

Norwegian Food Waste Policies

A Valuation Study

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Master thesis

TIK Centre for Technology, Innovation and Culture

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Norwegian Food Waste Policies:

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Abstract

This thesis investigates the legislation on food waste in Norway. Approaching this issue the thesis will introduce the concept of food waste through presenting a definition of the term, and looking at the social, environmental, financial and ethical perspective of the issue. Methods used in approaching the topic are discussed, including sources for data gathering, and valuation studies. Norwegian and EU policies on food waste are laid out, and both Norwegian and European initiatives combatting food waste are included in a separate chapter. The Norwegian efforts made by supermarket chains and social entrepreneurs are brought in to give insight into the Norwegian market place. The research question guiding this thesis is: How is food waste valued in Norwegian legislation?

The thesis found that there are no laws in place to ensure that only the minimum of what is considered food waste is wasted. The only policies affecting how businesses handle food waste spring from health and safety regulations. It is therefore up to the supermarkets themselves, motivated by CSR, the circular economy's thought process, promotional purposes, or something else entirely, to find solutions to lower food waste levels. The research conducted also found a lack of incentives and sanctions aimed at lowering food waste levels. This was surprising as both EU and the Sustainable Development Goals has clear long-term goals of significant reduction for the member states.

Key words: STS, value, valuation, food waste, circular economy, Norwegian legislation

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Oslo, 25 September 2017

List of abbreviations

| | |
|---------|--|
| CSR | Corporate Social Responsibility |
| EU | European Union |
| FAO | Food and Agricultural Organisation of the United States |
| FUSIONS | Food Use for Social Innovation by Optimising Waste Prevention Strategies |
| NFSA | Norwegian Food Safety Authority |
| SDG | Sustainable Development Goals |
| TMF | The Magic Factory |
| WRAP | Waste Reduction Action Plan |

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1. Introduction

1.1 Introduction to thesis

In recent times food waste has gone from being a non-issue to a widely acknowledged and serious problem. In many ways food represents what's wrong with western consumer culture –a culture of abundance and high spending. It is also a good representative for many of the current environmental issues – being global, with big and unintelligible goals, and a far reaching perspective that is hard to visualise. Initially, what made me curious about food waste legislation in Norway, was my lack of overview on the topic. I had observed recent advances in legislation in Italy and France and was curious to investigate what the status was in Norway; whether Norwegian legislation is strict or lenient, clear or vague, extensive or non-existent. I wanted to focus on Norway as whole, not a city or region, as my interested was in the national policies. My main reason for focusing on food waste behaviour in companies, rather than in homes or at production stage, is that I think that the way supermarkets are ran is a good representation of society today, both in terms of product choice, business model and waste handling. The research question shaping this project is: How is food waste valued in Norwegian legislation?

Other questions I am looking at, include:

1. What policies affect how Norwegian supermarkets handle food waste?
2. What is the impact of food waste legislation?

In which ways policies affect food waste is crucial in order to understand the food waste issue itself, both when it comes to what commitments it requires from the food industry, but also what commitments and demands it shows from authorities. Policies are good indicators to where priorities lie. Inspired by valuation studies (and works by Bush, Dewey, Geiger, Latour, McGilvary, Muniesa, Picard and Prall), I will look at valuation in context with food waste -this is vital for this study as the food waste issue is

really about how it is valued. Evaluating the impact legislation in the field has, is important in understanding the weight of both the presence and lac of proper legislation.

This thesis is meant to contribute to three discussions: firstly, on a more general debate around food waste. Secondly, on a more specific discussion about Norwegian food waste policies, hence the project title; *Norwegian Food Waste Policies: A Valuation Study*. Thirdly, to shed light on how food waste is valued in Norway. The goal of this thesis is not to offer a full overview of everything researched and documented about food waste in Norway or abroad, nor to produce a compilation of Norway's laws on food waste, or do a detailed analysis of them. The goal was to get an overview of the food waste issue in Norway, through looking at regulations that affect how supermarkets deal with food waste, and doing so by observing how some companies in the food sector value food waste. I was interested in discovering if Norwegian food waste policies reflect the sense of urgency and emergency that is present in the media (regarding resource scarcity and climate change).

From early in the project I decided to avoid looking at food waste generated in production stage, transport or consumer level, as well as packaging. Although these elements are relevant and closely linked to the food waste issue, I found it necessary to focus my approach. It was quickly established that the focus would be on Norway and policies affecting the food industry, and that supermarkets would be an interesting focal point (they deal with food waste on a large-scale, daily). The idea was that Norway would be an interesting starting point for the wider discussion on food waste, as it is one of the richest countries in the world; how is a country that is doing so well financially tackling food waste? And does the fact that the country is rich, developed and well educated, mean that they are ahead of the rest? One of the aims of this project was to discover if Norway was making an effort in the field of food waste, and to use what others cities and countries are doing successfully, to highlight this.

This thesis will include points and perspectives that I deem relevant for the thesis title and angle, and is based on a closed definition of the term food waste (presented later in the text). I will look to two Norwegian food retailers to see how they approach the food waste issue. I have also chosen to include research on a few social entrepreneurs, with

the potential to change the way we treat food waste, for perspective sake. I chose Kiwi and Meny to represent Norwegian retailers, not only because they are two of the largest supermarket chains in the country, but also because of their efforts in reducing food waste in store. FoodFarm, Marked.no and The Magic Factory were included to represent social entrepreneurs in the field. With a different outset and mind frame than the traditional stores, the social entrepreneurs have real potential to disrupt and change the way food waste is thought about and handled. Making food waste a central part of their business model, they are reshaping the concept. In contrast to the supermarkets, they are more dependent on technology and use smart digital solutions as the basis of their existence. The Magic Factory e.g. is world leading in what they do, and is a prime example of how food waste can be utilised, even in the last stages of the food waste hierarchy.

Reports that have been of particular benefit for this thesis includes the *Matsvinn og Matavfall i Norge* (2015) report, published by NILF (Norwegian Agricultural Economics Research Institute), *The ForMat Project Final Report 2010-2015* (2015), *Date Labelling in the Nordic Countries: Practice of Legislation* (2015), and the FAO report *Make #NotWasting a Way of Life* (2016). The first three had more impact on this project, than the last one, as they come from a Norwegian standpoint. Most of the data in this study is collected from secondary sources. The compilation of the information from secondary sources together with the project angle, the analysis and the interviews is, however, original. I have not been able to find any similar studies of Norwegian food waste policies (neither with nor without the valuation perspective). This text therefore has the potential to serve as an original study of the food waste state in Norway –from a regulatory standpoint.

In this text, I am approaching the food waste issue from a legislative, and Norwegian, perspective. This is done in the following order: I will introduce the concept of food waste, before introducing the methods used approaching the issue. Introducing valuation will be a part of this chapter. Policies (both Norwegian and European) will be introduced in chapter four. Following this, I will introduce initiatives that are making noteworthy efforts in the field. In chapter six, the Norwegian market and efforts are in focus, shedding light on how Norwegian supermarkets and social entrepreneurs are

approaching food waste. The circular economy will also be brought up in this section. Lastly, the conclusion follows with key takeouts and next steps.

1.2 Introduction to food waste

The world population is growing fast with the global population expected to reach 9.7 billion in 2050, according to UN estimates (2015). For the first time in history, more people are dying from eating too much than eating too little, half of humankind is expected to be overweight by 2030. Today, more people die from old age than from infectious diseases, thanks to the unprecedented achievements in medicine. Never before has the world been more healthy, prosperous and harmonised (Harari, 2017). Still, 795 million people are starving, with one in three suffering from malnutrition (World Food Programme, 2017), and a third of the food produced globally being discarded (FAO, 2017). According to FAO estimates from 2017 food losses and waste accounts for roughly US\$ 680 billion in industrialised countries, and US\$ 310 billion in developing countries. One of the biggest challenges civilisation is facing, with the growing population, is food security. While overconsumption and staggering levels of edible food is being thrown away in some parts of the world, other parts are struggling with malnourishment and undernourishment. The numbers don't add up.

It is well known that the global food system produces an enormous amount of waste (Parfitt, Barthel and Macnaughton, 2010). Current waste management is inefficiently managed across borders, causing waste to arise in every part of the supply chain, sadly including the final steps (on supermarket shelves and in homes). The further down the chain an item is wasted, the greater the loss, in terms of value and natural resources (Adenso-Díaz and Mena, 2014). Reducing food waste levels is a win-win, benefiting the environment (through freeing up land and other resources, reducing emissions, reducing landfill levels etc.), reducing financial costs, and having positive social impacts (the potential to feed more hungry people, and fighting inequality).

Since the industrialisation, modernisation and globalisation of the food chain, food has developed from being a local product, of limited quantity and availability, to being the opposite. In world of scarcity (where few resources are available), caution is taken when handling what you do have, i.e. you consume food before it expires, you don't buy

what you don't need, and you take care of what you have. In western society behaviours linked to scarcity have been switched with high living standards and a careless attitude to food, leading to food waste. In industrialised countries food waste is mainly caused by overproduction, strict product standards regarding appearance, consumer behaviour and faulty laws regarding food safety (mainly in labelling and packaging) (Lucifero, 2016).

Across the world food waste is approached from different angles. Some cities and countries have enforced strict laws affecting every part of the food chain, or just one particular. Others are operating without either. There are unsuccessful as well as successful examples of both. In this thesis the focus will be on Norway.

2. Food Waste

2.1 Reducing food waste

In an infographic published by FAO (2016) named *Make #NotWasting a Way of Life* the numbers presented paints a bleak picture for the global environmental: Europe and North America are the biggest sinners, wasting 95-115 kg of food waste per consumer, on a yearly basis. The numbers are 6-11 kg in sub-Saharan Africa, South Asia and South-East Asia. At what stages the majority of food loss occurs, differ from developing countries and industrialised countries. In developing countries 40% is lost during harvest and processing, while industrialised countries see the same number lost at retail and consumer level (foods that get damaged during transport, that never gets picked up off of supermarket shelves, or wasted by the consumer, comes on top of that).

The social perspective

The estimated 2.8 trillion tons of food that is thrown away is enough to feed 3 billion people (Rupp, 2015). The coexistence of food waste, starvation and malnutrition is one of the greatest paradoxes and absurdities of our time. It is disheartening and unsettling to try to make peace with the fact that parts of the world is living in abundance - overeating has become a bigger problem than famine in most countries (Harari, 2017)- while other parts don't have access to basic needs, like safe and nutritious food. Today, the food industry is linked to obesity, and diseases connected to overeating (in first world countries), and starvation, lack of access to food and diseases linked to malnourishment (in third world countries). As these links exists between food and social issues, the link also exists between food waste and social issues. More than half of the people starving today are people living in poverty, typically small-scale food producers that are hit the hardest by climate related catastrophes. The climate changes 3rd world countries are facing, are on the 1st world countries' consciousness (Helgesen, 2015).

Families with kids, and young adults get most of the blame for the shopping bags of food thrown away on a monthly basis. The richer and better educated we are, the more we throw, a fact that doesn't put the average Norwegian in good light (with a highly educated population and the average yearly salary being around €55.000). Full pockets and time shortage is a bad combination (Kiwi, 2017). Customers are pointing fingers to the large corporations, to the producers and to the supermarkets, while at the same time expecting constantly fresh food and a sea of options, throughout the day, at the local supermarket. The stores are meeting demand, giving customers crispy salad, freshly grilled chicken wings and seasonal product (e.g. gingerbread cookies and Easter eggs), and are left with the responsibility and blame for the produce that no one bought, not even at 50%, because no one wants Easter eggs in June. The supermarkets want to display fresh and appealing products (that is the market requirements today), ending up continuously raising customers' expectations, making customers unwilling to buy salad or plums with even the slightest defect (Food Sustainability Index, 2017a). I don't know if intelligent infrastructure and well calculated sales predictions can foresee how much tomatoes, cereal bars or baked goods are going to be sold on an idle Tuesday in August.

The environmental perspective

The dramatic effects of climate change are increasing incentives to reduce carbon footprint, and unnecessary strain on the environment. A reduction in food waste seems like a both necessary and obvious action. Close to 50% of the usable land (desert, tundra, rock and boreal areas are factored out) is already in pastoral or intensive agriculture (Tilman et al., 2002). Close to 30% of agricultural land currently occupied for food production produce food that doesn't feed anyone (FAO, 2016). In Norway, eliminating food waste would free up 20% of the country's agricultural land, and feed 785.000 more people than today, cutting unknown amounts of CO2 emissions from production and transport (Lindahl, 2016). Food waste is the origin of major CO2 gas emissions in the whole value chain, from production, processing, distribution, and sale to waste handling -10% of the CO2 emissions from food production in first world countries is caused by food waste (Helgesen, 2015). The largest environmental effects is linked to production -such as methane from livestock and gas from use of nitrogen

fertiliser. Food in landfills emits methane, which as a greenhouse gas is 21 times more potent than carbon dioxide (Cohen and Esroff, 2015).

The financial perspective

Besides the social and environmental perspective there is a strong financial perspective that should be convincing. A good example is the Norwegian dairy producer *Q-Meieriene* that started to reduce their food waste through an internal project in 2012. With the goal of reducing their waste product from 1,8% to 1%, they ended up reducing it to 0,6% in one year, through cooperating among an interdisciplinary team, saving 1,3 million litres of milk a year (matsvinn.no, 2013).

The estimated potential saving from homes, if private households reduced their food waste by 20-50%, is US\$120-300 billion (Helgesen, 2015). Besides the plain financial benefit of saving money, having food waste strategies and doing efforts to minimise food waste benefits a company through a good brand image. The engagement around responsible production and sustainable products has increased in recent years. Customers, especially in western countries, are asking questions about the provenance, environmental costs and ethical consequences of the food they buy (NorgesGruppen, 2017b). The expectations customers have in relation to companies behaving ethically, responsibly and environmentally, are pushing companies to become environmental frontiers. The European Commission (2017) defines Corporate Social Responsibility (CSR) as companies having a legal, social, environmental, and ethical responsibility, that goes beyond profit and a financial perspective. Regulations aren't always in tune with what people or the market wants (NorgesGruppen, 2017b). CSR is taking responsibility where legislation isn't sufficient. Although a thoroughly positive thing (for the community, society and the environment), I argue that CSR also can be viewed as a marketing strategy, with financial incentives.

The ethical perspective

Food waste is increasingly a matter of national and international concern, due to the detrimental harmful effect on the environment, the economy, and to society. From an ethical perspective, food waste is inexcusable and unjustifiable. It might not make a

direct difference to food insecurity in low income countries when food waste in medium and high income countries is reduced, but it does free up resources, like land and water, for others to use (Bagherzadeh, Inamura and Jeong, 2014). Gjerris and Gaiana (2014) points out two reasons why food waste is considered an ethical issue: additionally to wasting resources, it is viewed as detrimental to the environment. Looking at the ethics of food waste, the current human-nature relationship in many cultures raises questions about our relationship with food, and food waste; how did it become socially acceptable in some cultures to throw edible food? How did something edible get transformed to something inedible? Or rather, when does a devaluation of food lead to food waste? Investigating these questions would make for an interesting study in its own right.

My research indicates that there are mainly two factors that devaluates foods in supermarkets, from an edible entity, to something only worthy of the trash. First, labelling has a part of the blame (I will get back to this in chapter four). Many customers don't understand the labelling (three in five report they don't understand the correct meaning of the "use by" label, and over half misinterpret "best before")(Food Sustainability Index, 2017a). Approaching expiration date puts time restraints on the stores, pushing them to either reduce the price of the item in a hope that it will sell faster, plainly hoping it sells before the date is reached, or donating the food to charities. The second point is unrealistic aesthetic market expectations and demands. Consumers today have become accustomed to red apples of a distinct shape and hue, and bananas in an easily recognisable shape and size. Modern production has streamlined our choices, from the 7.000 types of apples grown globally (Brachfeld and Choate, 2007), and the over 1.000 banana varieties (Banana Link, 2012), to typically a couple presented in the fruit isle at your local convenience store – all with the same aesthetical characteristics. When something doesn't fit with what consumers have come to know as " a typical" apple or banana, it is discarded, either by the farmer (the supermarkets have product standards regarding produce appearances that the farmers have to meet), by the supermarket itself (when produce goes bad during transport, storage or on the supermarket shelf), or in customers' homes. In other words, valuation of food waste relies heavily on appearance, where binning the product due to aesthetically perceived flaws, cause a devaluation of the food, turning a food product into food waste. Changing cultural norms is also a factor. There used to be traditions regarding how to store food,

to make dishes out of food scraps and leftovers, and to not buy more than what one needed. In modern, western society today, these traditions are forgotten (blame wealth, abundance, or looser family bonds). Another aspect is the lack of commitment to the issue from the government and the EU. The blurry and unspecific demands and suggestions from the authorities are setting the tone for everyone to follow. In the end, if the authority doesn't deem an issue important –why should the citizens think otherwise? Guidelines in place of a proper regulatory framework, is in my opinion disgraceful, considering the environmental food print food waste has. Other factors undeniably play a role, but these appear to be the major offenders, in turning food into waste.

2.2 Food waste definition

In the absence of a harmonised definition and understanding of the concept and terminology, *food waste* takes many different shapes and forms around the world. Despite the heterogeneity of the concept, various, and sometimes contrasting, words are being used in reference to food waste and food loss, such as surplus and by-products (Díaz-Ruiz et al., 2015). The distinction between these terms is crucial: There is no legal definition of surplus food, but it is typically used to refer to overproduction from manufacturers or producers, or about foods that are deemed unfit for the retail market, either due to manufacturing errors -damage to products during handling or storage- or flopping in the marketplace (Tarasuk and Eakin, 2005). By-products refer to food generated by the food industry during production phase -such as carcasses, blood, whey, shells and seeds (Helkar, Sahoo and Patil, 2016). Both terms refer to specific parts of the food chain, while food waste (as explained later in this paragraph) only include the edible food waste (surplus food is included in this term, by-products are not). The lac of a coordinated understanding of the term creates difficulties when looking at data and comparing data sets, as different factors are included and excluded by different actors, resulting in literature without meaning. Ketil Stoknes (2017), project manager at the biogas plant The Magic Factory (TMF), describes food waste as a by-product with the potential to be recovered and turned into new products (e.g. additives in other products). I this project I have based the understanding of food waste on FUSIONS' (Food Use for Social Innovation by Optimising Waste Prevention

Strategies) (2014) definition: “Food waste: is any food, and inedible parts of food, removed from the food supply chain to be recovered or disposed (including composted, crops ploughed in/not harvested, anaerobic digestion, bio-energy production, co-generation, incineration, disposal to sewer, landfill or discarded to sea”. I will get back to explaining what FUSIONS is about later in the text. Stoknes (2017) points out that *waste* is an outdated word, as it indicates something being useless. The industry, and people outside it, continues to find new and smarter ways to use food waste to make new products that prevents it from leaving the food loop (read about the circular economy in chapter six). Food waste can be turned into animal feed, bio-fertiliser, and biogas, among other things, which I argue makes food waste far from useless. Words and terms matter, and calling it *food waste* gives the wrong impression. I strongly encourage authorities to agree on a more appropriate synonym. But until then, I will use the term *food waste* in this thesis (referring to edible food waste -excluding inedible part such as bones, egg shells, banana peel etc.).

Jens Måge (2017), from Waste Management Norway (Avfall Norge), divides food waste into two groups: residuals from food, not suitable for human consumption (e.g. cut offs from fruits, vegetables, meat and fish), and left overs that should and could have been eaten by humans. In the report *Matsvinn og Matavfall i Norge* (2015), food waste is categorised in three groups, separating unavoidable and avoidable food waste:

- I. Edible food (avoidable waste)
- II. Not edible food (unavoidable waste)
- III. Possibly usable food (possible avoidable waste).

The first group is produce that should have been eaten, that’s neither expired, unsafe nor undesirable, for any other reason. The second group includes products that aren’t inedible, but that often due to cultural norms are not consumed, like potato skins, bread crusts, etc.. The last group is mostly inedible parts such as bones, eggshells, banana peels etc. (Adenso-Díaz and Mena, 2014). Another important aspect of the term *food waste* is its separation from the term *food loss*; while food loss refers to food lost during the starting point of the food chain (e.g. during harvest, production, and processing) (FAO, 2012), food waste occurs at the end of the food chain, at the consumer and retail level. Food loss is more prevalent in the developing world (mainly due to unfavourable

climatic conditions and infrastructural issues, such as lack of cooling facilities and inadequate storage facilities), than in industrialised nations, and richer nations have a higher per capita rate of waste (in poorer countries people can simply not afford to waste food) (Royte, 2014). Food loss is considered involuntary waste (decreased food quality making the food product unsuitable for human consumption due to external factors), by contrast food waste refers to losses caused by behavioural issues (due to negligence, or by conscious decision) (Lucifero, 2016).

2.3 Stages of food waste

Waste management used to be about pollution prevention. Today, it is a more holistic approach, since realising the negative environmental, social and financial implications improper waste management has (Papargyropoulou et al., 2014). Food waste is categorised into more and less favourable stages, as shown in the food waste hierarchy (see figure 1).

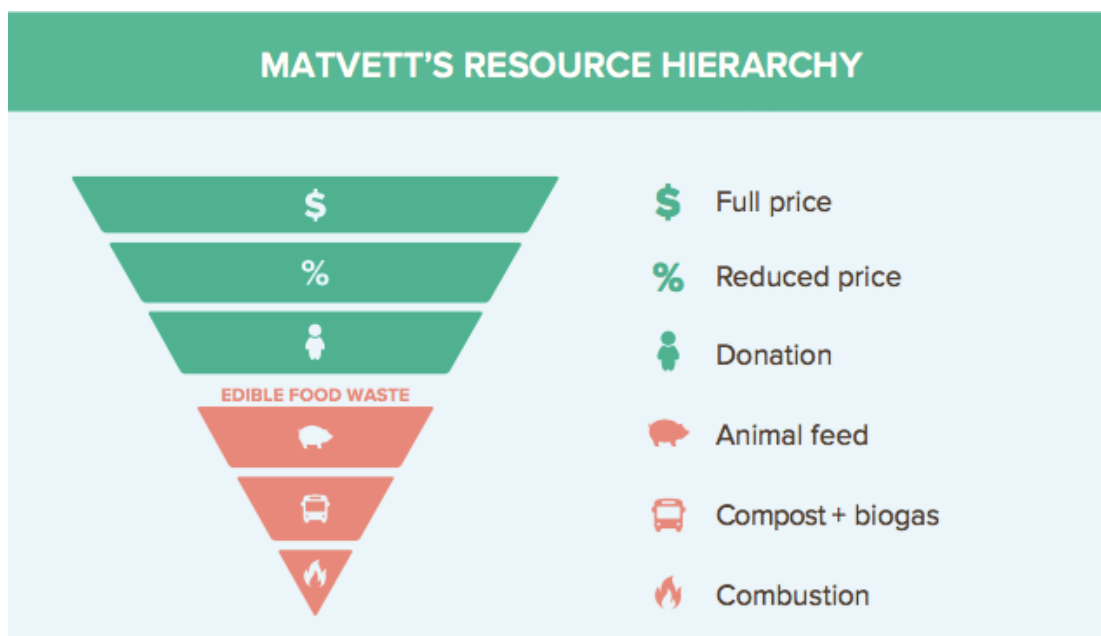


Figure 1: Food waste hierarchy by Matvett (2015)

The hierarchy places the most favourable solution (the most valuable stage) at the top, and the least favourable (least valuable) at the bottom, according to which solutions

have more desirable environmental and economic outcomes. There is a large financial difference from the top stage, to the financial loss at the bottom. The top half is food waste suitable for human consumption, while the bottom half contains food waste considered unsuitable for humans (Capodistrias, 2017). The first and best strategy to reduce waste is to prevent waste in the first place (Papargyropoulou et al., 2014). The second stage is also about prevention, reducing the price of goods approaching best before date. In other food waste hierarchies the second step also includes re-use, where a product, e.g., chicken, that didn't sell as raw, is cooked, and then attempted sold again. Matvett's third stage is donation. Donating to charities or food banks is a great way for companies and producers to get surplus food and food waste off their hands. On the composting and recycling stage there are several alternatives that can lead to by-products, through reselling the produce to the producer, or re-using it, e.g., through animal feed. The next stage is energy recovery. Here, unavoidable food waste is converted to compost and biogas. The least desired, last resort in the hierarchy is disposal of the product through combustion.

The majority of efforts in reducing food waste have focused on recycling, which is at the bottom of the hierarchy. Assigning larger efforts on levels higher in the hierarchy are more difficult to measure, but also has larger potential gains in terms of positive environmental impact (Mourad, 2015). It is important that the priority of the food waste hierarchy is the foundation of legislation in the field, in order to get the best use of resources, both from an environmental and economical perspective.

3. Approach & Method

3.1 Method

Early in the project I decided that the methods I wanted to use, were interviews, data collection and analysis, and document analysis. The main reason I chose data collection, is the vast information already available on food waste. I regarded it as the more resource effective approach to utilise the existing information. I decided to add interviews for further insight. The body of literature I have based my research on, draws on several fields, mainly focusing on STS debates, valuation studies and environmental studies. Drawing information from separate fields has the potential to shed new light and insight on the issue. Sources include books, reports, thesis work from recent graduates, articles, podcasts and policy documents, that are produced both privately and by governments, by big and small companies, from local, national and global sources.

Initially, I planned to only include interviews with a couple of supermarkets, before determining it would give a more holistic image to also include interviews with other companies that also deal with food waste. The interviews I conducted were performed face to face, or over telephone when meeting face to face wasn't feasible. In this project, interviewing was a supplementary method of data collection, not the primary one. The interviews were chosen for their qualitative qualities, bringing personal observations by professionals in the field to the table, but also for the opportunity to bring new insight to light. One of the advantages of interviews is the flexibility they offer, allowing for further investigation and questioning when unexpected or interesting findings occur. The interviews conducted were semi-structured; containing questions asking for a definition of food waste, how the company the interviewees were working in are combating food waste, and what regulations they have to pay attention to. Furthermore, the interviews contained open-ended questions leading to additional, unforeseen information being discovered. As the interviewees had different positions in the companies they represented (ranging from CEOs, to marketing coordinators and

projects leaders), and because the companies were dealing with food waste on different levels, not all questions were relevant for all situations. The interviews were therefore adapted accordingly.

Using published data has obvious benefits, like the availability of high quality data, and low spending of resources (especially if considering national statistics, where data typically cover a high percentage of the population) (Franke et al., 2016). The examples from other countries brought forward in this project are not included for comparison sake, but to let them act as stand-alone examples of positive initiatives in the field. There is a vast amount of data on food waste; including national statistics, statistics from waste collectors, scientific reports, books, articles, self-reported numbers from companies, research conducted by ideal organisations, and environmental costs calculated in emission numbers, to mention a few. Important references for information for the project includes Food and Agricultural Organisation of the United Nations, the FUSIONS project, as well as Norwegian sources such as the ForMat project, the Norwegian Agricultural Economics Research Institute, Ostfold Research and Matvett.

3.2 The issue with data

Data do not simply exist; they are created. They are an interpretation of the world (that in itself should be interpreted) and they represent the world (Sebastian-Coleman, 2013). The technical difficulty of acquiring reliable data and comparing different data sets is colossal (Asdal, Brenna and Moser, 2007). The Oxford Dictionary (2017) defines data as “facts and statistics collected together for reference or analysis”. What is between the lines in this simplified definition, is the set of choices made in every step of collecting that data, which ultimately changes and angles the data. The choices are made to represent reality in a certain way. Underlying these choices are the assumptions that constitutes reality for the person, company or authority collecting the data. A data set is one way of representing reality, one of many, and the decision about which characteristics in a source to represent, can be both conscious and unconscious, as can the reinterpreting of the data. Noise, such as lack of clarity or understanding of the data, creates another layer. Data go through different stages before being presented to an audience. With any data set it is crucial to understand the expectations and intentions behind the data source (Stenmarck et al., 2016). Blurry data, inconsistency and

shortcomings all pose serious threats to the weight of a data set, on the same level as lack of data does.

Data availability is one of the obstacles when looking at food waste. Despite the large amount of information about food waste, in both printed records and online, there is no cross-industry-standards, or guidelines that are followed. The result is data that is unreliable and incredibly difficult to compare, due to different factors of measurement, different understandings of terms etc.. Since reporting of food waste data is not required by law, the actors that do collect and make their data available to others, are most likely doing so due to CSR, or potentially because they think the data makes them look good. In the reports and data available the actors producing the different numbers don't include how different factors and levels were calculated, what was included and excluded, and the original data set. Another challenge is that measuring and working to actively reduce food waste is a relatively new concept for most companies, meaning there aren't any data available from 10, or even 5, years ago (there are exceptions). If a third party, with clear guidelines and a mutual understanding of terminology in place, was in charge of data gathering, the data would be both easier to access (today it is scattered around the web and in numerous reports and science papers), more comprehensive, and probably more likely to be truthful. Despite positive initiatives in recent years in Norway, there is a lack of historical foundation for comparison, accompanied by the lack of a unison definition and understanding of how to, and what to, measure. Comparing data from one supermarket to another, or between two or more food companies was therefore out of the question for this thesis. I decided that the angle should rather be an explorative study of food waste policies, with a particular focus on those affecting Norwegian supermarkets.

3.3 Valuation and food waste

I chose to use valuation as a theoretical framework when looking at food waste for several reasons; aside from being empirically relevant and important, I find it theoretically interesting. The research area of valuation studies consists of many fields; sociologists, economists, marketers, STS researchers, and anthropologists among others. Between them they share questions, hypotheses, ideas, discussions, and empirical results (Kjellberg and Mallard, 2013). The wide range of backgrounds,

academic knowledge and perspectives brings depth and width to discussions in the field.

When looking at food waste, valuation studies seemed like a logical approach, as regulations, attitudes and behaviour around food waste are hugely based on how we value food waste: whether and to which extent we think food waste has value, and if we think it is okay to waste food (or not). In studying the social practice of valuation, we are dealing with the result of social construction. Culture and money are huge influencers to how we treat food waste. At the same time, both the absence and presence of government policies set standards, telling companies and the society what the value is – and if something has value (lovdata.no, 2017). If we understand the values in place, we might get a better understanding of why edible food is discarded, which food we might be able to save, and what measures to put in place (Helgesson and Muniesa, 2013).

Valuation studies are about studying what is desired or cared about. This depends on whether people go from immediate, often unnoticeable valuations to more reflexive ones, asking themselves “is so and so worth this or that amount?”. Everyone gives everything value, at all times. But when managers or engineers, e.g., ask this question, economic value is what they are looking for (Vatin, 2013).

Numbers are very revealing when it comes to giving something value: What are the available numbers? Who collected them? What do they show? And what do they hide? The Food and Agricultural Organisation of the United States (FAO) is working towards food security for everyone, towards eliminating hunger and poverty, and sustainable management of natural resources. One of FAO’s main activities is sharing critical information about food, agriculture and natural resources (FAO.org, 2017). Because of this -and the size of the organisation- FAO’s numbers, aims and reports matter. FAO’s *Make NotWasting a Way of Life* report from 2016 clearly shows their engagement in food waste:

- Food loss and waste consumes 21% of all fresh water, 19% of all fertiliser, 18% of cropland and 21% of landfill volume.
- Safe and nutritious food that is lost, discarded and wasted, can feed some 2 billion people, or more than double the number of undernourished in the world.

- Around the world 1.4bn hectares of land is used to produce food that is ultimately wasted –an area greater than China.

In this small selection of numbers the weight is put on what food waste is costing society; the cost on wasted resources, land, and on hungry and undernourished people. It would be interesting to investigate their measuring criteria and tools used for this report in a separate study.

The meaning of the term *valuation* lies in how an object is referred to (Kjellberg and Mallard, 2013). It is a social construction (Fourcade, 2011), where the value or values of something is established, negotiated, provoked and maintained (Doganova et al., 2014). Because it is the outcome of a social process it not something that a thing just has (Muniesa, 2012) -values change, conflict, overlap, and contradict each another. One item can have many and various values, e.g. something labelled food waste by one actor can be valued as edible food by other actors. The value of an action or item will vary from individual to individual, from one group of society to another, and from one country to another. Food waste will be valued differently depending on who is valuating it, and the setting (Helgesson and Muniesa, 2013). The French dictionary *Dictionnaire Alphabétique Et Analogique De La Langue Française* by Paul Robert from 1966 provides two definitions of valuation:

To evaluate; To (precisely or approximately) estimate (appraise, calculate, appreciate, estimate, judge) the value or the price of something.

To valorise; To produce an increase of market value, to increase the price or value (Vatin, 2013).

Although also a collective effort, 'value is subjective; it is based on individual human experience' (Dewing, 1941). As I have my image of the world -my beliefs, moral, and preferences- you have yours, making valuation a difficult topic to both discuss and depict. Adding to this, valuation is influenced by time, place, history and culture (Haavardsholm, 2015).

As with everything else, food waste is inscribed with a particular value, an assumed market value. This is done through price (what it costs to get rid of it, or to buy it), the

regulatory framework (if there are laws to how to treat it, how clear the laws are, if the laws are enforced etc.), how it is handled, through association (what it is associated with) and choice of words (what it is refer to as, and what is associated with those words). Value is strongly associated with economic value (Kjellberg and Mallard, 2013), but food waste is also inscribed with values from various other perspectives and fields; like environmental, social, political and technological fields. Values are present in the entire value chain for food, involving and evolving with everyone participating in the process. Everyone in touch with it, from production to the supermarket shelf, puts a value on it. They use their personal history and knowledge, their culture and expectations to project their subjective opinion, through objective expectations to the product (whether it is to the label, a product category, the place of origin, the color, texture etc., e.g. how an apple is “supposed” to look). The value a farmer puts on his produce dictates to what price and to whom the produce is sold to, which depends on the money, time and effort the farmer put into it. What price the farmer gets is influenced by market prices, the amount of the given product already on the market, margins, the quality of the product, the time of the year, etc.. What supermarkets are willing to pay for produce depends on the same variables, including the buyer’s own value perception of the produce (that depends on all the factors mentioned above, plus more).

Today price (money) is an important valuation tool when understanding what something is worth. Eggs that are free range cost more than eggs that are not. Eggs from ecological farms cost more than eggs from non-ecological farms. This has not only to do with the fact that it is more expensive to produce eggs that are free range and ecological (in terms of more space per chicken, different feed etc.), but also about the market’s perception of these products being better (from the perspective of the quality of the animals’ lives, to an environmental perspective), and therefor being willing to pay more.

In an article valuing *good tomatoes* Heuts and Mol (2013) argue that a tomato has five registers of value: 1) Money 2) Handling 3) Historical time 4) What it is to be natural 5) Sensual appeal. There are various processes the tomatoes go through -from its seed stage to eventually, ideally, being eaten- that changes its value; including how it is packaged, cooked and eaten. In the process of understanding the value of a good tomato so-called *tomato experts* were interviewed. The expert panel included a selection of

developers, growers, sellers, professional cooks and so-called consumers. In short anyone who handles or eats tomatoes, was considered an expert, highlighting the difficulty of valuating any object –everyone values everything. In this case of the good tomato, being valued as good, ultimately finished them off (they are eaten).

In 2013 the food industry threw away food waste with a retail value of at least 6 billion NOK (Matsvinn.no, 2013). In the EU, food waste is estimated to 89 million tons yearly (European Parliament, 2016). Food waste is expensive. In the US food waste worth \$165 billion is thrown away every year (equivalent of the US government’s spending on education, homeland security, agriculture, commerce and energy combined, in 2013) (Bloom, 2016). The lack of serious responses from the government, supermarkets and consumers, indicate a sense of apathy, ignorance, and a lack of understanding. When food waste is discarded money is discarded (food waste is food, food costs money i.e. food waste is money lost).

In the following chapter, the focus will be on the regulatory framework that affects how the industry handles food waste. Additionally to introducing Norwegian legislation and EU legislation, the chapter also includes a section on labelling. The initial thought was to exclude *labelling* from focus. This was before I learned that labelling is the only concrete example of legislation that supermarkets have to pay attention to that is linked to food waste, besides the health and safety regulations from NFSA.

4. Regulatory frameworks

4.1 Norwegian food waste policies

Norway follows EU guidelines, through the EØS agreement, when it comes to food safety for the food sector (including food waste), and food production (including farming and fisheries) (The Norwegian Government, 2015a). Besides the voluntary initiatives and agreements (I will get back to them later), there are no guidelines steering how Norwegian corporations handle food waste. One of my main questions when starting the work on this thesis was: “What regulations impact how Norwegian supermarkets handle food waste?”. When it became apparent that there is none, the question changed to: “How is food waste valued in Norwegian legislation?”.

Matsvinn og Matavfall i Norge (2015) gives an overview of the Norwegian numbers on food waste, based on documentation from authorities and the industry. It describes what food waste is, where in the food chain it arises, what the causes are and the environmental consequences. The Norwegian government and the industry’s engagement are presented, and a few research projects are introduced (Helgesen, 2015). The text states that the national goal regarding food waste in Norway is for the growth in food waste to be lower than the economical growth. There is an obvious challenge here, as economic growth typically leads to increased production, increased spending and increased food waste levels. An increase in living standards means bigger homes, more frequent redecoration and rebuilding, and less meal planning, i.e. increased waste accumulation. This goal is in other words heavily challenged from the get go.

In the same report it says that reducing the amount of food waste has been a priority in the Norwegian waste strategy; to strengthen and expand cooperation in the food industry to reduce food waste. It is hard to see the weight or seriousness of this in any legislation affecting the food and drink industry. Looking high and low, between EU regulations, Mattilsynet and Matloven there are no concrete demands, sanctions or

incentives to prove or even initiate a move in the said direction. Paula Capodistrias (2017), project consultant in the organisation Future In Our Hands, points out that without regulations, sanctions or incentives in the field, there is nothing that encourages companies or the government to take food waste seriously. This results in many companies choosing the cheaper option when discarding food waste, which often is throwing rather than donating. In the current system it is up to each company dealing with food (and food waste) to handle it correctly. Each municipality is left to regulate and supervise, without any specific demands. Today, it is more common that customers and partners put demands on companies, than it is for municipalities to do so. There is also a lack of regulatory demands in relation to food waste handling solutions. However, the prohibition against landfilling food waste forces businesses dealing with food waste to have waste strategies (Skjoldli, 2016).

On a national level it is a challenge that the EU decides the majority of the laws regarding food safety (Lie, 2010). The Norwegian Environment Agency has suggested that sorting of food waste should become mandatory throughout the country, both for private households and corporations (Lindahl, 2017). The Norwegian parliament has asked the government to consider a food waste law. Why shouldn't it be illegal to throw away a carrot just because it looks funny? The necessity of a law of this kind is not only apparent in supermarkets but in the rest of the food chain as well. Norwegian farmers throw away tons of perfectly edible vegetables that could have been consumed, while at the same time Norway imports over half of the food that is consumed. Farmer Stein Håvar Fjestad explains to news station NRK that 30 years ago, when he started growing onions, about 90% of his onions were shipped to supermarkets. Today that number has sunken to between 30-40%. Last season alone he threw away 55 tons, as the good season provided him with more onions than his contract with the supermarket stated. This is a meaningless and fruitless system, a no-win situation (Krosby, Høye and Grimstad, 2017).

Several initiatives and voluntary efforts have been initiated in the last years. Voluntary efforts are undoubtedly positive, but they have nevertheless proven to be inadequate in themselves (research showed only 48% of British supermarkets donate food waste to charity, suggesting the remaining the remaining half could use a legislative framework

and a national plan as motivation). Jens Måge (2017) sees strong indicators that ambitions regarding food waste are not being backed up by sufficient legislation. Today it is up to each company which deals they make, and with whom, regarding their food waste. Demands and incentives are necessary to create change: to waste less food has to become the most economic solution. Publicly reported food waste data from food companies could contribute to a much needed transparency and insight into the industry. To allow the most sustainable management of food waste, local authorities, charities and social entrepreneurs should have a role in designing, coordinating and running efficient redistribution systems (Capodistrias, 2017). At the moment, authorities aren't contributing in this mix.

4.2 Mattilsynet (NFSA)

Mattilsynet -the Norwegian Food Safety Authority (NFSA)- is a governmental body that ensures secure and healthy food and water for the population in Norway through regulations and controls. As well as maintaining environmentally sustainable production, they promote health and quality along with other consumers' concerns along the entire production line. It is also the role of NFSA to draft and provide information on legislation, and to advise the Ministry of Fisheries Coastal Affairs, the Ministry of Health and Care Services, and the Ministry of Agriculture and Food (Mattilsynet, 2017). A central role in the shaping of regulations is simplifying, increasing usability, and modernising, while taking international commitments into account, since the majority of the regulations on food in Norway, is harmonised with EU's regulations (Lovdata, 2015). NFSA is the central authority when it comes to execution of food politics. However they are not responsible when it comes to food waste (the Ministry of Agriculture and Food, however, are). NFSA still contribute with labelling and hygiene regulations. Although these areas affect food waste, none of them have the main purpose of preventing food waste. The companies handling food and food waste are the ones responsible for following the NFSAs regulations. *Matloven* (the food law) is designed to ensure safe food and promote health and quality along the production chain. NFSA is in charge of *Matloven*. The regulations in it relating to food safety and hygiene, are also harmonised within the EU (Lovdata, 2015). In it, among other points, are requirements for marking of food durability. There are two ways of date labelling

for food: “best before” and “use by”. They both indicate the estimated length a food product can be stored under specific storage conditions, while still being consumed safely. The difference between the two has proven difficult for consumers to understand, and a fair amount of food is lost due to the confusion (Møller et al., 2015).

4.3 EU policies

In the EU there is an increased awareness of the need for a framework for effective policy making to decrease food waste. However, determining a large-scale action plan is complicated, since food waste issue varies from country to country, season to season, and between the different stages (between farms and factories, and to the consumers). Due to this, there are no concrete or unified legislation on prevention of the issue. The lack of a unified definition of the term *food waste*, adds another layer. Defining a legal reference framework with a unison understanding of terms would be a first step. And when policies are formed and put in action, monitoring long-term effectiveness of them, and setting cutback goals will be of great importance. Capodistrias (2017) encourages an incentive framework that makes it more profitable to give away the food than to throw it. The existence of policies -with benefits for throwing less food, or punishment for throwing a lot- is a good way of communicating a commitment to the topic from the government to the consumers.

Another challenge is the relation of food waste and relevant legislation governing food, environment and waste management, including economic, social and legal issues that underline the issue (Lucifero, 2016). In 2015, the global community adopted the UN's *Sustainable Development Goals* (SDG) planning to eradicate poverty, promote prosperity, peace and justice, and stop the climate changes within 2030. As a universal agenda, SDG is intended to be a driver for national policy actions, cooperation internationally, and collaborations. The place of food waste in these goals is minor; goal 2 -Zero Hunger - pledges to end hunger, achieve food security, improve nutrition and promote sustainable agriculture (which is the priority of the World Food Programme) (World Food Programme, 2017).

The EU Commission is responsible for several initiatives, and legislation, whose intent is to reduce food waste; In September 2011, a roadmap for resource efficiency in

Europe was presented with the aim of a 50% reduction by 2020 (Helgesen, 2015). In May 2017, the European Parliament called on the Commission to:

- Support a legally binding definition of food waste, and adopting a common methodology to measure it.
- Examine the prospect of setting up binding reduction targets by 2020.
- Update which foods that should be labelled with *best before* (European Parliament, 2016).

Other European food waste studies worth noting includes two studies, both based on FAOSTAT-data; a study carried out by the *Swedish Institute for Food and Biotechnology*, on behalf of FAO, addressing all stages of the food chain (Brautigam, Jørisen and Priefer, 2014). *Bio Intelligence Service*, on behalf of the European Commission, looked at all stages of the supply chain in 27 EU member countries, excluding agricultural production. The exclusion of the agricultural sector altogether along with the lack of reliable data puts limitations on the outcome of the study (Bagherzadeh, Inamura and Jeong, 2014).

The European Commission's regulations No. 1221/2008 makes a point of reducing the aesthetic requirements for fruit and vegetables (Adenso-Díaz and Mena, 2014). Regulation No. 2150/2002 dictates that the members need to provide data on the production, recovery and disposal of waste every two years. However, without standardised methodology and requirements for use of data method, the data produced is more or less useless. The EU Directive 1999/31/EC is aimed at providing measures and instruction on how to minimise harmful effects on the environment, including the greenhouse effect (Brautigam, Jørisen and Priefer, 2014). As a green house emitter food waste is definitely affected by this, although the directive is not aimed at food waste.

Without its own regulatory framework, food waste is addressed from an environmental, rather than from a food perspective, in the context of waste legislation (Directive 2008/98/EC). Directive 2008/98/EC is of specific relevance to food waste, defining food waste as food product lost in the food supply chain. This definition excludes food redirected to use as materials (like bio-products, or animal feed). The proposed revision

of the European legislation on waste is a part of the broader context of promoting the circular economy (in contrast to the linear model), based on the paradigm where economic growth occurs without increases use of resources (Lucifero, 2016).

The member states are supposed to take necessary measures ensuring waste (including food waste I believe, all though not specifically stated) is disposed of without harming the environment. Yet, isn't throwing away resources (edible food), using unnecessary resources producing, transporting, and (often) landfilling them, and on top of that, emitting needless green house gasses, harmful to the environment? It is up to an authority to draw up plans suitable for any type of waste. Member states are responsible for ensuring that any holder of waste gets the waste handled by a waste collector or undertakes the task of disposing the waste himself. Although not stated, this probably does not include food waste, for no such arrangements or plans are in place for the majority of the member states (with the exception of some cities and countries who have created legislation affecting a specific part of an industry -see regulations affecting food disposal in supermarkets in France, Italy and Denmark in the next section -4.5). The member states are also supposed to take the necessary measures, providing competent authorities to ensure that installations are managed so:

- I. All the appropriate preventive measures are taken against pollution
- II. No significant pollution is caused
- III. Waste production is avoided
- IV. Energy is used efficiently
- V. The necessary measures are taken to prevent accidents and limit their consequences (Arvanitoyannis, Tserkezou and Choreftaki, 2006)

4.4 Labelling

Food waste legislation should ideally control the format, how clear and to which use labels should be used to ensure food safety. Legislation in regards to food labelling are the same throughout the EU (Møller et al., 2015), and due to the lac of EU guidelines on the matter, it is up to each country how to label durability. However, the Codex Alimentarius, established by Food and Agricultural organisation and World Health Organisation, also known as the "food code", have since 1963 developed harmonised

international food standards, guidelines and codes of practice. Codex standards serve in many cases as a basis for national legislation (Codex, 2016).

The communication of minimum durability (Regulation 1169/2001/EU) on food, although clear in legal terms, causes headache for many consumers, being unable to differentiate or understand the terminology (Lucifero, 2016). Food labelling differentiates between “best before” and “use by”, by law. “Best before” indicates to which date the producer believes the food has the best quality (up until). However, it can still be consumed safely after this date (if properly stored). Dairy products, fish and meat are typically labelled “best before”, except for when fish and meat are fresh sliced - where “use by” is used. Food labelled “use by” is foods that are easily spoilt and indicates the last day it can be eaten without posing a health risk (if stored correctly in unopened packaging). After the “use by” date has passed it is illegal for stores to sell the expired food (Matvett, 2015). Up until that point stores are encouraged to sell products that are approaching “use by” date at discounts.

In Norway the current regulations on labelling food is based on the labelling directive (directive 2000/13/ec) produced by the European Parliament and the Council Of The European Union (Møller et al., 2015). Labelling information about expiration dates on most foods is mandatory and is regulated in *Matinformasjonsforskriften* (or the legislation for food information). Foods that are excluded from date labelling are produce such as fresh fruits, vegetables, and baked goods that are normally consumed within 24 hours after purchase. Foods that change only marginally through storage over longer time are also excluded.

Systematic mapping of food waste in the value chain shows that “best before” is the main reason for wastage in every stage (Matvett, 2015). Through improving packaging, changing production methods, and lowering storage temperatures, the timeframe a food product can remain in its original shape on a supermarket shelf for an extended time. It is up to each company what label to use on each product. Some producers use dynamic dating (under the governance of the Norwegian Food Safety Authority) where durability is determined on the basis of transport, storage, season and temperature variations (Stensgård and Hanssen, 2015), meaning if the conditions are optimal during

the time a certain food spend traveling from producer to consumer, the shelf life is longer than if it the conditions aren't.

Loose regulations when it comes to labelling have resulted in supermarkets experimenting with innovative label solutions. In Norway, the supermarket chain Rema 1000 is exploring a label solution with the potential of extending food's shelf life through *Keep-it*, where temperatures are monitored on each individual product. Kiwi is experimenting with new labels "Normally usable until" in an attempt to give customers a better understanding of the "Best before" date (Capodistrias, 2017), and the dairy producer *Q-Meieriene* changed their labels from "best before" to "best before but not bad after" (Aalen, 2017). In the US, confused customers and incorrect labelling are causing \$30 billion wasted food yearly. Silicon Valley based Zest Fresh has created a data-driven tracking technology to ensure that food stays fresh in transit, in an attempt to preserve produce and grocery quality along the supply chain. They use real-time, sensor-based tracking when recording the freshness of a product –detecting temperature, moisture, and location- to deliver a reliable metric (Anzilotti, 2017).

Inside the Nordics each country is interpreting the labelling legislation differently –with differences among similar food products in each country- indicating a need for better understanding and guidance of food labelling terms. There are also differences in terms of length of shelf life for similar products. It is unclear as to why this is. In the report *Date labelling in the Nordic countries* by Temanord, the lack of empirical data where food waste is directly linked to date labelling, is pointed out (Møller et al., 2015). A review of the national regulations and guidelines in the Nordics revealed that the National Food Agencies in Norway have less guidance to manufacturers than the other Nordic countries have, for unknown reasons. To synchronise practices and understanding of food legislation regarding date labelling and shelf life in the EU could prove beneficial to the food waste issue.

4.5 Perspective

There are several authorities that are making efforts in reducing food waste through prevention targets and legislation. In 2016, *France* became the first country worldwide to penalise supermarkets that throw away edible food. The supermarket law is a part of

a bigger set of proposals published in 2015, laying out a national policy against food waste. The proposals reflect a collaborative process, led by Parliament member Guillaume Garot, with input from 120 experts and stakeholders, and calling for 36 regulatory measures across the French food system (Mourad, 2015), offering a rich set of ideas for prevention, recovery and recycling –aiming at halving food waste by 2025. Garot argues “the fight against food waste should become a major national cause, like road safety, that mobilises everybody”. The *Economist Intelligence Unit's Food and Nutrition Sustainability Index* explores food systems across 25 countries, where France ranked first. Policy and governmental action is where France scores highest; tackling loss on distributions-level, managing water supplies, and unhealthy diets (Food Sustainability Index, 2017a).

Italy too has passed legislation fighting food waste. In 2016 the Italian parliament established food waste laws, enabling farmers and companies to donate food waste. Considering the former legislation that more or less forced them to throw away food waste, the new laws is a major step forward. As well as making food donations a lot simpler, businesses donating food to charities will receive tax credits of the food donated. The laws are also encouraging the use of doggie bags, finding innovative ways of storing food waste, and further research in new packaging methods with the potential of reducing food waste levels (Zero Waste Europe, 2016). According to estimates, around 1% of Italy's *BNP* is lost through food waste yearly (Jordheim, 2016).

According to FUSIONS (2016), *Denmark's* food waste is estimated to have dropped by 25% since 2006. Some of it is credited to Selina Juul, food waste crusader and her *Stop Wasting Food* movements, that have been going strong since 2008. The campaign promotes meal planning and shows consumers how to limit food waste, encouraging a move away from impulsive food shopping (FAO, 2011). Besides from raising awareness and starting a conversation about food waste in Denmark, Juul has gotten a lot of international media attention, and her campaign has earned the support from the EU and UN. Thanks to *Stop Wasting Food* the supermarket chain Rema 1000 has stopped their «3 for 2» offers permanently, and changed the way they sell vegetables, from pre-packaged to selling them loose. Both methods effectively prevent consumers from buying more than they need (Thoring, 2013).

The charity shop *WeFood* based in Copenhagen is another positive food waste initiative. The store sells edible but “unwanted” foods that are damaged or past the expiry date, for only \$3 USD a shopping bag (Bloom, 2016). The store is aiming at consumers of all socio economic backgrounds, with an environmentally conscious attitude, and it is the first of its kind in Denmark. Thanks to deals with supermarket chains and other independent stores, and a team of volunteers responsible for picking up the food, *WeFood* is able to keep its store stocked with produce (Nield, 2016). The store is considered a major success, and two more outlets are planned.

In the *United Kingdom* the non-profit organisation Waste Reduction Action Plan (WRAP) works with manufacturers, retailers, brands, suppliers, research institutes, universities and design agencies, to reduce packaging waste and consumer waste. Through R&D and guidance, WRAP encourages retailers and brands to identify collaborative approaches in how to reduce food-packaging waste (FAO, 2011). Another UK initiative, led by the government, retailers, and WRAP, slowed down the nations household food waste by 21% between 2007 and 2012. For every £1 invested in efforts to limit avoidable household food waste, households and local authorities saved £250. Another example is from an initiative in six London boroughs, where household waste was decreased with 15% a mere six months into the project. For every £1 spent on reducing food waste, the households saved £84 and the borough saved £8 in waste management costs. The UK is to my knowledge the only nation with full financial cost-benefit data like this available (Hanson and Mitchell, 2017).

With food waste policies dating back to 1989 *San Francisco* is a leading global city in battling food waste. Composting and recycling was made mandatory in 2009, moving from landfills to compost, turning organic waste into organic material that farmers use for their crops. In the process of assisting food banks in collecting of food that would otherwise have been thrown away, the city raised money to hire a driver and purchase a refrigerated truck to pick up leftover food. An important part of San Francisco’s success has been to teach their citizens why and how to separate their trash. They have made recycling and composting free for residential homes, while trash collection is a paid service. The city established a formula in 2006 that increased discount to businesses that recycle and compost a large part of their waste. The incentives are paying off exponentially in the commercial sector (Food Sustainability Index, 2017b).

Along with a handful other cities, *Austin*, Texas, is aiming for zero waste, a 90% reduction of materials sent to landfills and incinerators by 2040. A new law demands hotels, large restaurants and supermarkets to redirect their organic waste from landfills, i.e. businesses have to detect a use for their food waste, or face fines. Robert Young, professor at University of Texas and recycling expert, points out that businesses now have to pay double for the same food; once when they buy it, and once when they have to discard it (Monson, 2016).

Countries like Denmark, that are making visible improvements on the food waste issue, makes it hard for Norway to appear to be doing great. However, there is a real issue with the transparency of the data, as most of the data is self-reported. Data aside, it is apparent that in cities and countries with strict policies, or systems for rewards and punishments for handling food waste as the authority desires, has positive effect. It seems like food waste is considered a more serious issue by authorities in other places than in Norway –judging by both the legislation, efforts and results. Why Norway has a more relaxed relationship with the concept, is unclear –but would make for an interesting study. Although initiatives, such as KuttMatsvinn2020, are great, they are voluntary. Matvett’s head of office Anne Marie Schrøder (2017) thinks several companies are doing noteworthy efforts in relation to food waste; like the Q-Meieriene’s “best before but not bad after” labelling, and Bama’s (the largest commercial fruit and vegetable company in Norway) dedication to sustainability. Schrøder thinks creating appropriate regulations is a necessary step forward in food waste reduction, creating dynamic labelling, and to get everyone in the industry to pull in the same direction, is necessary to move forward.

4.6 Politics

Politics is not merely about governing and the government, it is also about interests, values, ideas, ideologies, and about practices, procedures and rules (Asdal, 2011). Different methods and arrangements contribute in shaping politics. Science, e.g., is a huge influencer; the numbers and insight that science brings to the table represent an important source of power, introducing new truths and contexts into politics, shaping and possibly changing reality. Governementalité highlights the significance of science and technologies in relation to actors. Kristin Asdal (2011) refers to the tools that

change politics as political technologies. Written documents –such as reports, articles and books- are one of politics’ most used political technologies. The sociologist Mark Weber pointed out that bureaucracy rests on written documentation. They establish new cases, and states what the case is in the first place (Asdal, 2011). Public reports for example can establish, change or kill a given case, i.e. written documents changes the value of a case.

Numbers are another political technology, on the same level as science. We understand society around us according to numbers; they bring issues in to the light. Numbers can change the focus of a case, through opening up for both interpretation and change; a situation can change entirely through a new interpretation or a different angle. Whenever a number is visible, another number –maybe not as important, or perhaps more- is in its shadows. In this way, numbers are both neutral, partial, current, and ready to be discarded at the same time. For numbers to work optimally, they have to be comparable over time. This is one of the major issues with food waste, as global statistics are non-existent, making it impossible to compare countries, track change, or identify good practices or growth opportunities (Adenso-Díaz and Mena, 2014).

Gouvernementalité makes a point of the state not being a closed structure, an apparatus of a given size or, in fact a place at all. In this research tradition, the state operates through a range of different systems that reaches far beyond what we conventionally have associated with it. The public plays a different role in shaping politics today than in the past. In a global situation characterised by controversies and insecurities, where not even experts agree with each other, public participation is taking a more meaningful role than before. Without moving away from the government controlling, some of the power is increasingly moving towards the people. The term *issue formation* refers to the issues constructed by actors, who are driven by the concern for issues that the government has failed to address. Turning issues into problems they play a major role in constructing, shaping societal challenges. I therefore argue that issue entrepreneurship (issues raised by actors) is a necessary part of bringing societal problems on the agenda for the government (Hermansen, 2015). The fact that politics is shaped through pressure and participation from the public, is of course nothing new. What is new is nature’s increased presence in politics in recent years. Both science and numbers have contributed in shaping nature into something comparable, quantifiable,

and therefore possible to understand in size. Nature, on the same level as numbers or science, holds the potential to change political cases (Asdal, 2011).

5. Initiatives

5.1 ForMat

The non-profit company *Matvett* is the food and service industries' concerted effort to reduce food waste (Matvett, 2017b), working alongside the industry to implement good prevention strategies, structural changes, and effective measurement tools (Matvett, 2015). The ForMat project (run by Matvett between 2010-2015) started the work with food waste reduction in Norway, and has reshaped the food waste debate nationally, with extensive surveys of food waste along the food chain. The overall project goal was to put food waste on the agenda in Norway in an attempt to prevent and reduce food waste; educating citizens about it, mapping it and inviting different actors to collaborate in the mapping.

The project included three sub-projects:

- I. An annual study of food waste
- II. Communication and dissemination
- III. Networks on preventative strategies and measures

ForMat cooperated with organisations and companies as well as the government, with government representatives in the steering committee: the Ministry of Agriculture and Food, and the Environment Agency acted as observers. The government provided funding from the start and has emphasised partnerships between public and private as an alternative to a food waste ban. The food research institute Nofima and Ostfold research provided expert advice on food safety, the environment and communication (Stensgård and Hanssen, 2015). Prior to ForMat there were no statistics on food waste in Norway, so when ForMat was initiated many companies requested measuring methods. In response, ForMat developed tools to assist them in tracking food waste and implementing preventive measures. The project created a guide titled *How to Reduce Food Waste* (aimed at food producers and retailers), and the *ForMat Check*, mapping the

current food waste state in a company. The project has initiated actions and networks in the food industry, aiming to solve key challenges, such as durability, orders, forecasting, smarter products and packaging, clear labels, giving storage tips and discouraging campaigns that leads to overbuying. When the project started, the goal was a 25% reduction in food waste by the end of 2015. Although this goal was not reached, ForMat has drawn international interest, with other countries taking inspiration from the way it was organised, how it was financed and the methodologies used in the project. This voluntary sharing of food waste data is quite unique. The data collection too is unique in European context, providing documentation on measuring methods, and what and how much food waste occurs in the different stages of the value chain. Food waste levels fell 12% during the period (Matvett, 2015) of the projects and there is reason to believe that the decrease in food waste reflects the efforts on the project. ForMat managed to successfully create change, higher public awareness and collaboration within the sector, without the introduction of taxes or laws.

According to Schrøder (2017) incentives are larger motivators than regulations; “everybody wants to be best in class”. It is an interesting question to ask which class she refers to, whether it is the best at appearing environmentally conscious, best in reducing food waste (regardless of motif), or something else entirely. She also points out that cooperation isn’t common in this industry, and that the current commitments (although just through a symbolic fee and a signature) are proving to be effective, displaying volunteerism from large corporations in the sector.

A negative aspect of KuttMatsvinn2020, is that the companies are measuring the data themselves. The employees are given training in how to execute it correctly, and how to plot it into an app, before Ostfold Research processes the data (Schrøder, 2017). Letting the companies measure the data themselves, invites a range of uncertainty factors into the equation: 1) Firstly, if a company could tweak their data to look better -with little chance of getting caught- there is always a possibility that they would do it. The reality is that it costs the companies time, money, and resources to gather data. If it isn’t CSR or the guarantee of a positive outcome that is motivating them, there is a chance that the motivation is self-promotional purposes, which is a big incentive to edit data. Even when tests are conducted, to double check numbers, there is a margin for error. 2) The general margin for error is large –if wrong data is plotted into the system (intentionally

or unintentionally), it makes the full data set invalid. How is one company's self-documented data set from a number of years prior going to be measured, against the new self-documented data, or against another company's self-reported data? The question is really not that interesting when realising the numbers won't be accurate. Where there is historical data to compare to (this is not often the case with food waste), the way of measuring, and what was measured, has likely changed, making the comparison faulty. 3) Another uncertainty is that the methods used to analyse the data has its own limitations. Compromises have been made and not everything has been accounted for, making the data incomplete. 4) Another natural part of any data set, is the perspective, which is never neutral. All data are made with an intended message and therefore come with a perspective, which ultimately changes the data.

Worth mentioning when talking about food waste prevention initiatives, is the EU project "Consumer in a Sustainable Food Supply" (2014-2017). The aim of the project was to prompt the public to make more sustainable choices to reduce waste. "Right Packaging for Reduced Food Waste" (REforREM) is another significant Norwegian project worth mentioning. This research project (2015-2018) aims at developing new packaging solutions that reduce food waste, focusing on production, retail and the consumer stages (Matvett, 2015).

5.2 KuttMatsvinn2020

KuttMatsvinn2020 (or Cut Food Waste 2020) is a three-year project initiated by the retail company NorgesGruppen for the hospitality industry, aiming to cut their food waste with 20% by 2020 (NorgesGruppen, 2016). After reaching the 2020 target, the new target will be that of the UN's SDG; reducing food waste with 50% by 2030. KuttMatsvinn2020 is led by *Matvett*, and some of the hotels, restaurants, and canteen companies that are involved includes the hotel chains Nordic Choice Hotels, Scandic Hotels, Umoe Group, Eurest and ISS.

The three-year agreement includes;

- The development of common measuring techniques for measurement and reporting.

- Measuring food waste at each involved actor.
- Establishing statistics for food waste from hotels, restaurants and canteens.
- Development of the tools for training the employees (Matvett, 2017a).

It is a historical initiative in reducing food waste, both By Norwegian standards and by global ones, as there are no other similar initiatives that is started by the food and drink industry, involving big actors working together towards a specific goal. Schrøder (2017) points out that collaborations like this is necessary to systematically map out food waste in restaurants and the likes, in order to start preventive measurements to prevent food waste. KuttMatsvinn2020 is both economical for the company, as well as positive for the environment and society, she continues.

5.3 Industry agreement on reduction of waste

Similar to the initiative KuttMatsvinn2020 (between the Norwegian hospitality industry), the Norwegian government and 12 food industry organisations have signed a binding agreement (Schrøder, 2017) to reduce food waste in line with UN's sustainability goal 12.3, with 50% by 2030. Signed by five ministries (including the Ministry of Agriculture and Food, Ministry of Trade, Industry and Fisheries, Ministry of Children and Equality, Ministry of Health and Care Services, and the Ministry of Climate and Environment) and organisations from different stages of the value chain, the agreement is a collaborative effort, showing the growing engagement in the food waste problem, and CSR responsibility from the participating parties. The agreement states that the industry is to collect data, while the authority will compile national statistics and consumer statistics upon receiving the data. Gaining international attention, the collaboration has been referred to as "the Norwegian model". In a press release by the Norwegian government it is stated that Norway hopes to inspire other countries to take new approached to food waste with the agreement.

The average Norwegian throws away 42kg of edible food yearly, adding up to about 350.000 tons on a national, yearly basis (The Norwegian Government, 2017). In order to address this issue it is necessary to map out the problem properly before deciding appropriate measures. In the instance of this particular industry agreement, the plan is that a new one with a more concrete framework will replace the agreement, once

statistics and insight has been gathered. This I naturally agree with –to make more concrete goals when one is more informed is only logical. What I don't agree with is that the parties involved in the agreement is supposed to agree on which grade of reporting data will be appropriate going forward (The Norwegian Government, 2015b). Collaborations, like this, are very positive –often they have large potential, whether between industries, across borders, or between competitors. It is probable that it is especially useful when looking at and trying to improve a problem that everyone is affected by, such as a global issue where everyone is benefiting from a solution and the goal is shared. What worries me in this particular collaboration is that the agreement might have received attention for the wrong thing; that it is receiving praise for being unique, and for the intentions behind it. There is a large difference between getting appraise for something one wishes to do well, compared to something that one actually executed well. The good intentions are clear, but how is an initiative where the parties involved can decide what to be measured on lead to anything constructive, in the long or short term? If the point of the agreement is to gather data that can contribute in better understanding, and mapping the issue the food waste, shouldn't someone external be the judge of what should be measured? It is likely that the companies measuring their own data would prefer to measure the data that they excel in (that makes them look good). It is worrying that industry leaders and government officials aren't taking the issue of food waste seriously enough to create a proper framework for the collaboration, to ensure the reward of the agreement.

Participation in the agreement is voluntary; it is binding for the contracting parties, with the opportunity to withdraw from the agreement at any point (with a written, one month notice) (The Norwegian Government, 2015b). The fact that an agreement on this level (between the government and serious actors in the industry) has been realised is one step closer to understanding food waste in Norway and doing something about it. However, I believe the agreement is suffering from high enthusiasm and poor planning. Firstly, how can an agreement be binding while at the same time offer the companies a way out at any given time, for any given reason? Secondly, how is data without structure, supposed to give insight? A coordination group is set to evaluate the agreement after delivery of the main reports in 2020, 2025 and 2030. I am very curious to see not only the results of this, but to learn who is in the revision boards, the criteria

measured, the factors left out, and what concrete plans the new insight this leads to. I am afraid the main reports will display insufficient, unclear, and inconsistent data without the opportunity for gaining much insight, apart from the obvious findings that more research is needed and more actors should be involved. A 50% reduction before 2030 is ambitious considering that we today have no real grasp of the state of things; where in the food chain we lose what foods, what measures works, and what the numbers are.

5.4 FUSIONS

While the focus of ForMat, KuttMatsvinn2020 and the industry agreement just described, focuses on reducing food waste, FUSIONS's main goal was mapping food waste data. Another difference is the size and span; FUSIONS was a larger, EU funded project with 21 partners, in 13 countries. Running from 2012 to 2016, the aim of FUSIONS was to achieve a more resource efficient Europe, through significantly reducing food waste and harmonising food waste monitoring. A manual was produced, detailing national statistics covering the entire value chain, accompanied by suggested methodology for data collection and analysis (Matvett, 2015). It is specified in the report that the data presented have a somewhat high uncertainty, due to a limiting number of studies of adequate quality available. Another issue with the data that have been identified is the variations and lack of definitions of the term food waste, which undoubtedly has effects on the end results (FUSIONS, 2016).

5.5 Donating food

Along with the other initiatives in this chapter, food donation is an important contributor in battling food waste. There are 257 registered food banks in Europe, across 21 countries, distributing food to around 31.000 charities. In 2013, 402.000 tons of food was distributed from these food banks, the equivalent of more than 800 million meals, feeding 5.7 million people. Food banks play a central role in increasing resource efficiency, giving social benefits and reducing food waste. The Norwegian food bank *Matsentralen* (the largest in the Nordics) collects food from supermarkets and producers, distributes it to charities that distribute the food out to households with low income (10% according to the Norwegian Institute of Public Health, 2016). The food

they receive would typically have been thrown away if it weren't for Matsentralen (Helgesen, 2015) –in a typical month they receive and distribute somewhere between 70 and 90 tons of food (Matvett, 2015). A clear benefit of food banks, is the scale. When receiving food from producers, wholesalers or distributors, it is usually the result of overproduction or mislabelling, i.e. the quantities are large. It is easier for a food bank than for a charity to receive lets say 250 cartons of milk, and to re-distribute them among several separate charities. Food from these sources typically also has longer shelf life than food waste food from supermarkets –giving the food bank more time to give out the food. When it comes to collecting food from supermarkets, charities are more efficient receivers. Most of the food has short shelf life, meaning that the time to re-distribute the food is tight -making it inefficient use of time for food banks to collect and re-distribute to charities. It's also resource costly to pick up small amounts of food waste food from different sources (Capodistrias, 2017). Here, it is visible that both charities and food banks have their role to play in battling food waste.

Handing out food waste for social purposes is common practice globally (Lucifero, 2016). However, supposedly only 48 % of supermarkets donate their food waste to charity. Numbers from the *Norwegian Supermarkets and Food Waste* report puts Kiwi as the Norwegian leader among supermarkets -donating the largest portion of their food waste to charity, with 90% of their stores giving to charity. The number is 80% at Rema 1000, and less than 20 % of smaller supermarkets like Joker and Matkroken. In Oslo, merely 20% of the supermarkets are donating their food waste to charity (this number is bigger in other Norwegian cities) (Capodistrias, 2017). The media give the supermarkets a lot of bad press due to these numbers. They paint it as if the supermarkets are being lazy, not having proper systems etc., and although this is without a doubt true in some cases, it isn't a simple matter to donate 100% of what the supermarkets have to discard, to charity. There are several reasons for this: 1) the organisations don't want everything the supermarkets throw out and 2) not everything the shops have to dismiss is eligible for donation (such as tobacco and alcohol). There are several reasons why a charitable organisation might say no to a food donation. Let's say a Kiwi store is closing for the day and they have two packages of one type of sausage left, along with a niche kind of cheese that requires specific taste buds (such as blue cheese), and five kilos of brown bananas. The Kiwi store would, in theory, ideally like to

donate the food instead of throwing it. However, the charity doesn't want it. Why? 1) They have limited capacity and would rather spend their resources picking up bigger batches of food from another store or organisation. 2) Charities typically use a lot of the food to make meals for the needling and would rather have 50 or 500 packages of the same sausage so they can make big batches of whatever they are cooking, instead of having a mishmash of different sausages and meat and fish in smaller quantities at their hands. 3) They naturally prefer receiving food that most people wish to eat, i.e. niche products like blue cheese aren't first on their wish list. They are picky, not because they want to be, but because they have to be. It's just not practical. So the problem remains, regardless of efforts from supermarkets, charities and food banks.

6. Norwegian Efforts

6.1 Efforts by Norwegian supermarkets

With nearly 4000 supermarkets Norway is one of the top countries in Europe when it comes to the number of supermarkets per capita. These supermarkets generate around 60,000 tons of food waste yearly, with 150,000 tons of CO2 in emissions, and a financial loss of roughly 3 billion NOK (Capodistrias, 2017). A number of supermarkets are naturally making efforts to reduce their losses. Many have systematic internal practices and intelligent ordering systems, giving away purchase trends and preferences, allowing stores to have a good overview of stock, and to plan orders effectively. The big supermarket chains have storage guidelines that also contribute. Smart labelling and offering smaller portions for small and single person households, and selling fruit and vegetables that don't fit industry standards cheaper (instead of the typical pre-packed standards), are successful initiatives that reduce waste (European Commission, 2010).

The research conducted for the *Norwegian Supermarkets and Food Waste* (2017) report by *Future In Our Hands*, showed that the percentage of Norwegian supermarkets with a designated area of their store where food with short shelf life is presented (with up to 50% discount) was at 92%. An issue in many places is that supermarkets don't have systems where information about what products in store expires when. The system today is mainly staff finding these products manually during store routines -an inefficient system that without a doubt leads to a lot of food going undetected, ending up in the waste containers instead of being sold at a reduced price. Another reason for items not being sold for half price, all though the best before date is approaching, might be that some brands don't want their products to be offered at reduced prices -not wanting to be associated with low-cost products (Capodistrias, 2017).

6.2 Kiwi

A report from Ostfold Research reveals that the average Norwegian household spend 5.800 NOK a year on food wasted (NRK, 2017). In 2014, every 5th bag of groceries brought home by the average Norwegian went in the bin. Today that number is 8, a fact that despite the important progress still leaves room for improvement. The grocery stores are making efforts to push consumers in the right direction. Beside from lowering the prices on produce that are about to pass the “best before” date, Kiwi has opted for selling fruit and vegetables that don’t fit the standard measurements under a different label, *First Price*. Produce that isn’t sold is donated to charity. The food that is left, for whatever reason (whether it is a niche product, or tobacco or alcohol –which is illegal to both sell at reduced prices and to give away), has to be thrown away. This is what Per Emil Lindøe, the operation coordinator at Kiwi, defines as food waste. Lindøe sais food waste is a big focus area for Kiwi; “These are products we have paid full price for, so we have both financial and moral reasons to keep the food waste level low”. He continues to explain that although they are trying to keep the food waste level to a minimum, some food waste is inevitable. The customers that visit the shop at the end of the day still expect to be able to buy fresh bread, and to have options to chose between, although the store is approaching closing time. Finding the medium here, between offering choice and full shelves to customers while throwing as little as possible, is a challenge for every supermarket. Automatic orders, good routines, lowered prices on soon-to-expire produce and cooperation with charitable organisations, are parts of the strategy that is going to reduce Kiwi’s food waste with 50% within 2050.

Discussing food waste laws, Lindøe observes that there are few regulations in this area. Regardless, he sees plenty of reasons for focusing and tackling food waste and points out “not everything is successfully governed through laws and regulations. It might be the wrong approach to make something illegal through laws first, and going in and organising everything in an orderly and functional fashion after.” Therese Hagtvedt (2017), senior advisor at Nofima, agrees, stating, “Not everything can be governed through regulations.” She remarks that if throwing away food waste were made illegal it would be difficult to regulate. But what if there were laws and incentives that were both

properly thought through and precisely formulated, with a support system that made sure the laws were followed and incentives paid off, wouldn't that be a different case?

6.3 Meny

Kiwi and Meny are both supermarket chains owned by NorgesGruppen -a wholesale and retail company with a total of 1.850 grocery stores across Norway (NorgesGruppen, 2017a) - and both working alongside NorgesGruppen to reduce food waste in their stores. Meny is aiming for a food waste reduction of 25% by 2020, and 50% by 2025 (compared to their numbers from 2015) (NorgesGruppen, 2017d). This is in line with the KuttMatsvinn2020 campaign that NorgesGruppen is a part of. NorgesGruppen is striving to be climate neutral, with development in environmental products and climate friendly transport, in line with three of UN's development goals, including;

- Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all.
- Goal 12: Ensure sustainable consumption and production patterns.
- Goal 13: Take urgent action to combat climate change and its impacts.

By 2020, Meny is set on recycling 85% of their waste, as well as turning 95% of food waste into biogas. The supermarket chain is making efforts along their value chain to reduce and exploit waste. Trine Erichsen (2017), the information officer at Meny, points out that proper training and creating awareness around food waste is a key approach for Meny. In 2016, they launched a campaign, aiming at reducing the amount of fruit and vegetables that is wasted; today this category represents a significant part of their total food waste. When one or more items in a pre-packaged fruit and vegetables unit have gone bad, store employees open and pick out the fresh produce. The produce that are still fresh, is then sold as single items for a cheaper price, saving the environment the loss of a package of 10 tomatoes (where only 2 had gone bad), saving the customer money and saving the store the loss of the 8 tomatoes that they otherwise would have had to throw away.

6.4 Social entrepreneurs

With social improvement as the motivator social entrepreneurs create economic value through social value. Their tool is CSR; good business practices, like traceability and transparency. If we want improvement on the food waste issue, we need social entrepreneurs to lead on issues like food safety, waste reduction and a global environmental perspective (European Commission, 2017a). There are social entrepreneurs in every sector in the global marketplace, including quite a few in the food segment:

- *Too Good to Go* is an app that makes it possible for consumers to buy food from bakeries and restaurants that the business was unable to sell on during opening hours. Selling it at a cheaper price the customers get value for money and a good conscience as they save food from being thrown away. The bakeries and restaurant makes a small buck rather than nothing, and avoids wasting food.
- On the webpage *resterant.no* people can sell the left overs their family's spaghetti dinner (Kristiansen, 2016).
- *Grabster's* app is also making it making it possible for people to buy home cooked meals (Lie, 2016).
- The app *Foodlist* assist consumers in finding deals on produce that risks getting wasted as it approaches "best before" or expiration date (Refresh, 2017).

6.5 FoodFarm

FoodFarm delivers food from kitchens, to companies and their employees, on a digital platform. Through an app, they offer a type of online cantina linking kitchens all over the city with companies with no proper lunch alternatives. The goal is to reduce food waste through giving employees control over their own lunch. Instead of having a cantina with a specific food selection, the app opens up the opportunity for its users to order from any kitchen in town. In the app, the user puts in personal preferences, allergies and favourite restaurants. They can schedule daily lunches, or do it sporadically, and they can cancel orders for days they aren't in the office or simply don't want it. The app communicates directly with the kitchens –meaning if you don't place your order they don't cook for you.

Looking at food waste today, many seem too focused on waste handling on the last level; when it is already classified as waste. Finding preventive measures is more effective, when possible. Alexander Breivik (2017), the founder of food tech innovator FoodFarm, says the food system today is upside down. Poor management of the complete value chain, poor logistics and the on demand model we base the food we eat on today creates waste. Breivik breaks down *food waste* to “the result of poor communication between the supply chain and the parties involved”. FoodFarm created a tool for this specific purpose. This way of tackling food waste is an interesting and reverse way, compared to how most companies tackle food waste. FoodFarm skips food waste all together, not through smart recycling or other waste handling, but through not preparing the food in the first place. The company’s next step is expanding to more cities, implementing a new solution on the way there: letting others users know when someone forgot to cancel or eat their lunch. The company’s founder and CEO Alexander Breivik say they don’t really have a problem when it comes to customers that forget to cancel orders or eat their meal. Usually, there is a colleague or five circling the lunch, if the lunch owner decides to not take it home.

6.6 Marked.no

Food shopping online is seeing a dramatic increase, with 50% yearly (mostly because it is a time saver). Today online shopping has an estimated worth of 2.1 billion NOK. Norway is lagging behind in this market –according to research the lac of meal planning is to blame. Instead of shopping at the supermarket once a week –like most Europeans– half of Norwegians report that they don’t know what they are going to buy as they enter the supermarket (NorgesGruppen, 2017c). Marked.no was one of the first online convenience stores in Norway, acquiring 1.9 million customers since their start in 2016. In autumn 2017, they are expanding beyond Oslo, distributing fresh and frozen food, beverages, baked goods and household items to all of Norway. Further expansion plans involves extending delivery from 362 days of the year, to 365, including night-time, says category manager Håkon Kavli (2017). With a wide selection of produce and low prices, the main difference between Marked.no and a traditional supermarket is the location (online), the convenience (your couch or work desk), and home delivery. Even the offers you expect to find in the local supermarket, are the same, with reduced prices on

products that are close to expiration date. Kavli explains minimising that food waste is an important battle for Marked.no. Most of their food waste is fresh produce –bread, fish, meat, fruit, and vegetables- and reducing these is important, not merely because of the obvious economic benefit, but to keep their customers happy. The fresh bread and meat sold on Marked.no is sold on demand, meaning if the butcher or baker don't get the notification that you want bread, they don't make it. From July 2017 they launched *Forundringspose* (or surprise bag), containing groceries, mostly fresh foods and baked goods that are close to expiration date, for double the value of what the customer is paying for the bag.

Warranties regarding how close to expiration date the produce can be when they are shipped off to customers, is important to keep customers satisfied. If a carton of milk e.g. has seven days until it expires when it arrives at Marked.no they have a small margin to get it out to the customer. In physical stores the customers can check the expiration date themselves, and choose to buy the milk even if the milk expires the following day if they know they are going to use it for baking that same day. Although there aren't laws dictating these kinds of warranties, Kavli points out that they have to put the customer first. Mattilsynet has rules that ensures the foods that are sold to customers, is safe to consume. Other than these, though, it appears as if Marked.no and the likes are free to implement and create warranties as they like -or to skip it altogether. Tesco and other large supermarket chains have offered online grocery shopping for decades. Still, Marked.no have had bumps in the road, establishing in Oslo - a city with a high density of supermarkets. Many don't see the need or a reason for ordering online. Marked.no have gained ground in families with young kids, where meal planning is more common. Students and young adults without kids don't typically have the structure, or the need thereof, in their day-to-day lives, making delivery times hard to navigate.

From a food waste perspective, Marked.no is indeed an improvement from the current system. They base their service on people that plan their buys, which in theory could be the same people who plan their meals days ahead –both are proven to throw less food than those who buy groceries spontaneously and sporadically. Marked.no and the likes end up producing less food waste than their physical counterparts –both because they have a centralised storage system and because they offer meat and baked goods on

demand –lowering the level of food waste from two of the most wasteful categories. Offering foods close to expiration date at lower prices, and selling surprise bags with the same, almost expired foods, adds to this.

6.7 The Magic Factory

In the report *The Magic Factory* from 2016 a white paper is mentioned, regarding reduction of climate gases from household food waste and manure. It also mentions the national waste strategy, where waste, reuse and recycling is a priority. The Magic Factory is meeting these targets through their biogas plant (recycling organic waste) in Tønsberg, Norway. With the main objective to increase recycling, they use a novel educational model to strengthen environmental knowledge as well as motivate towards pro-environmental behaviour. TMF is a centre for sustainability and innovative learning for kindergartens and schools, while also reducing green house gas emissions and enhancing sustainable food production in the region. A food-processing plant such as TMF, produces both organic and inorganic waste: solid, biodegradable waste that can be composted (organic waste), and materials such as plastic, wood and stone that is not easily degraded (inorganic waste) (Morawicki, 2012). The plant produce biogas from organic waste and manure from farms, private households and companies in the area, and use it as fuel in waste collecting vehicles and busses, in addition to supplying recycled bio fertiliser to farms, and to a greenhouse on sight in the near future -if all goes to plan. The biogas plant, including the greenhouse, is a national pilot, in terms of new isolation techniques and energy management (Hvitsand et al., 2016).

Initiated by the area of Vestfold, in cooperation with local farmers and waste companies, TMF is the largest biogas plant in Norway and the first in the world to accomplish this type of cycle for energy and food production. There are similar projects abroad, but no one has as per today gotten as far as TMF. A growing amount of research and investment in later years has helped a lot in the development of the factory, but the tone was a little different when the project was started in 2010. The guys in charge of kick-starting it, were uncertain if it was worth the buck. It was considered costly in the short run. Luckily, they were longsighted, and the prognoses for TMF are very optimistic.

Per 2017, TMF do have some leftover waste that the plant can't handle (such as plastic bags, orange peels, egg shells and cat sand). In the future, though, they are planning to use this too in the loop. The green house that they are currently building is planned to cover 1500 square meters, producing a wide range of fruit and vegetables on an all year basis. The food grown here will be given back to the same locals that are providing them with food waste. In this way they will demonstrate a full loop; organic waste in, organic food out. Another goal with the green house is to grow climate neutral vegetables that are ecological and grown without pesticides. TMF is also in the process of getting their bio-fertiliser 100% ecological, and approved. Giving bio-fertiliser back to the farmers who provide them with manure, is giving the farmers a better option, than the traditionally used non-bio fertiliser used in the fields. This alone has the potential to make a big difference in terms of CO2 emissions (Stoknes, 2017). TMF, and biogas plants in general, are the results of companies with long-term perspective. Methane emissions from cow manure are a major source for greenhouse gases. Bringing the manure to treatment at a biogas plants, gives big climate benefits.

Previously in this chapter I brought up examples of companies who are tackling food waste near the top of the food waste hierarchy -through reducing prices, re-using produce and donating. I chose to include TMF in this section of the text to highlight the efforts made lower down, on the energy recovery stage, and to give an example of how efforts on this level can make a difference despite efforts made on higher stages in the hierarchy being preferred. Through advances in composting and recycling (through e.g. a modern biogas plant), food waste can result in new products of value (such as biogas), as well as benefiting the environment. However, advances in recycling doesn't mean much if people don't recycle.

6.8 The circular economy

TMF is illustrating a real life circular economy (see figure 2). Today the value of material objects seems to have sunken as a result of factors related to mass production, abundance, roomier personal economy for many, and cheap production costs. The circular economy challenges the current economic system that is built on production, rather than resource efficiency, with the core of the concept simply turning goods at the end of their life cycle into resources in new areas. A shift from the current economic

system to a circular economy, would demand concentrated actions, including (Stahel, 2016):

- Research; calculating the impacts, costs and benefits –showing a circular economy is feasible.
- Information; raising public awareness, participation, and knowledge about product responsibility -to motivate for changes in ones own behaviour and consumption patterns.
- Policies; rewarding activities that are desired, and punish those that are not.

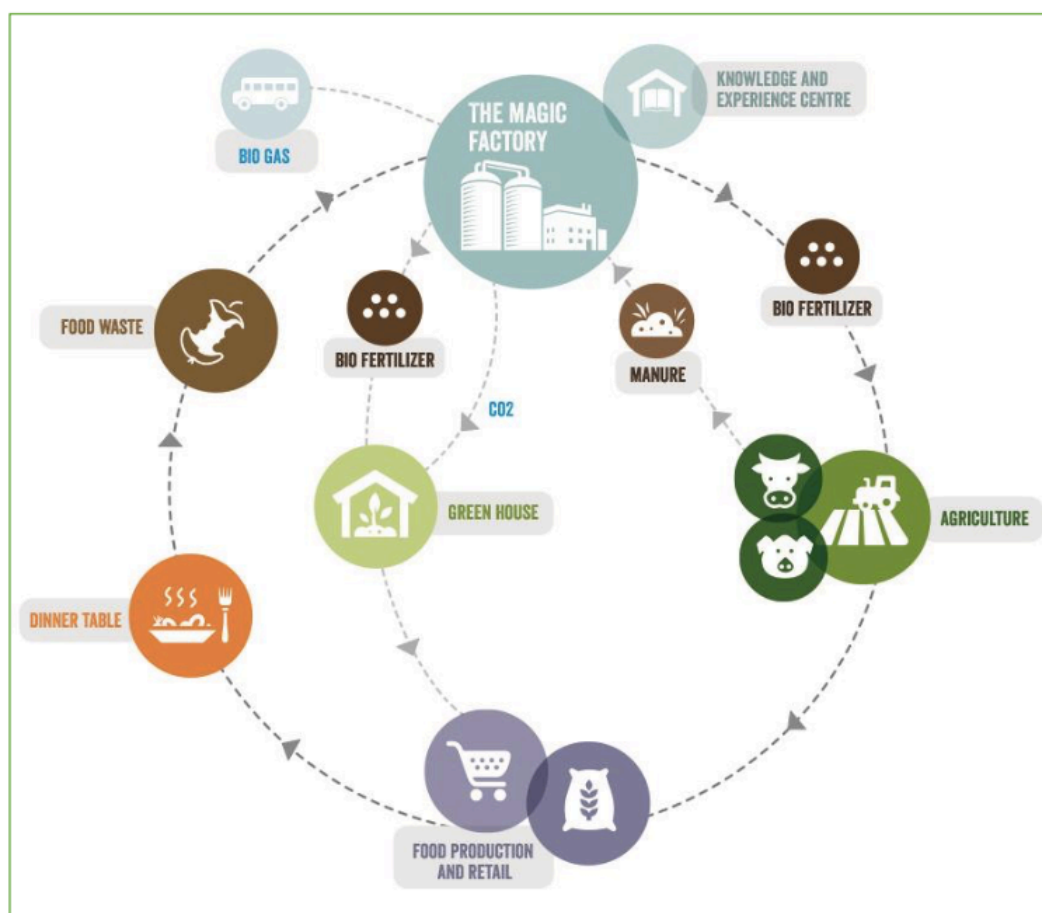


Figure 2: Illustration of a real life circular economy by The Magic Factory (2016)

In December 2015 the European Commission presented its *circular economy action plan* in 2016 including measures in five sectors, among them food waste (in all stages). The undertakings pledged by the European Commission include:

- I. Creating common methodology and indicators for measuring food waste
- II. Establishing a platform for Member States and actors from the food chain for examining how to achieve the SDG on food waste
- III. Clarifying food waste legislation in the EU
- IV. Exploring smarter labelling

The action plan is a part of the circular economy package with the aim to boost, not only European but, global competitiveness, sustainable growth and job creation. The package includes legislative proposals on food waste, with clear reduction targets, including long-term ambitions for recycling and waste management: recycling 65% of municipal waste and 75% of packaging waste by 2030, reducing landfill to no more than 10% of municipal waste by 2030, encouraging producers to create greener products with economic incentives, and supporting recovery and recycling schemes (European Commission, 2017b).

The circular economy concept it is an antonym of a linear economy, and relates to the concept of a cycle. The origin of the term is debated, with the earliest account tracked back to 1848 (Murray, Skene and Haynes, 2013), in fact, several authors trace it to China (Liu et al., 2009, Yuan et al., 2008). China is today, perhaps not by accident, the nation that has embraced the concept to the fullest, with ambitious programs to apply it (Zhou et al., 2014). Shifting to a circular economy has been calculated to have major benefits: the results of a study of seven countries in Europe, uncovered that the shift to a circular economy would increase the workforce and reduce greenhouse-gas emissions -by 70%- in each of the countries. It would also reduce consumptions and waste (Stahel, 2016). Europe is increasingly viewing the circular economy as a necessary path, with the rising environmental challenges, and a transparent need for sustainable transition when it comes to production and consumption (Hvitsand et al., 2016).

6.9 Recycling

Recycling is a fundamental part of the circular economy; keeping products in ecosystems, maximising the value of each product, and minimising waste (Stahel, 2016). Through increasing the lifespan of a product (smarter manufacturing and maintenance, through reduction, reusing and recycling) resource use is reduced. Thus regarding food

waste as a resource, not waste, has become a central part of the circular economy (Murray, Skene and Haynes, 2013).

In Norway, the level of food waste that's recycled, depends on and varies greatly between municipalities. Sorting waste is more common in municipalities where they have waste handling programs educating children. Although infrastructure and legislation for recycling are crucial, providing people with training, incentives, knowledge building, and motivating towards pro-environmental behaviour have proven to be effective measures (Stoknes, 2017). Even people who are seemingly uninterested or unmotivated can be nudged into making the right food waste decisions, through product and service placement and presentation, making the "best" alternative the default alternative, and by the use of social settings and standards. Effective recycling is not a coincidence, but the result of cooperation between infrastructure, legislation, and technology (Hvitsand et al., 2016). Prompting desired actions through smart architecture causes predictable behaviour without the need for prohibition or economic incentives (Thaler and Sunstein, 2008).

In the Magic Factory's 2016 report, it is mentioned that recycling ideally should be simple, social and a pro-environmental choice. Knowledge about climate change and the negative effects have proven inefficient in itself; it doesn't inspire people to act. Instead of focusing on an apocalyptic outcome, the communication could be changed to focusing on opportunities for businesses, opportunities for saving and opportunities for raising quality of life. Another point that I suspect contributes to the issue, is the global scope of the problem, making it hard for people to feel like their actions matter in the bigger picture. This is particularly visible in a country like Norway, where the negative climate effects aren't noticed as much as in other parts of the world. When climate change doesn't affect your way of living or has an impact on your day-to-day life, and people are notoriously bad at planning ahead –what is the incentive?

6.10 Chapter summary

I wanted to include both TMF and the circular economy because it paints a contrast and proposes a solution to the food waste issue. Looking at examples of companies utilising the holes in the system, looking at the issue from new angles and approaching food

waste with technology and new ways of thinking (social entrepreneurs) might be what is needed to reduce the problem -regardless of if the authorities can find the motivation to introduce legislation on the matter, or not.

Although both Kiwi and Meny are making efforts in reducing food waste, not all Norwegian supermarkets are doing similarly good. Even if my research indicates that I have chosen the star pupils among the supermarkets on the Norwegian market, I don't have a full overview of the efforts made by the others, hence I am not sure to which extent Kiwi and Meny are representative of the whole market. Judging by the two companies I looked at, it is obvious that legislation would have made a difference; pushing them to make more efforts, find new solutions and implement new technologies. The efforts made today, I consider fairly basic –what should be the norm in all supermarkets (including donating food, reducing prices on soon-to-expire food, to offer smaller sized product to smaller households, and to not promote overbuying). It is clear from the efforts I have gained insight in, that food waste reduction plans is considered a “nice to have” not a “need to have” –which has a visible effect on the effort and outcome the stores put into the process. Hence food waste is not valued highly. I would even say that it is valued low enough for most to do the bare minimum.

Comparing Kiwi and Meny, to FoodFarm and marked.no, is almost not fair, as they are coming from completely different angles. Kiwi and Meny are supermarkets with physical stores, while the two others are first and foremost technology companies, relying heavily on technology and algorithms, with the possibility to turn around much quicker when they get negative customer feedback on products or service. FoodFarm was founded on the principle that food waste should be a thing of the past, and marked.no had the output that they want to be a more efficient (a modern) supermarket. While the supermarkets to some extent are forced to deal with food waste as it happens (with the current system), the two technology companies have created technological solutions and systems that make food waste less likely to occur in the first place. Taking this back to the food waste hierarchy, the five companies I have looked at in this chapter are operating on three different stages. While FoodFarm and marked.no are operating on the top level, and Kiwi along with Meny on the level below, TMF is on the second lowest one, the energy recovery level. TMF don't see food waste as a liability, as waste, or something that needs to be reduced, but something that needs to

be recycled, managed, treated, and transformed into other resources for new use.

7. Conclusion

Food waste prevention and reduction is considered to be one of the most easily achieved measures in reducing CO2 emission. With estimated 30% of greenhouse gas emissions, and 10% of total emissions coming from food production (Matvett, 2015), one would think that preventative measures would be high on most countries lists of goals and priorities. Unfortunately, and surprisingly, this is not the case. We are still a long way from 2050, but we are also very far away from the SDG of a 50% reduction in food waste (Hanson and Mitchell, 2017). When I started the research for this project I thought the problem with food waste was the accumulation of food waste itself. Now, I know that a major part of the issue is due to lack of commitment and engagement from authorities. Food prevention requires long-term planning, cooperation between every step of the value chain and authorities (Capodistrias, 2017), and the presence of an exhaustive regulatory framework. Without proper legislation in place, companies are left to make the call themselves, regarding what value food waste has to them. A legislative approach has the potential to support and encourage more successful food waste efforts.

Both governments and industries are growing conscious of the relevance and importance of reducing food waste levels (Capodistrias, 2017), still, many countries are lagging behind when it comes to efficient legislation supporting this –Norway included. Many European countries that, similar to Norway, has a well educated, high earning population, and high living standards, are making similarly insignificant efforts in the field. This is clearly more about the will to do something, than the power to do something. The EU's laws on food waste affect all member states. However, the food waste laws referred to, is more like a loose framework, which means that it is up to each member state to best define their legislation, sanctions and incentives. Consumers' health and safety is at the centre of current legislation affecting food waste (Bagherzadeh, Inamura and Jeong, 2014). Legislation specifically directed to reducing food waste would be a step forward. Politics (and thus legislation) in itself isn't worth anything, but it has the potential to create value. The real value of policies lies in its

potential to extracted value from the results of the policies in the future - in the case of food waste the value would be the future environmental, social and political benefits (Muniesa, 2017).

Reflecting on the research question for the thesis -how food waste is valued in Norwegian food waste legislation- it becomes clear that it is more about the lack of value, than anything else. Investigating the relationship between food waste and valuation further, has the potential to give a deeper understanding of the food waste issue. Social innovations play an important role in initiating new business models and industry standards in perspective to food waste. The initiatives established to map out and reduce food waste are increasing in numbers. Still, the impact on most of the initiatives remains unknown, with few exceptions. A vast amount of reports are written on the subject, but without agreement on terminology and methodology, and with the majority of the data being self-reported, the numbers available are both unreliable and speculative. Gathering new and vast amounts of data on the currents state of things is essential for society to move forward with the issue.

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