of our sources, non-academic texts such as industry magazine articles were excluded. Description of this selection process can be found in section 4.2. In total, the search for academic research gave 15 unique hits.

| Search terms                                | Number of hits | Author(s)  | Journal description                   | Research topic   | Value chain focus                                     | Geographical focus | Business model focus |
|---|----------------|--|---------------------------------------|--|---|--------------------|----------------------|
| "Food Waste"<br>AND "Food Service Industry" | 4              | Beretta, Stoessel, Baier & Hellweg, 2013                             | Waste Management                      | Quantification of food waste   | The whole food supply chain                           | Switzerland        | No                   |
|   |                | Betz, Buchli, Goebel & Muller, 2015                                  | Waste Management                      | Quantification of food waste   | Food service industry                                 | Switzerland        | No                   |
|   |                | Sung & Ritter, 2008  | Compost Science & Utilization         | Composting of paper products   | Food service industry                                 | n.a.               | No                   |
|   |                | Kacmar, Andrews, Van Rooy, Steilberg, & Cerrone, 2006                | Academy of Management Journal (ABS 4) | Employee turnover  | Restaurants   | n.a.               | No                   |
| "Food Waste"<br>AND "Food Service Sector"   | 3              | Silvennoinen, Heikkila, Katajajuuri & Reimikainen, 2015              | Compost Science & Utilization         | Quantification and origin of food waste                                  | Food service industry                                 | Finland            | No                   |
|   |                | Katajajuuri, Silvennoinen, Hartikainen, Heikkila & Reimikainen, 2014 | Journal of Cleaner Production         | Causes and costs of food waste   | The whole food supply chain except primary production | Finland            | No                   |
|   |                | Mirabella, Castellani & Sala, 2014                                   | Journal of Cleaner Production         | Literature review of former research on recovery and reuse of food waste | Food manufacturing industry                           | n.a.               | No                   |

|  |   |  |   |   |                               |                            |     |
|--|---|--|---|---|-------------------------------|----------------------------|-----|
| "Food Waste"<br>AND<br>"Hospitality<br>Industry" | 4 | Pirani & Arafat, 2016  | Journal of Cleaner<br>Production  | Causes of food waste<br>and recommendation of<br>minimization strategies                                      | Food service industry         | United Arab<br>Emirates    | No  |
|  |   | Charlebois, Creedy & von<br>Massow, 2015                                   | International<br>Journal of Culture<br>Tourism and<br>Hospitality<br>Research | Causes of food waste  | Fine-dining<br>restaurants    | Canada                     | No  |
|  |   | Pirani & Arafat, 2014  | Journal of<br>Environmental<br>Management                                     | Literature review of<br>causes of solid waste<br>(including food waste)<br>and waste management<br>procedures | Food service industry         | n.a.                       | No  |
|  |   | Curtis & Slocum, 2016  | Journal of Food<br>Distribution<br>Research                                   | Food waste certification<br>programs  | Tourism sector                |                            | No  |
| "Food Waste"<br>AND<br>"Hospitality<br>Sector"   | 2 | Vakalis, Sotiropoulos,<br>Moustakas, Malamis, Vekkos<br>& Baratieri, 2016  | Waste and<br>Biomass<br>Valorization  | Thermal processing and<br>recovery of food waste  | Hotels                        | n.a.                       | No  |
|  |   | Papargyropoulou, Wright,<br>Lozano, Steinberger, Padfield<br>& Ujang, 2016 | Waste<br>Management   | Develops a conceptual<br>framework for studying<br>food waste generation<br>and prevention                    | Food service industry         | Malaysia                   | No  |
| "Food waste"<br>AND "Business<br>Model"          | 2 | Franchetti, 2016   | Resources   | Energy-recovery from<br>food waste  | Households and<br>restaurants | Local<br>community,<br>USA | Yes |
|  |   | Beitzen-Heineke, Balta-Ozkan<br>& Reefke, 2017                             | Journal of Cleaner<br>Production  | Zero-packaging  | Retail sector                 |                            | Yes |

## Appendix C – Sample group

Below, we have provided information of sample group. In total, we have a sample of 45 organizations, divided into 13 interviews and 32 document analysis.

### C.1 Interviews with food service businesses, food waste-experts and other food operators.

| Company                  | Description of work area  | Location                                      | Interviewee  | Length of interview | Type of interview |
|--------------------------|---|---|--|---------------------|-------------------|
| <b>Ché Fè</b>            | Organic Italian restaurant, with suppliers in Italy                                 | Copenhagen                                    | Katrine Giorgio, Sommelier and Restaurant manager  | 30 minutes          | Face-to-face      |
| <b>Deas Canteen</b>      | Canteen to one of Denmark's largest property managers                               | Copenhagen                                    |  | 15 minutes          | Face-to-face      |
| <b>Det Runde Bord</b>    | Volunteer surplus food distributor  | Denmark                                       | Peter Haugelund, CEO                               | 1 day               | Field-trip        |
| <b>Kiin Kiin</b>         | Thai, Michelin star restaurant  | Copenhagen                                    | Dak Laddaporn, Head chef                           | 20 minutes          | Face-to-face      |
| <b>KITA</b>              | Japanese-style seafood restaurant   | Stavanger                                     | Øyvind Næsheim, Founder and Head chef              | 30 minutes          | Skype             |
| <b>Matvett</b>           | The retail- and food service industry's commitment to prevent and reduce food waste | Norway  | Anne-Grete Haugen, General manager                 | 50 minutes          | Telephone         |
| <b>NorgesGruppen</b>     | Market leader in the Norwegian retail industry                                      | Norway  | Snorre Jordheim Myhre, Project leader, procurement | 50 minutes          | Skype             |
| <b>Relæ</b>              | Organic, world's 40 <sup>th</sup> best restaurant                                   | Copenhagen                                    | Martin Gervard, Sous chef                          | 20 minutes          | Skype             |
| <b>Scandic</b>           | The biggest hotel chain within the Nordic countries                                 | Nordic countries, Belgium, Germany and Poland | Morten Malling, Director Food & Beverage Norway    | 50 minutes          | Telephone         |
| <b>SiO Mat og Drikke</b> | Canteens and cafés for students   | Oslo  | Per Christensen, CEO                               | 50 minutes          | Face-to-face      |
| <b>Sodexo</b>            |   | Oslo / worldwide                              | Nora Kvaernes, Quality coordinator                 | 75 minutes          | Face-to-face      |

|                       |                                |  |   |            |              |
|-----------------------|--------------------------------|--|---|------------|--------------|
| <b>Too Good To Go</b> | Mobile application connecting  | Denmark, United Kingdom, Norway, Germany, France, Switzerland, Austria and the USA | Sofie Wiik, Owner and CEO TGTG Norge AS | 30 minutes | Skype        |
| <b>Øyvind Wold</b>    | Former chef and World Champion |  |   | 30 minutes | Face-to-face |

## C.2 Document analysis of food service businesses, food service partnerships and food waste-reduction awards and certifications.

| <b>Company</b>                  | <b>Food service concept</b>                         | <b>Location</b>   |
|---------------------------------|---|-------------------|
| <b>Amass</b>                    | Restaurant  | Denmark           |
| <b>Azurmendi</b>                | Restaurant  | Spain             |
| <b>BeyondCoffee</b>             | Partnership   | Denmark           |
| <b>BioMio Organic Bistro</b>    | Restaurant  | Denmark           |
| <b>Botaniq Food &amp; Juice</b> | Restaurant  | Denmark           |
| <b>Burger &amp; Bun</b>         | Restaurant  | Denmark           |
| <b>Café Kaffegal</b>            | Restaurant  | Denmark           |
| <b>Café Nutid</b>               | Restaurant  | Denmark           |
| <b>Café Retro</b>               | Restaurant  | Denmark           |
| <b>EAT Awards</b>               | Sustainable products, services and innovation award | Norway and Sweden |
| <b>Fødevarebanken</b>           | Foodbank  | Denmark           |
| <b>Food Cowboy</b>              | Surplus food distributor                            | USA               |
| <b>Footprint Awards</b>         | Food service industry award                         | United Kingdom    |
| <b>GreenAward</b>               | Restaurant award                                    | Denmark           |
| <b>Lunchie</b>                  | App for surplus food distribution                   | Finland           |

|                                     |   |  |  |
|-------------------------------------|---|--|--|
| <b>Matprisen</b>                    |   |  | Norway   |
| <b>Matsentralen</b>                 | Foodbank                                      |  | Norway   |
| <b>Nordic Choice Hotels</b>         | Hotel   |  | International (Norway, Sweden, Finland, Denmark, Latvia and Lithuania)     |
| <b>Nose2Tail</b>                    | Restaurant                                    |  | Denmark  |
| <b>OptiMiam</b>                     | App for surplus food distribution             |  | France   |
| <b>Refood label</b>                 | Food service industry certification           |  | Denmark  |
| <b>ResQ</b>                         | App for surplus food distribution             |  | International (Finland, Sweden, Germany, Netherlands, Belgium and Estonia) |
| <b>Rub &amp; Stub</b>               | Restaurant                                    |  | Denmark  |
| <b>Runes Mad</b>                    | Restaurant                                    |  | Denmark  |
| <b>SiB</b>                          | Canteen                                       |  | Norway   |
| <b>Silo</b>                         | Restaurant                                    |  | United Kingdom   |
| <b>SpoilerAlert</b>                 | Online platform for surplus food distribution |  | USA  |
| <b>Steensgaard</b>                  | Restaurant                                    |  | Denmark  |
| <b>Sustainable Restaurant Award</b> | Restaurant award                              |  | Worldwide  |
| <b>Tiny Leaf</b>                    | Restaurant                                    |  | United Kingdom   |
| <b>TripAdvisor Green Leader</b>     | Hotel certification                           |  | Worldwide  |
| <b>Villa Kähler Dining</b>          | Restaurant                                    |  | Denmark  |

## Appendix D – Steps in data collection and data analysis

Here, we present an illustration of how data was collected and analyzed, so that the reliability of the thesis can be highlighted.

### D1. Interview guide

Example of an interview guide used in the data collection procedure.

#### INTERVIEW GUIDE: CHÉ FÈ

##### Phases and description

##### Phase 1: Boundaries of the interview

1. Free talk
2. Information
  - a. Tell her about the background of the master thesis and the purpose of it
  - b. Tell her what we will use the interview for and how the data will be used
  - c. Ask if it is okay that we use the company's name and her name as a source in the thesis
  - d. Ask if it is okay to record the interview
  - e. Start recording

##### Phase 2: Introductory question

3. Open question
  - a. Can you tell us about how you started working with food waste?

##### Phase 3: Focus point

4. Key questions
  - a. What measures have Ché Fè implemented to reduce food waste?
  - b. What challenges do you face with these measures?
  - c. Do you inform your guests about your food waste-reduction?
  - d. What benefits have you achieved by reducing food waste?
  - e. Do you measure your food waste?
  - f. In Denmark, there are services that can help re-distribute food waste, such as TGTG and foodbanks. How would these solutions fit Ché Fè?
  - g. What are the next steps Ché Fè will take to reduce food waste?

##### Phase 4: Recap

5. Summary
  - h. Ask if she has anything to add
  - i. Ask if there is anyone she recommends we talk to
  - j. Repeat what we will use the information for

## **D2. Transcription of interview**

The first step of the data analysis process was to transcribe the interview. This was done to recap the information from the interview, and to have easy access to an overview of the information. The transcripts of the other interviews can be viewed if requested to the authors by sending an e-mail to *kristine.a.wold@gmail.com* or *julie.eikaas@gmail.com*

### TRANSCRIPTION OF INTERVIEW WITH CHÉ FÈ

*Translated from Norwegian and Danish.*

*Before the recording started, we asked for permission to use the interviewee's name, title and company as a source in the thesis, and for permission to record the interview.*

---

#### **Can you start by telling us about how you first started working on food waste?**

Well, we have different technical methods. For instance, earlier, we just had a regular oven. But now, we have bought a very professional oven, which is almost like a computer. You can program for when it should start, how long it should cook and so on. So this oven can run all night, which makes also the electricity cheaper for us. So this also reduces our electricity waste. Furthermore, when you cook food in such professional ovens, less water is lost from the product. This means that the food is moister and is kept longer. So these new ovens are one thing. And then we have a method called sous vide, it is a vacuum machine. For instance, if you heat one kilo of meat in a traditional oven, 300 grams of this meat would just disappear. But when you put it in the sous vide machine, which uses very low temperatures, no liquids are lost from the product. So this is also reduction of food waste. And you need to know these technical things, these ways of doing things.

#### **This is very interesting! So where did you find these machines?**

You can order the vacuum machine from suppliers, and the professional oven that is almost like a computer. All these things are planned so that you do not waste any food, that you should use everything at the right time and so on. The kitchen told me that this has helped tremendously with reducing food waste. Especially the vacuum machine, because when you cook meat, you put it in small bags and cook it maybe for 18 hours on 50 degrees, instead of 30 minutes at 200 degrees. You go very slow, and this means that a good product can be kept in the vacuum machine for a

month. So you only take what you need. You never make too much, because these are bags of meat made for one person. So if you have 20 guests that evening, you take 20 bags of meat prepared from the vacuum machine. So you never have to prepare a lot of fresh food, and then throw it away because you had only a few guests.

**This is so smart. Was this a large investment?**

I can ask the kitchen. The professional oven was expensive I know, and the vacuum machine. But yes, these were large investments. I do not know the exact price, but let me ask. These are investments that you do, but they also pay back.

**So the investment pays off?**

Yes, you earn the money back a hundred times over because you do not waste food. I asked the chef what it is they throw away, and he says they only waste the bones. If he has meat leftovers, he will make stuffed pasta or cannelloni, for instance, with those meat leftovers. So if he has leftover food, he will use this in a different dish. He does that a lot. And for instance, if he prepared too much main course, he can use that food for the starters the next day. He can serve it as carpaccio for instance, cold as a starter.

**He seems very good at reusing food?**

And we do not have a fixed menu. But our menu card states that we have the commodities that we receive, and we offer 5 and 10 course menus. And that is what we offer. So we do not promise that we will have a certain dish next week, so that we have to throw away the other food. If we have leftover food, we use that also for next week. Many guests ask about our menu and what dishes we serve, but our menu just states that we have seasonal products.

**So how do your customers react to this, when you tell them why?**

Our guests think this is a really good thing, also because it is an organic concept. They are very aware of this when they show up here, and it is written on our webpage that we are organic. There are some that ask for a specific menu, so then I had to explain this to them. But no-one has ever cancelled a table because of that.

**Do some people come here because you serve organic food?**

Yes, more and more. Our first years, they realized we were organic after they came here, and thought that was a good additional trait, but now they come here because we are organic. Maybe just 5-10 percent says it out loud, but before we did not hear it at all. So it shows that there is a growing interest for ecology and organic food.

But what I think about the menu, is that it is less food waste this way. I think when you say that we promise to offer certain dishes, some food can turn bad in the kitchen.

**Do your customers reserve tables, or do they drop by?**

They reserve tables. And there can of course show up extra people. It is more likely that too many show up, than too few in our restaurant. But at least that does not create food waste! Sometimes I just had to say that we are in fact sold out of food, we do not have any more. But then I guess they think that is a good thing, because it means that the food was fresh. But I see that a lot, that we run out of food.

**This sounds like a very smart concept.**

Well yes, but it is something that has developed. And it is also smart for us. It is much more financially sustainable for us to run the restaurant this way, with less food waste. It is a good model.

**So do you experience any negative consequences, in addition to these positive ones?**

One thing is that we have to explain to our customers why we do not have a menu. If you do not explain this, some people might think this is a bit strange. So it can take some extra time to explain, also in e-mail, back and forth, because they do not understand. So that is a bit time-consuming. But now we have been here for five years, so now people start to understand. They can just show up and relax, just choose between 5 or 10 courses and that's it.

**So we have already heard about some of the benefits related to reducing food waste. And you said that you receive a lot of attention because of this?**

Yes. And I have another thing. When guests leave food on their plates, because sometimes they are just too full. So then I ask them "do you wish to bring this food back home?". And then I pack it for them.

### **Like a doggy-bag?**

Yes, but a doggy-bag is a no-word, it sounds negative. But I tell them that their food is good meat, and it is sad to throw it away. And then they agree that it is stupid to throw it away, and they agree to bring it back home. But like I said, “doggy-bag” has a negative sound to it. That it is for the bad leftovers. Some even say that “we don’t have a dog”. But I think, why should a dog eat something that you can for lunch tomorrow?

**Yes, doggy-bags have kind of a negative sound. And it seems like there are many restaurants that do not offer doggy-bags? What is your impression of this?**

Yes, I definitely agree. I have never been offered a doggy-bag. And that’s sad, because sometimes you simply cannot finish your meal. It is not because you don’t like it, but because you are full. But no, people don’t think it is nice and fancy. And absolutely not here in Copenhagen.

**Yes, and this is very strange.**

Yes it is, and it takes such a short time to offer it to the customer. So it is not because people don’t want to, but because of the negative sound of it.

**So it seems like you are experiencing that more people take a doggy-bag if you are proactive and ask them if they need one?**

Yes, and I suggest to them that they can eat it for lunch the next day. Because they don’t even think about what they can use these leftovers for. And another thing is that we use leftover food as staff food. The chef said that he never cooks extra food to the staff, he always prepares something from leftovers from the day before.

**So what about your suppliers, are they positive to the way you run this?**

So we only buy organic commodities, so they really value our concept. But I think that they would want us to purchase more food. They don’t tell us anything, but I don’t know their philosophy, but I guess they want to sell as much as possible. I don’t know.

**So do you receive miss out on quantity discounts from your suppliers?**

Well, we purchase very specific commodities. It has to be Italian and organic. And we only buy for our little restaurant. We do share on transportation costs with two other restaurants. But we don’t

buy a lot. But we have high costs with our commodities, because they are from small producers. Our products are not mass-produced. They are from small farms. It is like our wine, you cannot find it the shops. So we ask our supplier in Tuscany, if he can ship the meat to Verona. And then, when everyone does that, we send the products from Verona once a month.

**So this sounds like your dishes would be very expensive. What are your prices?**

A whole menu is DKK 350, for the small menu. So this is not a lot. And DKK 500 if you wish to have the 10 course-menu. But I mean, we don't spend money on many things that other restaurants spend money on. Our highest costs are commodities and staff.

**So when you reduce food waste, you actually reduce one of your two highest costs?**

Yes, precisely. Now it is around 6 months since we bought the new machines, but I think we earned back the money very fast, because there was no waste of food.

**So a 5-course menu for DKK 350, is that cheaper than a 5-course menu other places?**

You have Madklubben and Cofoco, these are two large chains, they have around 10 restaurants each here in Copenhagen. So they are really large, and they have 3 courses for DKK 250. But they have a different concept; everyone eats for maximum two hours, and then they have to leave, because they have three bookings per table per night. So they have kind of optimized their work, and they use students and other labor that doesn't cost that much. So we have a completely different philosophy. I guess our price is in the middle, but in other restaurants, you will not get organic food. It will cost the same, but it is not organic.

**So people are willing to pay for the organic food?**

Yes, precisely. At this become more and more apparent. And you see that if people pay more, we are able to use commodities of even better quality. We begin to think that we can do things even better. But we are new, so these things take time. It is better to build things slowly and quietly, instead of starting off with high prices, because then our guests would might negatively about us. So it should be perfect from the start. Now we had time to find a concept that works.

**So were there any other practices you do to reduce food waste?**

No I think these are the ones, that I wrote down.

**What about using a partner like Too Good To Go, is that relevant for Ché Fè?**

No, I was also thinking about that, but we don't have much to sell there.

**In the description of your restaurant for the Green Award, we read that you reuse your coffee grounds. Can you explain to us a about that?**

Yes, we have used them. It was actually because many our guests wanted our coffee grounds to use them as fertilizers. So we have saved our coffee grounds for those guests. And you can also clean your hands with them, and it makes your hands really soft. But that's because our guests ask us about it.

**But it's fun that they are engaged to it. So you have actually answered many of our questions now. But do you have any ideas for the future about what to do regarding food waste?**

Yes, so the chef says that he knows about many other restaurants that does not work with food waste-reduction. For instance, they use the ovens too strong, or they don't have a vacuum machine, or they don't know how it works. And he says that there is a lack of professionalism, they lack familiarity with these techniques to reduce food waste. This is his experience from when he has visited other restaurants and those other restaurants he has worked at here in Copenhagen. They just don't know. So it is mostly about knowledge. Because he says that "the more professional a chef is, the less food waste is generated". A very professional chef will not generate that much.

**So it is important to think about how to communicate this?**

Yes, because it takes so long time to explain it to the customers, it is not because it is difficult.

**But would it be possible to post information about your practices on your webpage?**

Yes, well we have a newsletter, but this is limited to our guests, not other restaurants. But it is possible that it could be on our webpage. And that wouldn't just be to share knowledge with our competitors, but we would inform potential future guests as well, and that's a good thing. It could be about food waste, how we use the vacuum machine and so on. That would just be positive for us, because the guest would like it, I think.

**So do your competitors come to ask you for advice regarding food waste-reduction?**

No, not that much with other restaurants. But our chef has some former colleagues, and when they have changed restaurant, they ask him about this. And then he comes to help them.

**It is kind of strange that other restaurants are not doing the same as you, because as you say, the benefits are pretty clear.**

Yes, it is. And it could be an idea to have a sort of consultancy service, where we came to advice other restaurants. That could be a very good business idea. You could come to the restaurant and ask about how much they spend on food waste, and how they can optimize it. There are a lot of money in the optimization of food costs. So I believe there is a big potential if a firm could consult other restaurants.

**We agree, and it seems like that's the direction we are heading, that people care more about this problem.**

Yes, and it is so important, because food is our number two largest expense, after labor.

**So do you know how much you have saved by reducing food waste?**

No, I don't have a number. But I know there was a large investment with the oven, and I will ask how much it cost. But I am 100 percent sure that it gives us benefits, because every day we have 60 guests. And with the vacuum machine, the quality gets better, because you prepare meat or fish on really low temperatures, so all vitamins and minerals are kept. And the prolonged life-time of the food. And it is more healthy to eat it this way. So we tell our guests that this method is a lot better. We tell them all the time. But this is also because when they take the meat, it is red inside, and the fish looks like sushi, because it is so natural and delicate. So the texture is almost untouched. So that's why we also have to tell them, because they might think they got sushi, or something. The meat is red because we don't cook away the color. It is the natural color of the meat.

**So does all this create any additional work for your kitchen staff?**

Well, you should remember that the meat requires 18 hours of cooking, so it needs some planning. They prepare a lot, but it is no extra work, because it cooks over night.

**But your chef, does he have a long education?**

Yes, very much. He has worked in a three-star Michelin star restaurant in Milan, he is Italian. So he has a lot of knowledge. And you can see that we have this book, a whole book only about this method of using the vacuum machine. So this explains everything about this method.

**It seems like you have many good things going on.**

Yes, we think so too. I don't know about the technical things, so I cannot tell you about that, but there are so many possibilities. But I will take you to the kitchen to look at the oven and the vacuum machine.

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...

*Tour of the kitchen to see the professional oven and the vacuum machine, and to meet the chef.  
Discussion not relevant for the interview.*

...

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So the chef told me that the oven and the machine is 12 000 Euros. But then you also spend around DKK 4-500 000 on commodities each month. So the machines are around one-quarter of an entire months commodity costs. It is not much compared.

**But what about the little food waste that you have, have you considered sending this to be transformed into biofuels or other similar biomaterials?**

Well, we only have bones, and then some packaging. So it is not really relevant for us.

**Okay. But do you pay for the waste management?**

Well, we sort paper and everything in the backyard. But we don't have much food waste, so we actually have to use our neighbor's bins, we don't have a separate waste bin for food waste, because we have so little. So we cooperate with the households in this street, and we are allowed to just throw it away in their bins, because it not much. So we don't need anyone to come to the

restaurant to pick up the food waste.

Thank you so much for this, you gave us a lot of useful information. Is there anything you would like to add before we finish?

No, I think I have said everything. Or, I think that we should become better at informing our customers, through the webpage or in newsletters. I don't think our customers know everything we do. We are very good internally in the restaurant, but not so much externally in communicating to the customer.

### **D3. Color-coding of interview**

We color-coded the interviews as a first step in the business mode-categorization, and to highlight claimed benefits and other interesting data.

The following codes were used: **Key resources**, **Key activities**, **Key partnerships**, **Channels**, **Benefits** and **Other**.

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Well, we have different technical methods. For instance, earlier, we just had a regular oven. But now, we have bought a **very professional oven**, which is almost like a computer. You can program for when it should start, how long it should cook and so on. So this oven can run all night, which makes also the **electricity cheaper** for us. So this also **reduces our electricity waste**. Furthermore, when you cook food in such professional ovens, **less water is lost from the product**. This means that the food is **moister and is kept longer**. So these new ovens are one thing. And then we have a method called **sous vide, it is a vacuum machine**. For instance, if you heat one kilo of meat in a traditional oven, 300 grams of this meat would just disappear. But when you put it in the sous vide machine, which uses very low temperatures, **no liquids are lost from the product**. So this is also **reduction of food waste**. And **you need to know these technical things**, these ways of doing things.

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had only a few guests.

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I can ask the kitchen. The professional oven was expensive I know, and the vacuum machine. But yes, these were large investments. I do not know the exact price, but let me ask. These are investments that you do, but they **also pay back**.

### **So the investment pays off?**

Yes, **you earn the money back a hundred times** over because you do not waste food. I asked the chef what it is they throw away, and he says they **only waste the bones**. **If he has meat leftovers, he will make stuffed pasta or cannelloni**, for instance, with those meat leftovers. **So if he has leftover food, he will use this is a different dish**. He does that a lot. And for instance, if he prepared too much main course, he can **use that food for the starters the next day**. He can serve it as carpaccio for instance, cold as a starter.

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And **we do not have a fixed menu**. But our menu card states that we have the commodities that we receive, and we offer 5 and 10 course menus. And that is what we offer. So we do not promise that we will have a certain dish next week, so that we have to throw away the other food. If we have leftover food, we use that also for next week. Many guests ask about our menu and what dishes we serve, but our menu just states that we have seasonal products.

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### **This sounds like a very smart concept.**

Well yes, but it is something that has developed. And it is also smart for us. It is much more financially sustainable for us to run the restaurant this way, with less food waste. It is a good model.

### **So do you experience any negative consequences, in addition to these positive ones?**

One thing is that we have to explain to our customers why we do not have a menu. If you do not explain this, some people might think this is a bit strange. So it can take some extra time to explain, also in e-mail, back and forth, because they do not understand. So that is a bit time-consuming. But now we have been here for five years, so now people start to understand. They can just show up and relax, just choose between 5 or 10 courses and that's it.

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Yes. And I have another thing. When guests leave food on their plates, because sometimes they are just too full. So then I ask them "do you wish to bring this food back home?". And then I pack it for them.

### **Like a doggy-bag?**

Yes, but a doggy-bag is a no-word, it sounds negative. But I tell them that their food is good meat, and it is sad to throw it away. And then they agree that it is stupid to throw it away, and they agree

to bring it back home. But like I said, “doggy-bag” has a negative sound to it. That it is for the bad leftovers. Some even say that “we don’t have a dog”. But I think, why should a dog eat something that you can for lunch tomorrow?

**Yes, doggy-bags have kind of a negative sound. And it seems like there are many restaurants that do not offer doggy-bags? What is your impression of this?**

Yes, I definitely agree. I have never been offered a doggy-bag. And that’s sad, because sometimes you simply cannot finish your meal. It is not because you don’t like it, but because you are full. But no, people don’t think it is nice and fancy. And absolutely not here in Copenhagen.

**Yes, and this is very strange.**

Yes it is, and **it takes such a short time to offer it to the customer. So it is not because people don’t want to, but because of the negative sound of it.**

**So it seems like you are experiencing that more people take a doggy-bag if you are proactive and ask them if they need one?**

Yes, and I **suggest to them that they can eat it for lunch the next day. Because they don’t even think about what they can use these leftovers for. And another thing is that we use leftover food as staff food. The chef said that he never cooks extra food to the staff, he always prepares something from leftovers from the day before.**

**So what about your suppliers, are they positive to the way you run this?**

So we only buy organic commodities, so they really value our concept. **But I think that they would want us to purchase more food.** They don’t tell us anything, but I don’t know their philosophy, but I guess they **want to sell as much as possible.** I don’t know.

**So do you receive miss out on quantity discounts from your suppliers?**

Well, we purchase **very specific commodities.** It has to be Italian and organic. And we only buy for our little restaurant. We do **share on transportation costs with two other restaurants.** But we don’t buy a lot. But we have high costs with our commodities, because they are from **small producers.** Our products are **not mass-produced.** They are from **small farms.** It is like our wine, you cannot find it the shops. So we ask our supplier in Tuscany, if he can ship the meat to Verona. And then, when

everyone does that, we send the products from Verona once a month.

**So this sounds like your dishes would be very expensive. What are your prices?**

A whole menu is DKK 350, for the small menu. So this is not a lot. And DKK 500 if you wish to have the 10 course-menu. But I mean, we don't spend money on many things that other restaurants spend money on. Our highest costs are commodities and staff.

**So when you reduce food waste, you actually reduce one of your two highest costs?**

Yes, precisely. Now it is around 6 months since we bought the new machines, but I think we earned back the money very fast, because there was no waste of food.

**So a 5-course menu for DKK 350, is that cheaper than a 5-course menu other places?**

You have Madklubben and Cofoco, these are two large chains, they have around 10 restaurants each here in Copenhagen. So they are really large, and they have 3 courses for DKK 250. But they have a different concept; everyone eats for maximum two hours, and then they have to leave, because they have three bookings per table per night. So they have kind of optimized their work, and they use students and other labor that doesn't cost that much. So we have a completely different philosophy. I guess our price is in the middle, but in other restaurants, you will not get organic food. It will cost the same, but it is not organic.

**So people are willing to pay for the organic food?**

Yes, precisely. At this become more and more apparent. And you see that if people pay more, we are able to use commodities of even better quality. We begin to think that we can do things even better. But we are new, so these things take time. It is better to build things slowly and quietly, instead of starting off with high prices, because then our guests would might negatively about us. So it should be perfect from the start. Now we had time to find a concept that works.

**So were there any other practices you do to reduce food waste?**

No I think these are the ones, that I wrote down.

**What about using a partner like Too Good To Go, is that relevant for Ché Fè?**

No, I was also thinking about that, but we don't have much to sell there.

**In the description of your restaurant for the Green Award, we read that you reuse your coffee grounds. Can you explain to us a about that?**

Yes, we have used them. It was actually because many **our guests wanted our coffee grounds** to use them as **fertilizers**. So we have saved our coffee grounds for those guests. And you can also **clean your hands** with them, and it makes your hands really soft. But that's because our guests ask us about it.

**But it's fun that they are engaged to it. So you have actually answered many of our questions now. But do you have any ideas for the future about what to do regarding food waste?**

Yes, so the chef says that he knows about many other restaurants that does not work with food waste-reduction. For instance, **they use the ovens too strong, or they don't have a vacuum machine, or they don't know how it works**. And he says that there is a **lack of professionalism**, they **lack familiarity with these techniques** to reduce food waste. This is his experience from when he has visited other restaurants and those other restaurants he has worked at here in Copenhagen. They just don't know. So it is mostly about **knowledge**. Because he says that "**the more professional a chef is, the less food waste is generated**". A very professional chef will not generate that much.

**So it is important to think about how to communicate this?**

Yes, because **it takes so long time to explain it to the customers, it is not because it is difficult**.

**But would it be possible to post information about your practices on your webpage?**

Yes, well we have a **newsletter**, but this is limited to our guests, not other restaurants. But it is possible that it could be on our **webpage**. And that wouldn't just be to **share knowledge with our competitors, but we would inform potential future guests as well, and that's a good thing**. It could be about food waste, how we use the vacuum machine and so on. That would just be **positive for us, because the guest would like it**, I think.

**So do your competitors come to ask you for advice regarding food waste-reduction?**

No, not that much with other restaurants. But our chef has some **former colleagues, and when they have changed restaurant, they ask him about this. And then he comes to help them**.

**It is kind of strange that other restaurants are not doing the same as you, because as you say, the benefits are pretty clear.**

Yes, it is. And it could be an idea to have a sort of **consultancy service**, where we came to advice other restaurants. That could be a very good business idea. You could come to the restaurant and ask about how much they spend on food waste, and how they can optimize it. **There are a lot of money in the optimization of food costs.** So I believe there is a big potential if a firm could consult other restaurants.

**We agree, and it seems like that's the direction we are heading, that people care more about this problem.**

Yes, and it is so important, because **food is our number two largest expense, after labor.**

**So do you know how much you have saved by reducing food waste?**

No, I don't have a number. But I know there was a **large investment with the oven, and I will ask how much it cost. But I am 100 percent sure that it gives us benefits**, because every day we have 60 guests. And with the vacuum machine, the **quality gets better, because you prepare meat or fish on really low temperatures, so all vitamins and minerals are kept.** And the **prolonged life-time** of the food. And it is **more healthy** to eat it this way. So we tell our guests that this method is a lot better. We tell them all the time. But this is also because when they take the meat, it is red inside, and the fish looks like sushi, because it is so natural and delicate. So the texture is almost untouched. So that's why we also have to tell them, because they might think they got sushi, or something. The meat is red because we don't cook away the color. It is the natural color of the meat.

**So does all this create any additional work for your kitchen staff?**

Well, you should remember that the **meat requires 18 hours of cooking, so it needs some planning.** They prepare a lot, but it is **no extra work**, because it cooks over night.

**But your chef, does he have a long education?**

Yes, very much. He has **worked in a three-star Michelin star restaurant** in Milan, he is Italian. So he has a lot of **knowledge**. And you can see that we have this **book**, a whole book only about this method of using the vacuum machine. So this explains everything about this method.

**It seems like you have many good things going on.**

Yes, we think so too. I don't know about the technical things, so I cannot tell you about that, but there are so many possibilities. But I will take you to the kitchen to look at the oven and the vacuum machine.

...

*Tour of the kitchen to see the professional oven and the vacuum machine, and to meet the chef.  
Discussion not relevant for the interview.*

...

So the chef told me that **the oven and the machine is 12 000 Euros. But then you also spend around DKK 4-500 000 on commodities each month. So the machines are around one-quarter of an entire months commodity costs. It is not much compared.**

**But what about the little food waste that you have, have you considered sending this to be transformed into biofuels or other similar biomaterials?**

Well, we **only have bones**, and then some packaging. So it is not really relevant for us.

**Okay. But do you pay for the waste management?**

Well, we sort paper and everything in the backyard. But we don't have much food waste, so we actually have to **use our neighbor's** bins, we don't have a separate waste bin for food waste, because we **have so little**. So we cooperate with the households in this street, and we are allowed to just throw it away in their bins, because it not much. So we don't need anyone to come to the restaurant to pick up the food waste.

**Thank you so much for this, you gave us a lot of useful information. Is there anything you would like to add before we finish?**

No, I think I have said everything. Or, I think that we should **become better at informing our customers, through the webpage or in newsletters. I don't think our customers know everything we do.** We are very good internally in the restaurant, but not so much externally in communicating to the customer.