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i Innlandet**

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Food Waste Reduction in Oslo' Restaurants

An approach toward Sustainability

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Abstract

In the current era, the climate change and environmental sustainability are the most challenging issues and objectives. For this purpose, the sustainable development is required to combat climate change and to adapt environmental sustainability. So, organizational and businesses innovations for sustainable development can contribute in this battle. There is so much research which has already been done on the organizational innovations for sustainable development but, there is not much literature regarding businesses innovations to achieve sustainability especially in the restaurants businesses for the management and reduction of food wastage. The reduction of food waste in restaurants is very important to contribute to sustainable development in order to overcome climate change and environmental issues because; food waste has diverse negative environmental, social and economical consequences.

This thesis aims are to understand and find that, what are the reasons behind the food wastage in the restaurants of Oslo and making strategies and finding out the practices through which the restaurants of Oslo can reduce the food wastage if they implement those strategies and practices. There are ten interviews from ten different restaurants conducted for this thesis. The data collected through the semi-structured interviews provide the insight into the current state of food waste sources and thinking attitudes regarding food waste of the owners and management of the restaurants.

Although, all the restaurants implement some kind of practices and processes at a certain level to reduce the food waste in their respective businesses but it varies among the restaurants due to the knowledge and awareness of the owners and top management about the food waste's impacts on the environment, society and economy. Polishing the professional and managerial abilities of the owners and management of the restaurants and educating them, making legislations and granting funds for food waste management at government level, staff training working in the kitchens in restaurants and making them aware and responsible for environment and society are the main factors that can trigger the processes for food waste reduction in restaurants.

Key Words: Food Waste, Sustainability, Leadership & Management, Restaurants

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Abbreviations

- **CSR** – Corporate Social Responsibility
- **EU** – The European Union
- **FLW** – Food loss and Waste
- **FW** – Food Waste
- **GDP** – Gross Domestic Product
- **SDG** – Sustainable Development Goals
- **UNFAO** – The Food and Agriculture Organization of United Nations
- **UNICEF** – United Nations International Children’s Emergency Fund
- **WCED** – The World Commission on Environment and Development
- **REG** – Renovasjons og gjenvinningsetaten (The Waste and Recycling Agency in Oslo)

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1 Introduction

Food lost and waste is a global problem which receives an increasing amount of attention from government, non-government organizations, industry and media. Each year, we lose and waste around 30 - 50 percent of the edible parts of food that is produced for human consumption globally (Gustavsson, Cederberg, Sonesson, Van, & Meybeck, 2013). When converted to calories, it becomes approximately 24 percent of all calories produced for human consumption is lost or wasted somewhere along the food supply chain – from farm to fork. That is 1.3 - 1.5 billion tons of food wasted annually that could have been consumed by, and improved the livelihoods of the impoverished people in the world. Instead, it often ends up in the landfills where it rots and produces methane and a potent green house gas. Food lost and waste by its very nature, extremely inefficient and has negative environmental, economical and social impacts (Lipinski et al., 2013).

The food wasting is a global issue not because of its ethical concerns that reducing the waste can feed the hungry but also for environmental consequences of food waste (Derqui, Fayos, & Fernandez, 2016). It is a big challenging issue that the human kind is facing in era, sustainable management and reduction of food waste is a momentous research area that has grown recent years (Garcia-Garcia et al., 2017). The main environmental impacts from food waste and loss are soil degradation, water and energy consumption, pollution and biodiversity loss, air pollution and waste disposal. Approximately, 88 million tons of food annually wasted in European Union. In the developed regions the food waste loss at the consumption level is 31-39% and this wastage is not only has negative impacts on environmental but it also have problems for global economy and food availability (Aschemann-Witzel et al., 2015).

The economic costs due to food waste and loss is reach to 18.3 billion dollars a year globally and it is estimated that, 27 kg per capita of food waste is generated by the food service and catering sector in old EU members and about 12 kg per capita in new EU members states (Huang, Liu, & Hsu, 2020) . When we talk about the economic impacts of food waste, the food waste affects all the individuals and organizations involved in the food supply chain and have a large economic impact. There are many economic costs of wastage and understanding them may encourage behavioral changes to prevent food waste as saving money is one the driving factors in food waste prevention behaviors (Thyberg & Tonjes, 2016).

Literature on the economic analysis of food waste is in short supply. The studies which are based on economic reasoning focus on economic costs of food waste and benefits which we can get from the reduction of food waste but the trade-offs are rarely into account in a methodical way. The first precise implementation of economic theory to analyze the impacts of food waste reduction concludes that the impacts are likely to be ambiguous and there is need to quantify the exact impacts. The study sketches the framework that can be used in an economic analyzes of food waste reduction but due to the absence of data it remains hypothetical. There are different types of tools and model-based studies such as, EGE (Computable General Equilibrium) models at country level or global level, trade models, partial equilibrium models or econometric methods, some models and methods from all of them focuses on down-stream stages of production and some of them pay attention to earlier stages. All of these models have different assumptions and structures but almost all of these studies report the main findings as, significant economic benefits and reduced environmental impacts from agriculture production, improved food safety, decline in agriculture production and limited impacts on GDP (Rutten, Nowicki, Bogaardt, & Aramyan, 2013).

There are some studies in the literature which explain the food waste on the base of economic behavior and about the benefits of food waste reduction. These studies say that, food lost and waste should be a rational decision which should be based on economic costs and benefits of food waste reduction as Food waste reduction would decrease the number of undernourished people by 63 million in developing countries. These studies offer a different view that associate food waste to the inability of economic agents to apply food waste actions because of irrational behavior, asymmetric information, and organizational problems. Once the trade-offs and costs taken into account then food waste reduction will have distributional impacts by redistributing wealth/income among different regions and economic agents (Britz et al., 2019).

When we calculate the amount, the direct economic consequences of food wastage (fish and seafood not included) have calculated up to 750 billion dollars annually. A research has found that, a global quantity of food wastage is estimated at 1.6 billion tones of primary agricultural product equivalent, from which total edible part of food wastage amount to 1.3 billion tones. Due to this loss at global level, the demand for food in developed countries has raised which in turn makes the food too expensive for poorer nations (Kotyková & Babych, 2019).

Food waste impact on environment is particularly concerning because the population of the world is growing very fast and consumption habits are also changing worldwide which leading to higher global demand for food and amplifying environmental pressures (Tonini, Albizzati, & Astrup, 2018). One of the ways to reduce the environmental impact of food waste is to minimize the amount of food which is discarded (Al-Rumaihi et al., 2020). The food wasted is a considerable component of the food system challenges in the world because the population in the world is growing, urbanizing and getting wealthier which is leading to an increase in demand of land, resources and intensive food such as meat and dairy (Corrado et al., 2019). On the other hand, it is estimated that, growing population and consumption growth worldwide is going to lead an increase in the global demand for food for at least 40 more years which can be possible through intensified use of natural resources as land, water and energy. For this purpose, making the restaurants and food systems more sustainable is both essential and urgent, and achievements are needed throughout food systems to moderating the demand, producing more food, improving governance and reducing the food waste (Thyberg & Tonjes, 2016).

1.1 Aim of research

The main purpose of this research thesis is to find the means and system to reduce the food waste in Oslo's restaurants. The restaurants included in this research are the small and medium size restaurants and they are not part of any large chain of food industry. Research shows that, these kinds of restaurants and businesses have limited capacity to be innovative in term of implementing sustainability in their restaurants. According to Jacobs & Klosse (2016), these businesses have simple structures and lack of knowledge deficit as well.

When we talk about executing the sustainability and developing sustainable policies in restaurants, the studying food waste and its reduction in restaurants is very important and provides a foundation for it. According to an article on the Norwegian government's official website (Agreement to reduce food waste, 2017), in Norway, a minimum of 355000 tons of fully edible food is discarded each year in which numbers from the service industry are not included. The 1/3 of this food waste is producing by food industry as restaurants (Regjeringen, 2017).

Norway is one of the leading countries in Europe who is having many initiatives against food waste. Norway is also playing a very important role to achieve UN sustainable development

goals (SDGs) agenda 2030. So in order to reach the 3 out of the 17 UN SDGs as (Zero Hunger, Climate Action & Life on Land), it is very important to eliminate the food waste from the most populous city of Norway to preserve food and eliminating the hunger globally and diminish the horrific impacts of food waste on environment. There is some big Norwegian hotels chains name as THON & Scandic hotels who are already trying to reduce the food waste through implementing their own strategies but at the restaurants level these kinds of efforts are very less. There are some specific restaurants that have developed their business models through which they are also going to achieve sustainability.

For example, one Norwegian restaurant name as “Restaurant Rest” has developed his entire business structure and food menus which are totally about food waste reduction efforts. The restaurants turn food waste into a fine dining experience. But in Oslo, when we talk about the Asian restaurants, there are so many restaurants which are not playing their role regarding food waste reduction and don’t know about the consequences of food waste in their restaurants. For example, there are many Indian, Pakistani, Thai and Arabic restaurants in Oslo who have a large amount of turnover of sale every month and producing a large size of food waste, but the owners and managers of these restaurants are totally unaware about, what is UN sustainable development goals agenda 2030. For this reason, we can say that the research findings of this thesis will be very assisting to achieve the goals specially the goals about food nutrition and security and protection of environment through the elimination of food waste in the capital of Norway. This project is also going to be very helpful for all those hotels in Norway who have made an agreement with Norwegian Government that hotels and restaurants in Norway are going to take action with their specific goals to reduce food waste by 20 percent within 2020. On the other hand, there is another agreement which have signed by five ministries of the Government of Norway and twelve food industry organizations name as “Industry agreement on reduction of food waste”, in which it is stated that, Norway will make the food waste halve across the food value chain within 2030 (Regjeringen, 2017).

1.2 Problem formulation

In the light of our aim, our problem formulation is,

“Why the food waste is occurring in the restaurants of Oslo & how can we include Oslo’s restaurants in this fight in order to play their role to achieve the sustainable goals regarding food nutrition & security and environment?”

In other words, I am particularly interested in knowing the reasons behind food waste in restaurants and analyzing the thinking attitudes and the level of knowledge & awareness of owners and top leadership of the restaurants that how they conceptualize food waste and its impacts on environment & society, what they know about sustainability & through which ways we can involve them in this battle against food waste. For this purpose we have build up two research questions.

1.2.1 Research questions

- 1. What are the basis and quantity of food waste in Oslo’s restaurants?**
- 2. Which measures should be taken to reduce food waste in Oslo’s restaurants?**

In the light of these research questions and through our interview questionnaire, first we will identify those multiple drivers and behaviors which are the root causes of the food loss & waste in the restaurants and second, on the base of our identifications, we will set the measures through which we can eliminate those root causes to reduce food loss & waste.

2 Theory/ Literature review

2.1 A sustainable interplay

The sustainability concept is not a new concept and it has a long history and is evolving over time to time. This evolution has been affected by different intellectual and political streams of thoughts that have molded these concepts (Kidd, 1992). Sustainability has been defined in many different ways over the few decades, but has often set its focus on environmental concerns (Sheth, Srithia, & Srinivas, 2011). According to the report of The World Commission on Environment and Development (2011), the most widely known and used definition of sustainability is “the development which meets the needs of the present generation without compromising on the needs of future generations. This definition highlights the importance of environmental quality and the conservation of nature’s assets in consumption (Huang and Rust, 2011). The concept of sustainability is ambiguous and debatable; it was applied to various industry sectors in different ways. While there have been numerous definitions and critiques of sustainability related concepts. The best definition of sustainability originated from the ideology of sustainable development “meeting the needs of the present without compromising the ability of future generations to meet their own needs” which is addressed in report of the world commission on environment and development (WCED) name as “our common future (Brundtland, Khalid, Agnelli, Al-Athel, & Chidzero, 1987).

Sustainability varies according to the arena in which it is applied. Literature defines and redefines sustainability across varied temporal and spatial scales. It agrees on the presence and interconnectedness of environmental, social and economic domains. Sustainability developed as a response to quantitative environmental and economic data that indicate that current trends in economic growth were not viable in the long run (Gibson, 2006). Problems in any of the three domains would directly affect the other two domains for current and future generations (Sadalla, Guhathakurta, & Ledlow, 2005). For example, a breakdown in the environment on any scale would directly impact social and economic realms of activity (Berke, 2002). A sustainable future depends on harmonious interplay between businesses, society and environment. Today we are experiencing a comprehensive sustainability problem because of the activities of the businesses generating large amount of food waste. Over time, companies are going to depend on a sustainable society, in which there is trust, educational institutions that can provide workers with

needed skills and well-functioning democratic systems as well as political and legal institutions that make business operations possible. When these assumptions fail, it harms companies that depend on these conditions (Jørgensen, & Pedersen, 2018). Sustainability requires trade-offs which are across times. For example, businesses should chose between investing less for small profits as soon as possible and investing more to get the large profits later (Bansal & DesJardine, 2014).

Both, businesses and society exist within environmental boundaries (Ingebrigtsen, & Jakobsen, 2007). This does not relate to only the physical environment on land. The environment extends deep into the oceans and far into space (Rockström et al., 2009). Society and environment are both embedded in the ecological system. Businesses and society are independent, and both of these two systems are reliant on nature. Earth can exist just fine without the humans but humans are completely dependent on a viable ecological system (Rolston, 2006). On the other hand, all businesses activities also dependent on inputs from nature, and it leaves behind a significant footprint on the environment (Jørgensen, & Pedersen, 2018). The natural environment and economy are interlinked. Nature plays a very important role in supporting economic activities directly or indirectly. Directly, it contributes by providing resources and raw material such as water and minerals which are necessary as input for the production of goods and services. Indirectly, it contributes by providing services by ecosystems such as carbon sequestration, water purification, managing flood risks and nutrient recycling (Everett, Ishwaran, Ansaloni, & Rubin, 2010).

Figure 1: Economic growth vs. environmental sustainability



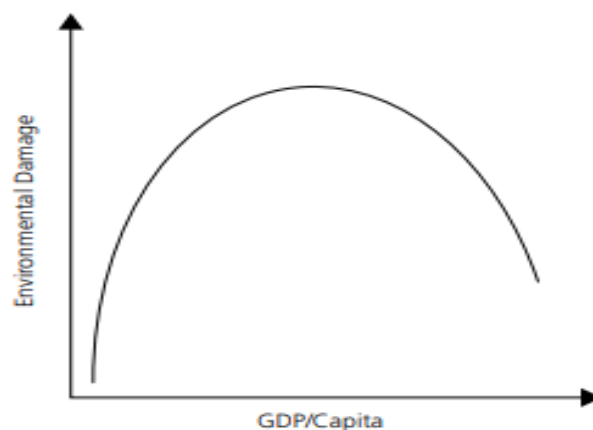
Source: Economic growth or environmental sustainability: Do we have to choose? Nicole, 2018)

Therefore, we can say that saving the natural resources is vital for securing economic growth and development not just for today but for future generations also. Relationship between economic growth and environment is not easy to understand. There are many different drivers which we have to observe first including the scale of the economy in the light of share of services in GDP as opposed to industries and manufacturing and change in the technology which can reduce the environmental impacts of production and consumption decisions while driving the economic growth on the other side. Sustainable economic growth also require the decoupling of the production of goods and services in a way which is not harmful for environment which means that consuming the environmental and natural resources in a sustainable manner and we can do it by improving the efficiency of resource consumption and adopting new production techniques and product designs (Everett et al., 2010).

Economic growth means an increase in the level of goods and services which is produced by the economy which is estimated by measures such as Gross Domestic Product (GDP). GDP reflects the value of goods and services which is provided through the market but there are many others things which are not provided through the market but contribute to overall welfare of wellbeing. For example, there are many services which are provided by the natural environment and facilitate the economic activities and increase the society's wellbeing. While economic growth produce many benefits, raise standard of living and improve quality of life but it is also a cause for depletion of natural resources and the degradation of ecosystems (Mittal & Gupta, 2015). There has been debate over whether it is possible to achieve economic growth without depletion and degradation of environmental assets. Many researchers believe that, it is just possible by using environmental resources sustainably. But when we go in deep, there is always an environment cost which we don't add in the price of product so there is no provision to make sure that, these sources will not be depleted in the near future. There is only one point where we can interlink sustainable development and economic growth where these two things can grow side by side is that, using our resources in a sustainable way (Nolberto, 2004).

The Environmental Kuznets Curve (EKC) describes the relationship between economic growth and environmental quality. While we analyze the curve, it refers to the hypothesis of a U-shaped relationship between economic output per capita and some measures of environmental quality.

Figure 2: Environmental Kuznets Curve



Source: Economic growth and the Environment, (Defra evidence and analysis series, 2010).

There is a relationship between per capita income and environmental degradation. When the GDP per capita rises the environmental degradation is happening. However, there is a certain point, when increase in the GDP per capita can lead to reduction in environmental damage. Because due to the effects of behavioral changes, at first society shows interest in higher level of consumption without considering its other factors but after a certain point society become more conscious about other factors such as quality of life and environmental factors of more consumption (Everett et al., 2010).

2.1.1 Sustainability in restaurants

The concept of sustainability has been central to many tourism, hospitality and restaurant sector in terms of managing social, environmental, cultural and economic concerns. There is increasing recognition that the restaurant sector has demonstrated an active engagement in sustainable management practices through various industry associations' initiatives. Restaurants and Coffee shops are defined as “enterprises involved in the sale and provision of meals and drinks, ordered from a menu, prepared on the premises for immediate consumption and with provided seating. Each restaurant is defined by its food offering, location, clients and experience it offer. A restaurant becomes a space that satisfies a number of needs of its customers and potential customers. It includes celebrations and rewards, pleasurable eating experiences, satisfying of food cravings and convenience (Katsigris & Thomas, 2006).

There is a limited discussion on how restaurants can contribute to fostering wider sustainability efforts. In order to engage in wider sustainability practices, it is necessary for restaurant operators to move beyond current initiatives and consider alternative ways of doing business, eating and living (Moskwa, Higgins, & Gifford, 2015).

Sustainability is commonly understood to require the balanced pursuit of three aspects such as, ecological protection, social equity and economic welfare (Saarinen, 2006). There is evidence that a significant share of global food is thrown away. How to reduce the food waste is a very big challenge which the food industry is facing. Food waste reduction can improve future food availability in the context of global population growth and can increasing resource scarcity. The food and agriculture organization of United Nations (FAO, 2009) estimate in a report name as “how to feed the world in 2050” that, the World population will reach 9.3 billion by 2050 and

this growth will require an increase in food production by about 70 percent. Reducing food waste across the entire food chain will be a key part of any strategy to sustainability and equitably feed the World's growing population (Foresight, 2011).

Food waste occurs at different stages of the food value added chain, in high income countries this is usually at the end and, in low income countries it happens at the beginning. So, all around the world approximately 1.3 billion tons of food designated for human consumption is either lost or wasted (FAO, 2013). Several studies have been conducted on reduction and prevention of food waste, but their focus has been mainly on the prevention at the production stage and other that go past this stage put emphasis at the retailer level. This has led to less research being conducted in areas such as hospitality sector which includes restaurants. Government and private organizations have been slow to encourage restaurants to implement food waste prevention measures and restaurants have been similarly slow to act. Academic research regarding food wastage in restaurants has predominantly focused on food waste management options such as the cost benefits of anaerobic digestion or sorting food waste at source as opposed to food waste prevention (Bernstad et al., 2013).

The Food and Agriculture Organization of United Nations (UNFAO) study on food waste did not specifically estimate the amount of food waste produced globally by the restaurant sector; however, other studies indicate that, this sector is very related and significant because the hospitality and catering sector of Europe is contributing 14 percent in the whole food wastage of Europe (Gustavsson et al., 2011). The restaurants are in the process of achieving sustainability. However, most restaurants including those that are trying to reduce energy and water consumption, have not achieved full sustainability. Therefore all restaurants are suited at some point on a continuum of sustainable development. Every restaurant in food business, no matter how well organized, very often ends up throwing away food. There is just no way to predict exactly how many portions of food people are going to buy or consume in a day. On the other hand, throwing away food is not ethically bad but it is also bad for environment, if we just think about all the resources and energy that used for food production (Monier et al., 2010).

There is a need for food waste reduction should be a major concern for individual restaurants as well as society. Restaurants are gradually moving toward more of a preventative approach to

food waste, with organizations and industry publishing guidelines around how restaurants can avoid food being wasted in the first place, and restaurants implementing more efficient, top down approaches to prevention (Nordic Council, 2012).

But this movement has been slow and there continuous to be a real need for research into food waste prevention in restaurants and particularly, the sustainability issues regarding environmental protection should be set as benchmark for food waste minimization in restaurants. On the other hand, consumers in this era also getting more and more interested in sustainability generally and making more sustainable choices and food has become an important issue in the sustainability debate (Yıldırım, Yıldırım, & Gedikli, 2016). The political underpinning of sustainable development governance rooted in as “development that meets the needs of this generation without jeopardizing the ability of future generations to meet their own needs”. This marked a shift to addressing social and cultural needs as critical, with a focus on the south and the issue of the poor (Brundtland et al, 1987).

2.2 The concept of food loss and food waste

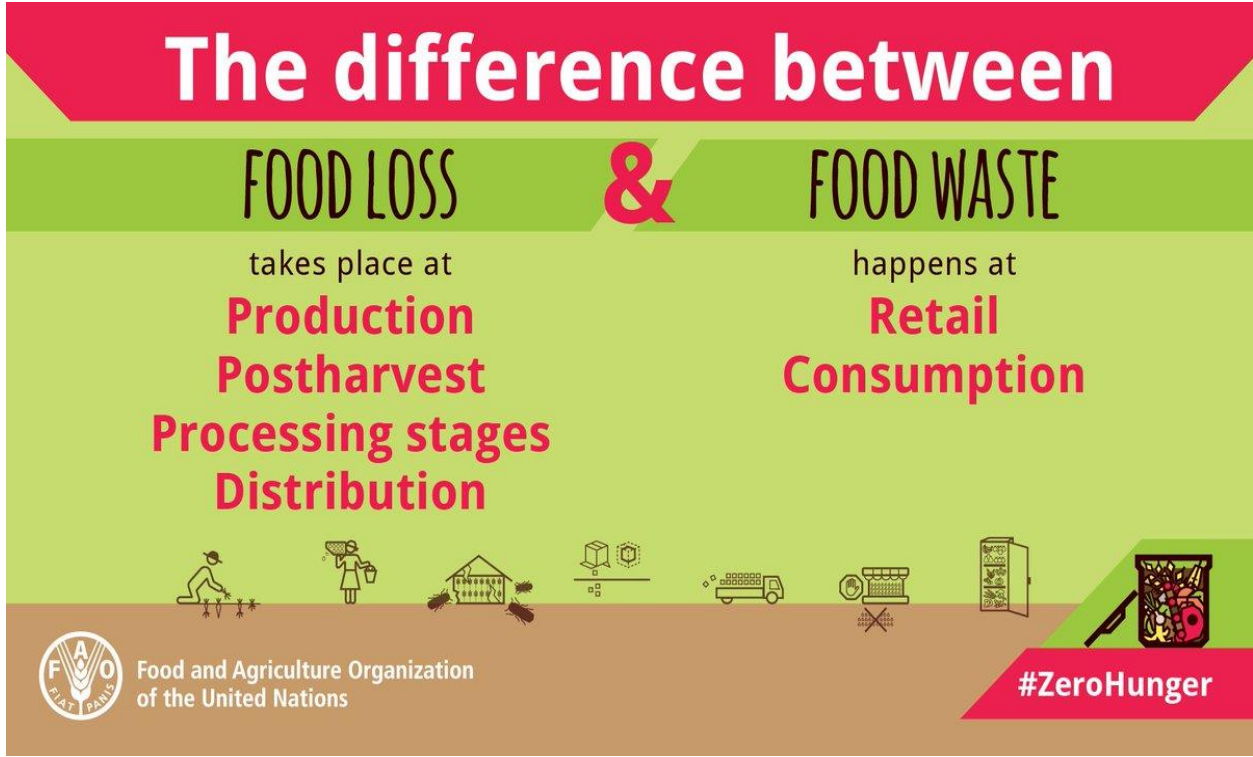
Food waste is a concept whose definition may vary depending on the country and research through which it is being analyzed (Liu, 2014). In 1981 in the research Food loss prevention in perishable crops from FAO, food was defined as “wholesome edible material intended for human consumption”. From this research and considerations the cause of food waste, the definition of food waste is “wholesome edible material intended for human consumption, arising at any point of the food supply chain that is instead discarded, lost, degraded or consumed by pets”. Food loss refer to decrease of quantity or quality of food at early stages of the supply chain, whereas, food waste refers to the discarding of food suitable for consumption at later stages of the supply chain and it is often related to human behavior (Parfitt, Barthel, & Macnaughton, 2010).

Food waste tends to be food that has fine quality and is suitable for consumption, but does not get consumed because it gets discarded, before or after it is left to perish. It typically takes place at the retail and consumption stages in the food value chain (Papargyropoulou, 2019). The causes are the negligence and conscious decisions made by the restaurant owners to throw away food. Both, food loss and waste happen all over the world but food loss tends to be more prevalent in developing countries, while food waste tends to be more prevalent in developed countries

(Lipinski et al., 2013). The drivers that produce food waste and the solution to it are different from those of food losses; food waste is recognized as a distinct part of food loss (FAO & UNICEF, 2017).

In the case of restaurant industry, a food item becomes waste when it failed to be used by a customer or an employee of a food service or restaurant operation. Food waste consist on both, food and beverage for customer’s consumption and kitchen waste such as eggshells, fresh food trimming waste, oils, spoiled and expired products. Food waste falls into two categories such as, pre-consumer food waste and post-consumer food waste. Pre-consumer includes overproduction, spoilage; expiration and trimming waste, while post-consumer referred as plate waste or food items left or discarded by the customer (Baldwin & Shakman, 2012).

Figure 3: The difference between food loss & food waste



Source: FAO (2017) report of United Nations

The food losses are unwanted results of agriculture process and technical limitation for storage, infrastructure, packaging and marketing. Food losses are losses that occur in the production, processing and distribution stages such as, through spills, spoilage or abnormal reduction in quality (Weingärtner, 2009). Food losses are highly prevalent in developing, low-income regions such as South Asia, where around 40 percent of food loss and waste occur in the post-harvest and processing stages (Mittal & Sethi, 2009). On the other hand, food waste tends to be food that has fine quality and is suitable for consumption but does not get consumed because it gets discarded – either before or after it is left to perish. Food waste takes place at the retail and consumption stages in the food value chain. The causes can be negligence or a conscious decision to throw food away. In the case of restaurant industry, a food item becomes waste when it failed to be used by a customer or an employee of a food service or restaurant operation (Lipinski et al., 2013).

2.3 Causes of food waste in the restaurants

The sources of food waste in restaurants and canteens are clued meat, cereals and vegetables, while the main sources for food waste in service industry are oversized dishes, buffet of fixed price, use of single portion packs for jams, juice, milk, underestimation of demand, ordering too much, disliked ingredients etc. The different factors determine food waste related attitudes and behaviors which include gender, age, income, family size and education. Studies show that, young people waste more food than old people and large household and household with higher income generate more food waste in total (Dagiliūtė & Musteikytė, 2019).

While we talk about people's behavior, an in-depth qualitative study in the UK has found that people show a resistance to wasting food not as a result of a global citizenship but they do it because of the expression of ethic, responsible and conservative use of resources. Therefore, our efforts to influence customers to decrease the food waste just should not focus on climate change or food security but it should also focus on to give opportunities to make people to act ethically and responsibly as well (Kennard & Bamford, 2019). Overstocking is the main issue which leads to FW because restaurants more stock in rather than run out of items and prefer to have a broad collection of available menu options (Stuart, 2009).

Food waste occurs at different stages of the food chain from the supply to the after-service. It is impossible for a restaurant not to produce any waste at all costs. Food waste generation does not indicate poor operating practices, since it take place due to various comprehensible and sometimes, inevitable reasons. As food waste is categorized in two groups such as pre-consumer and post-consumer food waste, the causes of them are different. Pre-consumer food waste is often caused by the reasons stated in Table-1 and the table also summarizes the main causes of food waste in the restaurant and hospitality industry which is mentioned in the book name as Green Food & Beverage Services written by (Baldwin & Shakman, 2012).

Table 1: Causes of food waste

Causes of food waste	
Pre-consumer	Post-consumer
Unidentified demand	Large portion sizes
Overstocking	
Inefficient production	Inefficient service model
Poor communication	
Staff behavior	
Unskilled trimming	Customer's menu acceptance
Over merchandising	
Food safety	

Source: (Baldwin & Shakman, 2012)

Buffet style is a common reason for food wastage. The restaurants who serve the buffet admitted that, it's a big headache because they cannot predict approximate the number of customers and the food they are going to consume. The requirement for preparing the varieties of food items on daily basis is also the reason in generation of FW because all the items in menu we have to prepare every day (Katajajuuri, Silvennoinen, Hartikainen, Heikkilä, & Reinikainen, 2014).

Most of the restaurants don't make and keep the accurate records of the quantity of FW on daily basis. At the end of the month, the kitchen chefs and management just make a prediction of waste in the past month and add it in the accounts. While we talk about the quantification of wastage, it is essential for development of effective and well-planned food waste management policies and can be useful to determine food waste recovery and prevention in future. Management and staff may change their attitude and behaviors when they understand the extent of food waste (Thyberg & Tonjes, 2016).

Over production and over preparation are also sources of FW in restaurants which occurred due to errors in demand forecasting. The foods which overproduced are ready to consume but has a short life ranging to 24 hours in average (Garrone, Melacini, & Perego, 2014). Poor knowledge of labeling and expiry dates on products is also the cause of food waste in restaurants. The producers print the expiry dates on the products which are generally earlier than the actual dates when the food becomes unsafe to eat because of the possible food safety risks, associated liability on the producers and suppliers and government food agency. Therefore, this can lead to unnecessary disposal of food which was actually still safe to eat. The best-before date labels don't interpret the food safety but, these are used by manufacturers to mention the peak quality. If the food handled properly, even after the best-before date has passed it should be safe to use the food. It does all depend on the consumer's perceptions that, how they interpret the labels and dates and how they use the food. Some studies say that, how the labels and dates affect the consumer's perceptions it does depend on the value of food products (Collart & Interis, 2018).

While we talk about the large portions they also generate the significant amount of food waste because large portions increase the probability that the customers will waste the food because most of times, but it's not possible for everyone to eat all the food. Serving large portions can be attractive for restaurants but it is not good while we are trying to implement food waste reduction

practices in the restaurants. As an example in the U.S., the average customers in the restaurants cannot finish 17% of the food they order and 55% of food they leave as leftover behind (Kennard & Bamford, 2019).

2.4 Circular economy model for restaurants' sustainability

The circular economy is an industrial and social concept which follows the sustainability goals through a culture of no waste and suggests a closed-loop of material flows in the economy. Sustainability issues and natural resources on the earth have required governments and businesses to adopt policies which can achieve resource-efficient economies. Circular economy is getting world's attention as a best way for the society to increase prosperity and reducing dependence on natural resources and energy through making the current production models based on continuous growth and output (Jørgensen & Pedersen, 2018). Circular economy is sustainable development strategy and economic model which integrate and inter act the economic activities and environmental issues in a sustainable way for balancing economies and environmental and social aspects. It is a system in which common grounds are set between ecology, knowledge and innovation to create the synergies between economy, society and democracy (Julião, Gaspar, Tjahjono, & Rocha, 2018).

There are large numbers of global sustainability forces that are driving us toward circular. For example, challenges like resource scarcity, global pollution, reducing global stock of natural resources and environmental decline are driving the need for change. In this era, shifting toward circular economy is one of the important challenges for governments, companies and communities. It is also a key opportunity to enable progress toward the UN sustainable development goals including halving food waste by 2030 and zeroing hunger and improving resource efficiency (Geissdoerfer, Savaget, Bocken, & Hultink, 2017).

Implementing the circular model in our restaurants can reduce the food wastage in our restaurants as well as can help us to obtain one of our important sustainable goal as zero hunger through reducing the food waste. On the other hand, circular benefits also includes increase in efficiency and profitability, reduced cost, better innovation and strong relationship with customers, business competitiveness, sustainable economic growth through waste to value initiatives (Jurgilevich et al., 2016). According to the KPMG report on "fighting food waste

through the circular economy”, the aim of the circular economy is to avoid waste and preserve the value of resources like, raw material, energy and water for long as long possible. There are five principles of circular economy, first, waste no longer exists, second, materials and resources are renewable and recyclable therefore they should be reused, third, try to reuse the products as a whole if not then it should be recycle, fourth, we have four options to reuse the material like, repair, reuse, refurbish and recycle, fifth, make use of renewable energy. So, if we apply these principles in our restaurants to tackle the food waste, it is good for environment and our communities as well as our business (Ben, Amanda, & Sally, 2019).

Governments, universities, research bodies and financial institutions also play an important role in the implementation of circular economy model. For example, government will help through policies, incentives and training. Universities and research bodies can also include circular principles regarding food systems in the education courses. Financial institutions can help circular economy models through incentives and direct capital investment for businesses with circular models (Jørgensen & Pedersen, 2018).

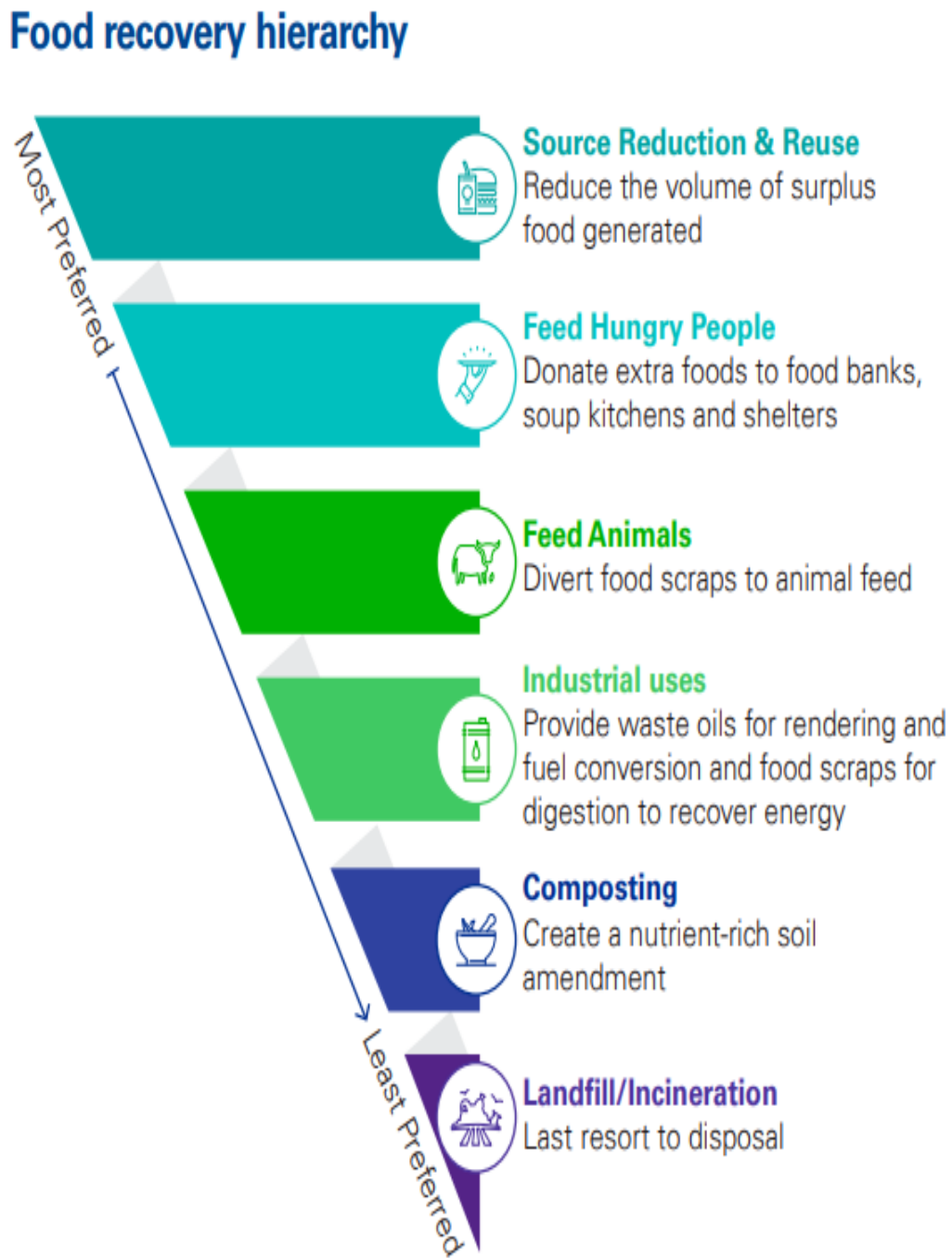
If we talk about the government’s efforts to implement circular economy model in the industries and businesses even these are food industries or restaurants businesses, the government’s policies, regulations and incentives regarding this matter can be very helpful. The dysfunctional conducts that occur between industry and government are the causes of FLW. It’s depend on these two forces that how they interact for this mutual goal’s achievement. The governments should incentivize and support industries and businesses to reduce FLW through policies, regulations and programs. On the other hand, it also depend on industry and businesses senior leadership that how they align those policies and take bold steps to achieve the revolution required reducing FLW (Gooch, Dent, Felfel, Vanclief, & Whitehead, 2016).

The circular economy principles of reduce, reuse and recycle apply to food as decreasing in volume lost to waste, redistribute surplus food and create new value from waste food. There is food recovery hierarchy address food waste according to circular mindset in which the best outcome is to reduce the volume of surplus food or reuse it and least favorite outcome is to send food waste to landfills. In the circular model, we have an important duty to design food products, recipes and menus which are healthy for people and the environment. It is also about the food

packaging through which we preserve food which is also compostable so it be recycled as nutrients into the soil (Banks, Heaven, Zhang, & Baier, 2018).

The food recovery hierarchy chart below illustrate that, when we talk about the food waste in restaurants in the logic of circular economy model, we should try our best to reduce the volume of surplus food generation in our restaurants which is most preferred. On the other hand, even if we generate food surplus or food waste even after our best efforts, it should be used in a way for example, helping the needy people in society and reduce hunger, feed animals, give it for industrial use or dispose it in a way which not harmful for the environment and disposing it should be the least preferred option (Ben et al., 2019).

Figure 4: Food recovery hierarchy



Source: (Ben et al., 2019), *Fighting food waste using the circular economy*.

2.5 The role of top management to achieve sustainability in restaurants

The role of top management is one of the crucial internal drivers regarding changing the businesses attitudes toward environmentalism and setting the tone for implementing ecological practices (Kiesnere & Baumgartner, 2019). It's all depend on managers, the greater and well they emphasis to implant good environmental practices into their organization whether it is culturally or structurally, there will be a better rate of success in adoption of environmental programs due to their commitment and work culture. On the other hand, when the commitment of the top management is detached and there is lack understanding between environmental and economic costs relationship, it could be a barrier to an organization's initiatives for implementing environment friendly practices. While we talk about the lower management and staff, the environmental education programs and training is also crucial for them to make the businesses sustainable and to succeed these kinds of programs, top management should also reward the staff who commit to these kinds of company's policies and practices (Kasim & Ismail, 2012). Leadership is all about the abilities to motivate the staff and make them aware and skillful because, in this way they can change their behaviors (Graham-Rowe, Jessop, & Sparks, 2015). To clarify the problems and provide as a vital waste prevention measure staff training also plays a very important rule (Thyberg and Tonjes, 2016).

The management of restaurants put the environment and other factors at second but, at some point, they show concerns for developing practices and implementing strategies, training their staff and fixing labor times and administration costs to reduce FW. In spite all of this; the idea for saving money is the only powerful motivator behind the prevention of food wastage for them (Graham-Rowe, Jessop, & Sparks, 2015). The attitudes of owners of the food businesses have a big impact on the wastage of food because the policies and practices of their restaurants guided by the profit and loss margins. The businesses need to achieve customer satisfaction and stay competitive in the market therefore they just try to meet customer's needs to get their loyalty and don't have any concern about that FW taking place in this process (Heikkila, Reinikainen, Katajajuuri, Silvennoinen, & Hartikainen, 2016).

Operational improvements through managerial practices such as introducing innovative processes and developing green restaurants management standards and social responsibility require a degree of new knowledge and vary in degree of newness for adopting firms

(Lampikoski, 2012). Food waste management practices has not been the part of managers' practices in the literature until recently. Managers' practices in the restaurants to reduce food wastage requires creativity, procedures, beliefs, awareness and knowledge, setting goals and actions and a sure from of improvisation because many forms of waste are anticipated but others are not and some are avoidable and some are not (Chou, Chen, & Wang, 2012).

Three main drivers name as, favorable cost analyses, changing the business models as sustainable business models and experimentation with existing management practices which can help management of the restaurants to take initiatives regarding waste management practices. A cost oriented initiative includes business practices based on cost saving analyses and the other two drivers depend on the manager's engagement orientation and proactive innovative orientation. The proactive approach involves a set of innovations through which restaurants can introduce new management practices or changing their existing business model by building sustainable waste practices. On the other hand, build partnership to modernism the working styles by co-operating with other stakeholders such as suppliers, local authorities, associations working for reduction of FW and waste management companies can also be useful (Martin-Rios, Demen-Meier, Gössling, & Cornuz, 2018).

3 Methods/ Research Strategy

This research is practically oriented because our plan is to give concrete recommendations to restaurants reduce the food wastage; it is exploratory because the food waste field has only newly emerged, especially the focus on restaurants and obstacles and drivers to reduce food wastage in the restaurants to achieve sustainability.

This research is qualitative because there are some reasons. First reason is that, the data on food waste in restaurants is often non-existent or measured. The second reason is that, it would be difficult to distinguish between the exact amounts of food waste caused by chefs during the preparation of food in the kitchens, food left at the dining table not eaten by customers and mismanagement of stocks of food ordered by hotel managers which are not used and go to wastage after expiry date. Qualitative research is used when there is no prior information, theories or the research on the phenomenon and the phenomenon is new as an object of research. While quantitative research produces numbers to structured questions, qualitative research produces words and sentences to open questions to help the researcher gain an in-depth understanding of a phenomenon. It is more flexible than the quantitative research in the sense that, the research results direct the progress the research. The interpretations and findings are dependent on the researcher. However, this does not mean that, the researcher can produce wrong results and interpretations (Kananen, 2013).

The qualitative approach used in this thesis provides an insight into the perceptions of the community studied, as well as their intentions and experiences and the attitude and behavior of restaurants owners toward food wastage. In the qualitative research, subjects are selected based on the fact of whether they themselves are individually relevant to the subject being investigated, as opposed to simply representing the target population of the study (Koch and Vallgård, 2008).

The thesis aim is to study the questions, how the Oslo's restaurants can deal with food wastage and can reduce it, in other term, how to improve their waste management systems. Evaluating a management system is not an easy task because management is a daily ongoing process. There is no previous study on, how to reduce food wastage in Oslo's restaurants, thus, it is a new research topic. For this purpose, qualitative research method was chosen as the main research strategy.

Then, in the qualitative research we have chosen interview study method as research method. Qualitative research is about the nature, explanation and understanding of phenomenon. Unlike quantitative data, the qualitative data are not measured in term of frequency or quantity but rather are examined for in-depth meaning and processes.

Interviews are widely used as data collection tool in qualitative research. They are typically used as research strategy to gather information about participant's experiences, views and beliefs concerning a specific research question or phenomenon of research (Ryan, Coughlan & Cronin, 2009).

The way in which particular research strategy are applied can vary, depending on the goals of the research as well as the preferences and personality of the researcher. These differences we call style. Research styles can be vary in different ways, ranging from how much researchers rely on the published literature to how dogged they are in asking follow-up questions. It follows that, the main method of data gathering to access this way of knowing will be qualitative interviewing and observations. So, the qualitative way of research is suitable here, because qualitative research appeals to subjective ways of knowing and to a primarily qualitative methodology that captures experiential understanding (Stake, 2010).

3.1 In-depth qualitative research

As, we have selected In-depth qualitative research method, so I give a short description about, what is in-depth qualitative research. The in-depth qualitative research method is used to learn of individual perspectives. The questions which are used to guide the interview are often semi-structured, that a researcher formulate as a set of the questions which he/ she ask in all interviews. Then depending on the interviewee's answers, each interview take different twists and follow its own winding paths. Most questions in in-depth qualitative research are open-ended which allows the interviewees to decide if they want to give a short or long answer. The researcher is an active listener and encourages the interviewees to give their whole point of view using reflecting listening and follow-up questions, but also decide for when it is appropriate or not to continue asking, and when it time to close (Brounéus, 2011).

3.2 Semi-structured interviews

As, we have used the semi-structured approach in our in-depth qualitative study so here is a short description of semi-structured interviews. In the semi-structured interview, researcher has a specific topic to learn about, prepare a specific number of questions in advance and plans to ask follow-up questions. This approach encourage the interviewee to answer at length and in vivid detail and the researcher tries to focus more narrowly on the planned items that will be about the research questions. In-depth interviews, the researcher looks for specific facts, description of events that will help answer a particular and focused research question. It explore questions like, what, when, how, why, or with what consequences. The goal of these interviews is to work out a coherent answer to a research question by piecing together what a variety of people with different information and distinct perspectives tell you (Rubin & Rubin, 2011).

3.3 Questions development for interviews

Interview questions for this research were designed to examine awareness, knowledge, perception, attitudes and practices of actors in food business on wasted food. The prepared set of questions measured managers/ chef's attitude, knowledge and awareness level, business practices regarding food waste and their perspective on the importance/ need on reducing food waste and their future plans. First, set of questions examined interviewee's knowledge on subject matter and business attitude toward the key concepts. For example, the interview started with general questions on waste and if they thought FW as an issue that need to be dealt in their everyday business or if they were concerned to see how much food goes to waste and its effect on environment and society in the big picture. To understand their management practices questions such as, if they are following any national or international guidelines, if they provide specific training to their staffs, if they part of any association related with reducing food waste, how they deal with leftovers and expired items on a daily basis, if they have any special technique or strategies to avoid food losses were asked to the respondents. Questions were designed according to need of research questions. As we selected the qualitative approach for our research so it was essential to understand the present insight of the participants working place through their own experience and views.

Qualitative interviewing has three characteristics. First, the researchers are looking for rich and detailed information, not for 'yes or no', agrees or disagree responses. They are looking for experiences, narrative and stories. Second, the interviewer does not give the interviewee specific answer categories; rather, the questions are open-ended, meaning that the interviewee can respond any way they chooses, elaborating upon answers, disagreeing with the question, or raising new issues. Third, the questions that are asked are not fixed. The interviewer does not have to stick to a given set of questions or ask them in a given order; they can change wording or skip questions if they don't make sense at the time, or make new up questions on the spot to follow up new insights (Rubin & Rubin, 2011). On the other hand, Semi-structured interviews offer a more flexible approach to the interview process in which we can use an interview schedule for predetermined topics which allow for unanticipated responses and issue to emerge through the use of open-ended questioning. It allows an interviewer to peruse a series of less structured questioning and also permits the exploration of spontaneous issues raised by the interviewee to be explored. The wording of questions is flexible and facilitates different levels of language to be used and clarifications to be made by the interviewer (Ryan, Coughlan & Cronin, 2009).

3.4 Data collection

The data collection is about the objective and accurate reporting of statements provided by participants. Creating a comfortable and encouraging atmosphere in which the interviewee feels respected and safe is important for obtaining useful information and for ethical research. Reflecting listening skills are very important in this regard. For this purpose, the researcher's most important tools including empathy, an ability to listen and an ethical judgment of when it is time to stop. When we talk about the qualitative research, it is not necessary to collect data from everyone in the community in order to get a valid finding, only a sample of a population can be selected for any given study. The population can be determined on the basis of preselected criteria relevant to the study's research question (Brounéus, 2011).

In this research, the in-depth semi-structured interviews were conducted with key informants of 10 different restaurants of Oslo city. The number of participants was identified on the base of their knowledge and experience regarding food handling. The importance of availability to communicate personal experiences and personal opinion of the participants in an articulate,

expressive, reflective manner was also taken into considerations. The participants approached in this research were managers, assistant managers, kitchen chefs and cooks of 10 various restaurants of Oslo city, which had authority, ability to influence change and decision making in their respective workplace. On the other hand, they can provide valuable reflection of the overall management practices at all department levels of their respective workplace, which is why they were purposively chosen for interviews to serve answer to the research questions. Researcher had prior working relationship with some of the participants that made it easier to approach them for interviews.

3.5 Recording and coding the interviews

Most of the participants in this research were interviewed during their working hours finding time in between or mostly before they started their usual shift. At the beginning of the interview, participants were provided with an overview with the purpose of the study, intended use of interview data and the measure to protect their confidentiality and anonymity and the right to withdraw. They were asked for permission to tape recording and note taking. The questions were asked to engage in discussion. Firstly, few background questions were asked then the questions were asked which allowed the interviewee to get in the mindset of the food waste. The pre-prepared interview questions were used as a guide or to elicit further discussion of salient topic areas, if and when appropriate. Most interviews lasted approximately 40-45 minutes on average and with only their permission, were recorded and noted. Interview transcripts were then coded. The transcripts of the participants were read thoroughly and analyzed for meaningful interpretation. Initially, the researcher transcribed the tapes and notes taken of the conversations during the interview process. The transcriptions were checked and rechecked against the tapes, in order to make sure that, the transcripts accurately recorded the conversation. Through the process of transcribing the tapes of the conversations, the experiences described were transposed to written text. The transcripts were then examined and divided into statements. For the analyses purpose, statements were categorized in themes with the aim of finding similarities, differences and connections within phenomenon.

3.6 Ethical considerations

The protection of human subjects and information is very important in any research study. In the qualitative study also, ethical consideration have a particular character due to in-depth nature of the study process. Ethical issue becomes more notable when conducting face to face interviews with a group of participants. The ethical considerations for the present study were based on the principle that the research “does not cause harm, allow harm to be inflicted, or otherwise damaged the interest of any involved parties” (Arifin, 2018).

To achieve this purpose every participant involved in this study was communicated in a clear way the reason, objective and activities that they were going to be involved in if they agreed to participate in the study. Furthermore, the interviews conducted respected the privacy and confidentiality of the participants, allowing anonymity if they are requested so. Interviewees were given the opportunity to review their responses and statements and were given full autonomy to alter, modify or change what they deemed necessary. The following requirements had taken into account during the collection of data, the analysis of data and the discussion of the results. First, the respondents were explicitly consented to research, the respondents were properly informed about the research and data were processed anonymously. Because this is the non-sensitive nature of the research and subject anonymity, there was not a need for additional consent procedures. Respondents had freedom not to answer the questions whenever necessary, however such incident did not occur during data collection. Recorded statements are kept anonymous and will be described in research section below without the participant’s identity.

3.7 Methodological considerations

The topic reduction of food waste in the restaurant sector does not have a large amount of research available. Therefore, the qualitative approach was the best option to be adopted and, which is adopted when we deal with a new phenomenon, finding or one that has little research on it. Reliability and credibility are very important to assess the quality of research.

Reliability and credibility requires different kind of measures. The most important measure is validity which is about internal and external validity. Internal validity is about quality of the research design, in this case we can say that, the concepts about FW, sustainability, circular economy and sustainability of economic growth will measure the validity. Because, it is achieve

by the credibility of concepts. So in other words, credibility is the measurement of what the researcher claims to measure to determine acceptability of his/ her findings. In this project the interviews are used to determine whether or not the research results which have obtained are homogenous. We have achieved credibility by using consistent concepts which trigger the need to reduce food wastage in restaurants to make them sustainable and to boost economy. While the external validity in qualitative research is achieved by transferability, means the description of the circumstances in which the data are collected for example, environment and time (Bryman, 2012).

As, qualitative approach provide explanation rather than conclusions, so the results cannot be generalized due to contextual differences and the personal views and background of the participants can manipulate the entire outcome and findings (Kvale, 1996). The conclusions and results derived from this research may or may not apply to all restaurants in the Oslo city, but it is not may claim that it does. The empirical delimitation of this study is that, selection of participants related to food waste in restaurants in Oslo city, focused on the perception of participants toward food waste could not be found. The emphasis was placed on the participant's position regarding food waste, actions, decisions, and other options that they could have had observation, favor and the authority to address the issues. The participants in this research selected purposely and the researcher knew most of participants which could possibly temper the response and interpretation process.

4 Results

In this chapter, I have shared and summarized the findings of my research about making the restaurants sustainable and waste less in Oslo city. According to our problem formulation and research questions, our aim was to answer and find the means, quantity and sources of the food waste and building the system and finding and setting the measures to follow which are essential to reduce the food waste in Oslo's restaurants. For this purpose, I have structured my findings according to my research questions. As, we have two research questions, the first is about sources and quantity of FW, in other words, the reasons of the FW in restaurants. The second research question is about, examine and analyze awareness, knowledge, perception, attitudes, and practices of actors in restaurants to reduce food waste. It knows about the measures and actions to take which the owners and management of Oslo's restaurants consider as necessary or not to reduce the FW, in other words, the technique to reduce FW and knowledge of the owners and management regarding food waste. In the light of our problem formulation, I have summed up my interviewees answers under the two main heading according to our research questions as,

- **The reasons of the FW in restaurants**
- **The techniques to reduce food waste and knowledge of the owners and management of restaurants regarding FW**

4.1 The reasons of the FW in restaurants

When participant were asked about the quantity of food waste, how much food they are discarding, most of the participants said that there is a large amount of waste which they are throwing away due to many reasons but they don't have accurate quantity of it. There are many types of food items which end up in garbage bins such as: fruits, vegetables, and bread, chicken and beef leftovers by the customer. Most of the food waste produced mostly during preparation such as potato peel, roots from leafy vegetables, bones and meat, fluids and dropped food items which are felled on the kitchen floor and there are many reasons of such kind of wastage but the first and most common is unpredictability.

“We do lots of preparation most of the time when we cannot predict how much sale we are going to make. The other source is the expiry items. Lots of food cannot be used in time due to up and down of daily business. On the daily basis during our working hours we have a list of items to record the food waste. At the end of the month we calculate the expenses through wastage and work on it.” (Respondent H)

When I asked if they have any special kind of measures to minimize this unpredictability, all of the participants said that they don't have any kind of measure for it.

“We don't have any instrument to reuse the leftover, we can just throw away. We have calculated recipes which are enough for a good meal per person, so we cannot predict if somebody is going to eat less than that.” (Respondent I)

“I like to solve this issue but we don't have any service or method through which leftover from the customers and buffet can be reused therefore it is thrown out as waste. Many customers ask us to pack their leftovers then we provide plastic containers so they can carry extra food to their home, otherwise it goes to waste bin.” (Respondent J)

“We handle and store food according to international standards. Foods that are freezer items we don't freeze them less than -15 degree. On the other hand, in the coolers we have made the hierarchy of goods storing system and according to hierarchy we put the new items at the bottom and food which is ready to eat we put on the top of the cooler.” (Respondent D)

“In our restaurant, we have an early shift according to kitchen schedule to place the delivery item in respective refrigerator and freezer. We use back to front system where we put new products on the back or bottom while the older products rooted to the front. We write dates on all the products when they arrive because if they get mixed up we can recognize new products from the old ones.” (Respondent A)

Profit oriented thinking of the restaurants owners and overload of work are also causes of food wastage in restaurants.

“We cannot do nothing much to reduce food waste in our kitchen. We just throw it in the respective bins and that’s all. Customer satisfaction is our first priority and nobody comes to restaurant because of their waste disposal strategies, out only purpose is to generate profit. It should be the municipality’s duty to remove food waste from our property and we have no idea how waste is treated after that and how it can be beneficial.” (Respondent E)

“As a cook, while I am working in the kitchen I have so pressure on me so thinking about saving energy and water or minimize the food wastage to protect the environment is the last thing I would be think at work. I admit that we should also think about other things also than cooking and serving customers.” (Respondent G)

“If we see our financial situation it is a challenge, for us and we cannot manage the food waste and reduce it on our own. It is very difficult to bear the expenses of buying the machines and tools for it. But we try our best to buy an amount of inventory which is not leading to loss or damage of food items but sometime, we cannot predict correctly which the reason of food losses becomes. Every day is not the same but we try our best to be efficient but there are human and machines errors sometimes so, in all possible ways it is challenging.” (Respondent D)

“Working on this matter is very important but it is very time consuming and costly too. We are trying our hard to minimize the food waste in our restaurant and making our restaurant sustainable is also our agenda.” (Respondent G)

“The management of food waste is a challenge. To avoid the waste is impossible but it can be controlled. As an owner, I am thinking to hire myself as a waste control manager. Sometimes I think that, the process and preparation and consuming the food is the same so why there is generation of food waste? I hope that I will be successful to bring it at the lowest level.” (Respondent I)

Large portion sizes menus and not reusing the overproduced food and leftovers due to poor handling are also causes of food waste.

“We have very less choices in our menu to make it sure that, 1000 gram of meat should not be thrown away for 200 gram of meat which is sold. This idea was presented by our chef and it is very successful without the fear of losing customers, money and food.” (Respondent J)

“We give the opportunity to cooks to be creative and come up with the new menus on daily basis instead of following the same menus for lunch and dinner on daily basis. They have created and create too many new dishes made by the leftover ingredients that did not get use at the events the night before.” (Respondent F)

“When it is possible we reuse it. From the old breads we make breadcrumbs and we ask to our staff to bring home the food which is overproduced or food which will be expire in few days and it need immediate consumption. But we have very few ways to reuse or recycle it. When have to throw good food also despite our best intentions which is over prepared due to lack of regulations and policies regarding the food donations.” (Respondent H)

“The food which customer don’t consume we throw it away due to our restaurant policy because of possible contamination with bacteria or something else as allergic concerns, even that food is untouched by customers.” (Respondent E)

“It is very hard to separate the wastage even we have two types of bins in the kitchen. Most of times, we motivate to our employees to put and separate the food and throw it in the respective bins. But sometime when workload is very high then employees don’t follow the instruction because at the end of the day or at the end of the time when customer leave and there is too much pressure of work, you want to grab the plate throw the whole leftover into one bin and you don’t have time to separate.” (Respondent E)

4.2 The techniques to reduce food waste and knowledge of the owners and management of restaurants regarding FW

Not having the satisfactory knowledge and awareness about food waste and impacts of food waste on environment and society are also causes of food waste.

“The issue of food waste is very important and I pay attention about it. It is very costly for our business and make me frustrating when I see that so much food is going to garbage but I try to make it shorter as much as possible.” (Respondent A)

“In this Era, food waste has become everyday concern. We should record everything which is wasted in order to make it less.” (Respondent B)

We can call the food waste the waste of resources and a medium to degrade the environment. The food which we waste can be used to meet the basic needs of poor people. For example, in the other parts of the world there are many people who don't have access to meal on regular basis. If we count waste in term of finance, it is our income and savings; it is also a waste of energy.” (Respondent C)

While we talk about the thinking attitudes of the participants regarding FW, most of the restaurants owners said that, FW is a general problem and it is impossible for them to do something about it. Wastage of energy and water consumption is the areas where manager/ chefs said that, their businesses having an environmental impact. One of the participants said that, they don't feel good when they throw and waste a big amount of food without using it. Two of them said that, they have concerns about to reduce the food wastage but they don't have any choice other than to throw it. One of the participants said that, wasting excessive prepared food or damaged or expired food is not his choice so there is nothing which bothered him, so he don't think wasting food is a problem and they have to do it because they have concern about consumer health and hygiene, illness and public perspective of the restaurants.

A cook and kitchen chef in a restaurant said that, while they are doing their jobs responsively and they don't feel bad about it when they throw away food because; it is not their fault if some kind of food is becoming useless and wasted. They cannot take any necessary initiatives at personal level to minimize food wastage while preparing food, it should be the restaurant policies and

rules how they want to reduce the food wastage they can follow these policies and rules otherwise it is not their concern.

“To saving environment should be a high priority but there is nothing we can do about it. FW is a general problem and it is impossible for us to reduce it because it depends on other people” (Respondent D)

“We are just performing our duties and we don’t feel bad when we throw away food wastage because it is not our fault. We cannot take any imitative at personal level to reduce it because it should be included in restaurants policies, how we can reduce it”. (Respondent B)

When we talked about the guidelines regarding FW, all of the restaurants were following the same guideline as separation of degradable and non-degradable wastage in respective bins which are collected on daily basis by the Oslo municipality but some of the restaurants settled their own guidelines as well.

“We work according to municipality guidelines to prevent the impacts of food wastage on environment, society and economy. We separate the wastage and put it in the respective bins which are collected by the Oslo municipality on daily basis.” (Respondent C)

“We have set our own guidelines which are about providing each and every food its own life duration that the food should be used within this specific period normally one day or two days. After that duration, the food is discarded and recorded on the wastage sheet and thrown away in the respective bins.” (Respondent G)

We use it in the kitchen if we can and then rest goes to waste. We just see that if it does not look if it is not bad, we just throw it away. (Respondent D)

Norway has a well-functioning system regarding handling of all types of wastage and is also working and playing the leading rule to implement the UN sustainable development agenda. 5 out of 10 participants trust the Norwegian government authorities and believe that, they are doing their best but 5 participants expressed their dissatisfaction on government measures.

“The Norwegian government doing its best and I have praise for government authorities. They are providing simple rules and guidelines regarding this matter to improve the state of food in region and globally. These guidelines also giving us help in the waste management but I still think, they will do better in the future.” (Respondent H)

“I think they are not doing enough but they are working on it as well so it a good thing. Governments have a lot of ways and tools to do this job so they have to improve their ways and methods. Every year, we are consuming more and more in our society which means that the amount of waste is also increasing.” (Respondent I)

“There are plenty of places where amount of food waste handled in a wrong way so it is hard to say yes. There are many restaurants who throw away everything in to one bin even things wasted like metal and cardboards etc. May be the municipality later divides the wastage like this but it becomes and brings more wastage of energy and time.” (Respondent J)

There were just 1 out of 10 restaurants whose owner and manager who had allocated separate budget for managing FW and provide some kind of staff trainings to their staff about how to handle food to minimize its waste.

“In our kitchen, we have appointed two staff members to monitor the waste. We also have a waste audit method and have records of damaged and expiry foods items. These staff members review and analyze the quantity and type of waste from customer’s plates. At the end of the month, when we get results, all kitchen staff and manager talk about this and we make plan to minimize it. We pay an extra amount to these staff members to do this job. We also try to provide some kind of trainings to our staff about reducing and handling the FW” (Respondent H)

All of the 10 restaurants were not part of the any national or international association which works for FW. 7 out of 10 restaurants were offering the some kind of staff training to their employees and providing the necessary information that, how to manage food waste. At the end of the month, they had follow up meetings where they discussed issues regarding food waste in their restaurants. Most participants said that, they provide proper guidelines regarding waste management as the part of the employees’ duty. 1 out of 7 participants said that, we agree that it

should be the company's policy and responsibility to give proper knowledge about FW but it also depends on the individual's initiatives to reduce waste.

"We can just tell to our staff about how to handle waste generated from the restaurant but it is up to them if they follow it or not, and how much willing they are willing to take initiatives." **(Respondent C)**

"We have informed to our staff about our system for the management of waste, I cannot say, it is as the training or taking educational classes of the staff to work on FW but they are aware about the situation and the system of the restaurant. It is also our agenda to reduce the food waste in our restaurant and we also conduct the staff meetings about it at the end of the month." **(Respondent E)**

2 out of 10 interview participants working as staff said that, they are unsatisfied with their owners regarding the handling of food waste, they both were the chef cooks and they also said that, we can improve our ways to reduce FW because, it is waste of money and resources.

"I am not satisfied with the ways we handle FW in our restaurant. It is a criminal offense and we need to take action and should change our behavior. I'm also supporting the movements which are about to stop food waste. I am also trying to co operate with these kind of movements." **(Respondent B)**

5 Conceptual model

In the figure below, I summarize my findings from the interviews visually. The figure is further explained in the text that follows.

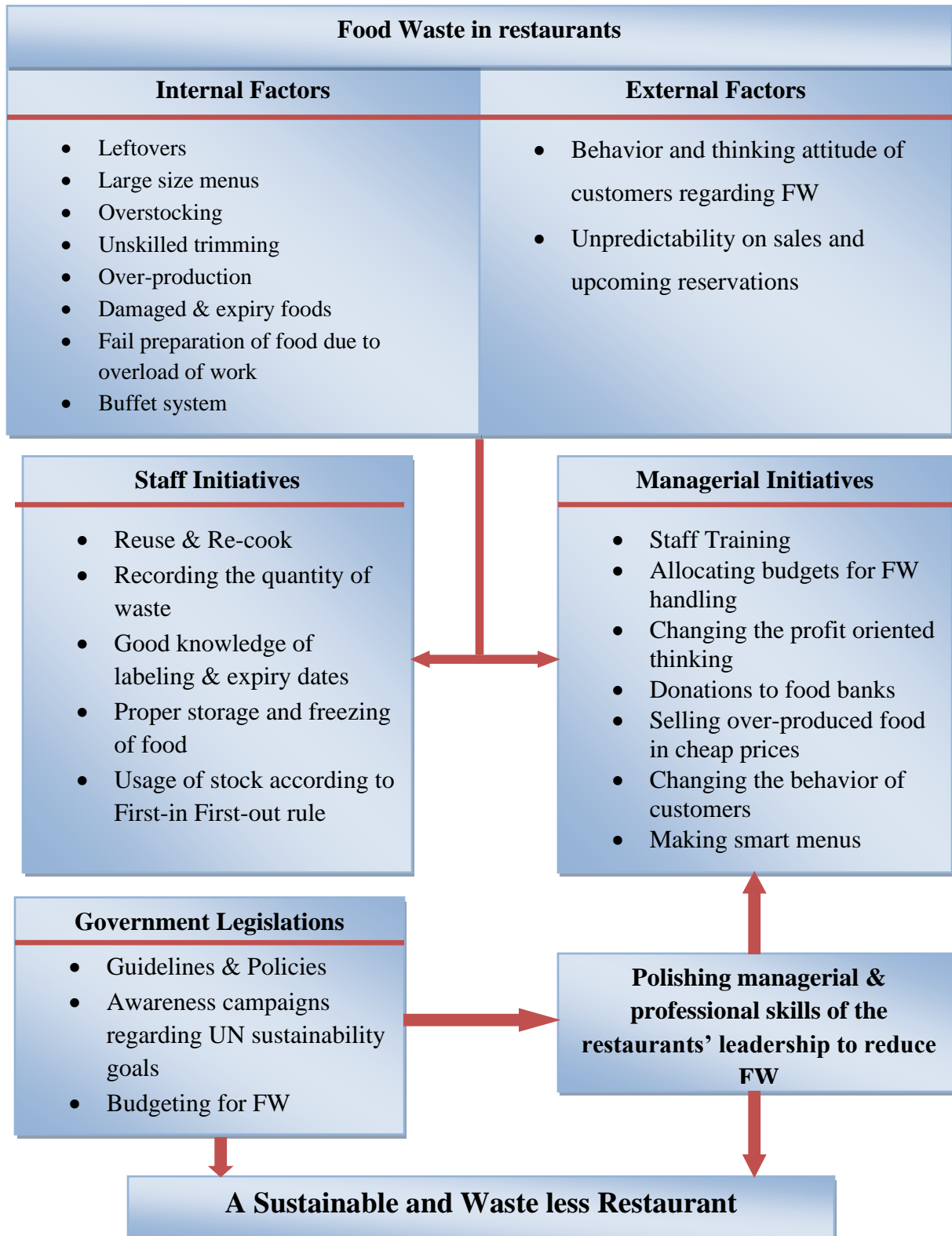


Figure 5: Conceptual model (Author's illustration)

The conceptual model gives us a general and simple overview of the practices which we can adopt in the restaurants to reduce FW. According to our problem formulation and research aim, our purpose was to answer and find the means, quantity and sources of the food waste and building the system, finding and setting the measures to follow which are essential to reduce the food waste in Oslo's restaurants. For this purpose, we structured our findings according to our research questions. As, we had two research questions, the first was about sources and quantity of FW, in other words, the reasons of the FW in restaurants. The second research question was about, examine and analyze about awareness, knowledge, perception, attitudes, and practices of actors in restaurants which they are implementing already or can implement to reduce food waste. It also knows about the measures and actions to take which the owners and management of Oslo's restaurants consider as necessary or not to reduce the FW.

As we can see in the diagram, our problem is the food waste in restaurants and our plan and target is making the restaurants waste less and sustainable. Now first of all, we talk about our problem. According to our findings, there were two main factors and reasons for food waste in Oslo's restaurants as internal factor and external factor. The reasons for FW according to internal factors included customers leftovers, large size menus, overstocking, unskilled trimming, over-production, damaged & expiry foods, fail preparation of food due to overload of work and buffet systems. While the external factors included behavior and thinking attitudes of customers regarding FW and unpredictability on sales and upcoming reservations. So we can say that, the reasons mentioned in internal and external factors were our difficulties and we had to make plans and strategies that, how we can overcome and eliminate these difficulties.

According to our findings, it's all depended on the owners and top management of the restaurants how they can lead sustainability in their respective restaurants or reduce and eliminate wastage. Polishing the managerial and professional finding of top leadership is our main finding and directly involved and interlinked with our goal as making the restaurants sustainable. On the other hand, it is directly linked with managerial initiatives because, after getting knowledge and professional skills the top management can be able to take initiatives.

There is also another outside force as government legislations which can be helpful to reduce the food wastage. It is also directly interlinked with our main goal but indirectly, it's also linked with the skills of the management and owners of restaurants that, how they follow and implement these guidelines and awareness campaigns of the government to reduce the food waste.

When we talk about waste management in Oslo city and government regulations regarding businesses in Norway, all the businesses operate according to government regulations. The waste management company which handled and collects the wastage from Oslo city is the agency for waste management and recycling (REG), which provides municipal waste disposal services in Oslo in an environmental and cost-effective manner in accordance with laws and regulations. Oslo municipality is in charge of practical administration of waste management. They also collect wastage generated in restaurants on daily basis which is treated and recycled by feeding animals and also used for generating energy sources. But, as we have mentioned in our findings, there is still need for guidelines and regulation at government or municipality levels which should about the food waste reductions measures in Oslo's city restaurants specifically.

On the other hand, when we talk about other measures and practices which we can adopt to reduce FW as, staff training, allocation of budgets for FW handling, donations to food banks and selling over-produced food in cheap prices etc, basically its depend on the owners and top management how they make decisions and take actions regarding these initiatives.

If we look at other practices as staff initiatives, like reuse & re-cooking the food, recording the quantity of waste, awareness about environmental issues, proper storage and freezing of food and usage of stock according to First-in First-out rule etc, its depend on the staff that how the working staff of the restaurants especially cooks implement these practices. Because these are the things which are directly related to working staff who prepare and handle food and raw material. But on the other hand, basically it's directly interlinked with the training of the restaurant staff which also depend on the top management that, how they educate their staff and make them aware about environmental issues and benefits which they can get through the reduction of the food waste. Finally, According to our finding results we can say that, basically it's the top management of the restaurants who can lead sustainability in the restaurants and responsible for the make strategies and implementing food waste reduction practices in restaurants directly or indirectly.

6 Discussion & findings

In the table below, I have sketched our findings from the results according to priorities and categories. These priorities are further explained in the text that follows.

1	2	Managerial initiatives		Staff initiatives	
Polishing managerial & professional skills of the restaurants' leadership to reduce FW	Legislations, guidelines, policies and granting funds for food waste reduction & management at government level	3	Staff training	11	Keeping record of the quantity of waste
		4	Allocation of budgets for FW handling	12	Proper storage and use of stock according to First in First-out rule
		5	Changing the profit oriented thinking	13	Good knowledge of labeling and expiry dates
		6	Drop off the overload of work on staff	14	Minimizing over and fail productions or Reuse & Re-cook over-produced food
		7	Elimination of over-stocking		
		8	Changing the behavior of customers regarding wastage of food		
		9	Selling over-produced food in cheap prices	15	Donations to food banks and charitable organization
		10	Making smart menus		

Table 2: Research findings from the results according to priorities (Author's illustration)

When we talk about our findings, our first key finding according to table (2[1]) is about, polishing the managerial and professional skills and practices of the restaurants management to reduce the food wastage in restaurants. In other words we can say that, it is about changing the thinking attitudes of the restaurants management regarding FW and educating them about the benefits they can get by minimizing the FW. When we analyze we can see that, it's all depend on the management of the restaurants how they can lead and guide the restaurant staff and formulate policies to reduce food waste to make their restaurants sustainable. The interviews analyses have revealed that, there is disparity among management when it comes to reducing FW and becoming sustainable and environmentally friendly. There were 5 restaurants whose management was very concerned about FW and its effect on environment and showed desire to act against it through introducing future initiatives. While other restaurants' management also showed some concerns but not very eager to work on this matter because they think that, their efforts and practices which are essential to become environmentally friendly can be costly and time consuming and their businesses cannot afford these kinds of costs and efforts. When we talk about the thinking attitudes of the participants regarding FW, one of the participants said that, FW is a general problem and it is impossible for them to do something about it. Wastage of energy and water consumption is the areas where he said that, their businesses having an environmental impact. One of the participants said that, they don't feel good when they throw and waste a big amount of food without using it. Two of the participants said that, they have concerns about reducing the food wastage but they don't have any choice other than to throw it. One of the participants said that, wasting excessive prepared food or damaged or expired food is not his choice so there is nothing which bothered him, so he don't think wasting food is a problem and they have to do it because they have concern about consumer health and hygiene, illness and public perspective of the restaurants.

On the other hand, the success of all our other findings which we have mentioned above, is also depends on the successful implementation of this finding. Because the benefits we can get through the finding which are mentioned above shall be possible, when the management take initiatives for it, and the management can take initiative when they have the awareness and knowledge about sustainability, which benefits from sustainable practices they can get and which strategies and ideas they can introduce for reducing FW. One example which we can give about the best managerial and professional practices can be the selection of suppliers and products.

According to our interviews data, the management and owners of the restaurants prioritize the price and quantity over sustainability when they choose suppliers to purchase the products and supplies. So, we can say that, if they choose the suppliers which are also involved and active for achieving the sustainability goals in their respective businesses it can be very useful. The reason is that, while they are working on sustainability already, it means that, they are producing the products which are environment friendly and have the minimum waste ratio. Therefore, if the management purchases such products it will ultimately reduce the food wastage in their restaurants as well.

When we talk about the literature on managerial and professional practices regarding the waste management in restaurants, there is not much literature available on it. The data is very limited on managerial practices toward food waste in restaurants because the research conducted had just included the other sectors of the food such as food producers, manufacturers and retailers and not specifically had included restaurant business.

This finding shows that through this practice all of the restaurants in my empirical material could be improved according to the literature on the FW reduction, which stresses the importance the role of the management as, there are three main drivers name as, favorable cost analyses, changing the business models as sustainable business models and experimentation with existing management practices which can help management of the restaurants to take initiatives regarding waste management practices. A cost oriented initiative includes business practices based on cost saving analyses and the other two drivers depend on the manager's engagement orientation and proactive innovative orientation. The proactive approach involves a set of innovations through which restaurants can introduce new management practices or changing their existing business model by building sustainable waste practices. On the other hand, build partnership to modernism the working styles by co-operating with other stakeholders such as suppliers, local authorities, associations working for reduction of FW and waste management companies can also be useful (Martin-Rios et al., 2018). Operational improvements through managerial practices such as introducing innovative processes and developing green restaurants management standards and social responsibility require a degree of new knowledge and vary in degree of newness for adopting firms (Lampikoski, 2012).

The second finding (2[2]) is regarding making regulations, guidelines, policies and granting funds for the FW reduction and management at government or municipality levels. In this way, it can also be a good step to involve the restaurants in this war against food waste in Oslo's restaurants. Because, some of the restaurants' owners and management think that, managing and reducing the food waste in their restaurants is a big challenge because they don't have resources to overcome it. They said it is a big challenge because we cannot invest our time and put efforts on daily basis on this matter. On the other hand, it is very expensive and costly procedure. Most of them perceived that, because they have very busy schedules and other operating expenses are already very high so they cannot make a separate allocation of budget for food waste reduction.

The importance of government legislations regarding reduction of FLW is also mentioned in our literature as, the dysfunctional conducts that occur between industry and government are the causes of FLW. It's depend on these two forces that how they interact for this mutual goal's achievement. The governments should incentivize and support industries and businesses to reduce FLW through policies, regulations and programs. On the other hand, it also depend on industry and businesses senior leadership that how they align those policies and take bold steps to achieve the revolution required reducing FLW (Gooch et al., 2016).

Government's efforts are also described in the light of circular economy models for businesses to reduce wastage as, governments, universities, research bodies and financial institutions also play an important role in the implementation of circular economy model. For example, government will help through policies, incentives and training. Universities and research bodies can also include circular principles regarding food systems in the education courses. Financial institutions can help circular economy models through incentives and direct capital investment for businesses with circular models (Jørgensen & Pedersen, 2018).

The third finding (2[3]) is about staff training, which also plays a very vital role to reduce the FW in restaurants. Because, restaurant staff and management also very relate to each other and important to interlink for this agenda because they are the ones who handle food from storage to serving so it is very important to increase the awareness between them on this issue. Our study results revealed that, there was just one restaurant out of ten restaurants whose management provides some sort of staff trainings about handling food to minimize its waste. The owners and management of all other restaurants were aware of the importance of its staff training but they

were not taking actions on it. So we can say that, if all the restaurants owners and management provide proper training to their staff regarding handling food and minimizing the food waste it can be very helpful as well to make restaurants waste less.

While, our literature has also mentioned already the importance our finding to reduce the FW as, Skills and awareness make the people to change their behaviors (Graham-Rowe, Jessop, & Sparks, 2015). To clarify the problems and provide as a vital waste prevention measure staff training plays a very important rule (Thyberg and Tonjes, 2016).

The findings (2[4, 5 & 6]) are about changing the profit oriented thinking of owners of the restaurants, reducing the overload of work on staff in the restaurants and allocation of budgets for FW reduction and handling in the restaurants. The first two reasons profit oriented thinking and overload of work are very big causes of food wastage in restaurants. There were just two participants who finally talked about it but they also told us that, mostly all of others restaurants owners share the same thinking as well and many staff persons in others restaurants also facing the overload of work problems. First of all, we have to change the thinking of the owners about, their profit margins will not decrease if they take initiatives to minimize food waste and it is going to be beneficial for their business's success in the long run. We can do it through educating the owners of the restaurants which don't have any kind of knowledge about sustainability and impacts of the food waste on environment and society.

The knowledge can be a person's major significance because the extent of a person's knowledge allows him/ her to make informed choices about his/ her actions. According to our results, many participants did not have the clear understanding of the sustainability knowledge and FW impacts and the other participants who had clear knowledge of FW and its consequences but they showed a specific degree of disinterest in taking actions against FW and overcome the challenges. So, these kinds of attitudes have negative impact on their co-workers and staff as well who work under their supervision. On the other hand, the overload of work on staff should also be managed in a good way in the restaurants. Because, when a person has a lot of pressure and overload of work, he/ she cannot think about other vulnerable aspects and responsibilities of his/ her job such as, keeping in mind that, they also put attention on food waste and try to reduce food waste. They just don't care about it and just want to fulfill complete their basic routines and duties. The overload of work we can manage through proper allocation of duties and responsibilities

according to working contracts and providing the working environment according to Norwegian standards. Because, there are many owners in the Asian restaurants who don't provide a good environment to their staff and demand extra work from the staff as it is mentioned on their working contract. We should also make sure that, every staff members in the restaurants getting the weekend free days according to schedule because there were many workers who just don't take free days and work the whole week 7 days. It can also release the stress of work which can make better the performance of staff and they will try to take initiatives regarding reduction of food waste as well while they are performing their other duties.

The attitudes of owners of the food businesses have a big impact on the wastage of food because the policies and practices of their restaurants guided by the profit and loss margins. The businesses need to achieve customer satisfaction and stay competitive in the market therefore they just try to meet customer's needs to get their loyalty and don't have any concern about that FW taking place in this process (Heikkilä et al., 2016). The management of restaurants put the environment and other factors at second but, at some point, they show concerns for developing practices and implementing strategies, training their staff and fixing labor times and administration costs to reduce FW. In spite all of this; the idea for saving money is the only powerful motivator behind the prevention of food wastage for them (Graham-Rowe, Jessop, & Sparks, 2015).

This finding (2[7]) is about overstocking which is also a big cause of food waste in restaurants. When we talk about overstocking, almost all the restaurants keep the stock the food which is more than their usual needs because they cannot forecast the accurate quantity of food which they are going to sell in coming days. As we know generally, the vegetables and fruits have very short period of life and after some days they become useless but the restaurant's management and owners don't care about it. According to our results, there were 5 restaurants who were stocking food which was enough for one month. So we can say that, if the owners and management just purchase and stock the food which is enough for one week and make and manage their inventory system in a good way, there are many chances they can overcome on the large amount of food waste in their restaurants.

According to Stuart (2009), overstocking is the main issue which leads to FW because restaurants more stock in rather than run out of items and prefer to have a broad collection of

available menu options. According to Baldwin & Shakman (2012), over-merchandising is a pre-consumer cause of food waste and it is very important to handle it in a proper way through the management practices to overcome the food wastage in restaurants.

This finding (2[8]) is about, how we can reduce the food wastage in the restaurants through changing the behavior and perception of customers regarding food waste. However, in order to getting the people and change their behavior seems little difficult because wasting of food is highly habitual and many people underestimate the amount of food they waste and feel less incentive to get education on preventing food waste. For this purpose, we can launch the awareness campaigns especially in the restaurants and organize educational programs which target people during times they are more enthusiastic to change their behavior in order to make them an ethically responsible citizen. It can be an opportunity to break their habits and reshape behaviors which are associated with food waste.

As mentioned in the literature, it is very necessary to understand the reasons that, why the people are not going to waste food and what are the things which can emphasize these feeling. In the UK, an in-depth qualitative study has found that, people show a resistance to wasting food not as a result of a global citizenship but they do it because of the expression of ethic, responsible and conservative use of resources. Therefore, our efforts to influence customers to decrease the food waste just should not focus on climate change or food security but it should also focus on to give opportunities to make people to act ethically and responsibly as well (Kennard & Bamford, 2019).

These findings in table (2[9 & 10]) are about making the smart menus and selling over produced food for cheap price to reduce the food waste. According to our interviews data, there were just two restaurants that were following the smart portion size approach and other eight restaurants were offering the large portions sizes menus. There were not even one restaurant who was selling the over produced food in cheap prices but the staff of all restaurants was just throwing away over produced food in the waste bins. So our point is that, restaurants managers, chefs and cooks should concentrate on following the smarter approaches regarding their menus because making the menus smarter and leaner is one of the good measures to reduce FW, like adding the small portions sizes of meal in the menus, ending the buffet systems in their restaurants or, if they don't want to end buffet system they can serve buffet at customer tables and they can ask the

customers which dishes they like to eat most so they can serve those dishes. In this way, they will be able to save much food because when it is not serving at table the customers just fill their plates with all kind of meals even they know that it will not be possible for them to finish all of this. On the other hand, changing the dish specifications and using the vegetables and meat trimmings to make soup can also help to minimize the food waste. While selling over produced food items in cheap price near to closing hours is also the good strategy to reduce the FW. While, creating the smart menus and introducing other innovative practices and strategies to reduce FW require a good awareness and knowledge of innovation for creating ideas, setting the goals and achieving the ways to meet those specific goals. On the other hand, the knowledge of management practices regarding FW and innovation practices in the restaurants businesses were not the parts of the literature in the history. So we can say that, It is the reason that all our research participants as restaurants management and owners did not have such kind of knowledge and awareness so it can be very useful if they obtain the knowledge of innovation in this modern era that how they make their businesses better and sustainable and ultimately it will minimize FW wastage in their restaurant businesses.

According to literature, buffet style is a common reason for food wastage. The restaurants who serve the buffet admitted that, it's a big headache because they cannot predict approximate the number of customers and the food they are going to consume. On the other hand, the requirement for preparing the varieties of food items on daily basis is also the reason in generation of FW because all the items in menu we have to prepare every day (Katajajuuri et al., 2014). Food waste management practices has not been the part of managers' practices in the literature until recently. Managers' practices in the restaurants to reduce food wastage requires creativity, procedures, beliefs, awareness and knowledge, setting goals and actions and a sure from of improvisation because many forms of waste are anticipated but others are not and some are avoidable and some are not. For example, through creativity managers can make smart menus which unlimitedly will lead to reduction of FW (Chou, Chen, & Wang, 2012).

This finding (2[11]) is about recording and management of the quantity of food waste in the restaurants. According to our results, there were just two restaurants that were keeping record of the waste for all the expired, damaged and overproduced food items at the end of the shifts and recorded on waste sheets. The remaining 8 restaurants did not have any procedures to record the

quantity of food waste. Most of the restaurants don't make and keep the accurate records of the quantity of FW on daily basis. At the end of the month, the kitchen chefs and management just make a prediction of wastage in the past month and add it in the accounts. So, we can say that, having the record of the quantity of FW is very important to take action and making plans regarding FW reduction policies. If the restaurants management follow this guideline and keep the record of FW, then it will be possible for them to take the decisions and make the plans for it. In this way, the restaurants can also make the accurate prediction to prepare the food on daily basis. They can check the records for same day of the last week or last month and can found what their food waste was on the same day in the last month and how much we should prepare for today and it will be enough.

According to Thyberg & Tonjes (2016), the quantification of FW is essential for development of effective and well-planned food waste management policies and can be useful to determine food waste recovery and prevention in future. Management and staff may change their attitude and behaviors when they understand the extent of food waste.

The findings (2[12 & 13]) are about proper storage and use of stock according to First-in First-out rule and good knowledge about the labeling and expiry dates of food. When we talk about the storage facilities, the proper storage of food in the restaurants is essential to minimize the food waste. According to our data collected, there were just two restaurants that were doing it right. So, we can say that, all the restaurants should make it sorted all the food delivery items immediately when they arrive and then store them in refrigerator or freezer. All the products they should store in standard fool cool box and packaging wrap and proper temperature to prevent bacteria. As I asked from a participant who was freezing the food properly and he said that, the frozen foods require storage at -18 degree or below while refrigerator foods require 5 degree or below. All the deliveries they should check very carefully for rotten or damaged goods. If they make it clear that, the items which arrive earlier are used first and new arrivals placed behind to prevent the older products and expiry dates as FIFO method first in first out, there will be many chances they can reduce FW in this way also. While, the proper knowledge about the expiry dates and labeling of the products can be as very important and crucial factor for the management and staff to minimize the food waste in restaurants because, many times the staff of the restaurant just waste and throw away the food items which they don't see as good and fresh

but actually it was good to eat and this happens due to their lack of knowledge about labeling and expiry dates.

There was just one reference in our literature regarding the importance of the knowledge about labeling and expiry dates. But it is very important finding so, there should be more research on this topic because I know myself as I have also worked in the many restaurants, the poor knowledge of labeling and expiry dates is a big cause of food wastage even before opening the packing and making a to use it. According to Collart & Interis (2018), the producers print the expiry dates on the products which are generally earlier than the actual dates when the food becomes unsafe to eat because of the possible food safety risks, associated liability on the producers and suppliers and government food agency. Therefore, this can lead to unnecessary disposal of food which was actually still safe to eat. The best-before date labels don't interpret the food safety but, these are used by manufacturers to mention the peak quality. If the food handled properly, even after the best-before date has passed it should be safe to use the food. It does all depend on the consumer's perceptions that, how they interpret the labels and dates and how they use the food. Some studies say that, how the labels and dates affect the consumer's perceptions it does depend on the value of food products

Our last two findings (2[14 & 15]) are about fail & over productions and reuse of those productions. Almost all restaurants admitted that the main source of food waste in the kitchen is over production. The main reason of the over production is unpredictability as we have mentioned in our finding above. Indirectly, large portions in menus are also the cause of over-production. So, first we can control the over production through recording the quantity of waste which can motivate the staff ethically in a way that how much food they are wasting and second, we can use many other ways to use the over produced food through making the smart menus or donating the food to food banks and charitable organizations. When the overproduced foods are not consumed on time it becomes the wastage. If we talk about food banks/ charitable organizations, these can also become very good source to use the FW in a proper way by donating it to them, so the government should introduced proper safety rules and regulation for the restaurants for the donation of FW to food banks. Utilization technique of food wastage as feeding the animals and generating energy source are already working which are implemented by the Oslo municipality but will be more useful when the staff of the kitchen handle the food waste

properly. According to our interviews data, there are many people who just don't care about throwing away food but they showed the feelings that they see it as unethical job. So, when the staff of restaurants knew that, if they don't throw away over produced food and handle it in a proper way, then it is going to be a good meal for somebody they will take care of it.

According to literature, the food waste through over-preparation takes place due to the inaccurate forecasting of demand and coming customers, because the food become ready to consume but has a very short life ranging to 24 hours in average (Garrone, Melacini, & Perego, 2014). While we talk about large portion of menus, it is also the causes of over-production and generate the significant amount of food waste because large portions increase the probability that the customers will waste the food because most of times, but it's not possible for everyone to eat all the food. Serving large portions can be attractive for restaurants but it is not good while we are trying to implement food waste reduction practices in the restaurants. As an example in the U.S., the average customers in the restaurants cannot finish 17% of the food they order and 55% of food they leave as leftover behind (Kennard & Bamford, 2019).

6.1 Strength and limitations

The first limitation of this research is that, it is not giving the concrete evidence on the accurate record of the quantity of food waste and expenses because the actors did not have managed the record of the FW expenses and quantity. The data was collected from the semi-structured interviews from the restaurants personals that were directly or indirectly responsible for food preparation and production and management of the restaurants.

On the other hand, the results generated from this study, may be cultural specific which can be true in one culture and may not be true in another culture setting. Although, the researcher took the hour long interviews but due to highly posts and responsible job nature of the participant and their busy schedules some interviews were cut short. The restaurants investigated in this study are not the representative of the whole food service industry of Oslo.

One major problem can be related to our data collection method because; the participants' biases can distort the data. Due to small number of participants in these kinds of studies, the phenomenon can be distorted due to participants' biasness. Because, there were 10 participants in our research study and they had very different kind of business models and practices due to different kind of origins and cultures as Asian, Arabic, Indian and Thai cultures. However, the researcher crosschecked the descriptions provided by the participants against theoretical interpretation and insured cross validation to minimize the distortion of phenomenon. Some interviews questions were asked second times to insured, whether the researcher interpreted it correctly what they were saying. The researcher was also able to verify the details from the most of the participants if he wanted to improvise or not due to working links with the restaurant businesses, as the researcher got many references and knew many people from the different restaurants. However, the researcher made assured the respondents that, the data would be anonymous and their information will be treated confidentiality.

6.2 Implications of the study

The results of this research can be used and formulated through many ways to reduce the FW in restaurants and can decrease the environmental, economical and social impacts of FW. First of all, the owners and managerial personals of the restaurants that have the knowledge and awareness on the FW are the very important sources to reduce the FW. The attitudes and beliefs of these personals are very vital regarding this matter because they can set the norms and strengthen the beliefs of their staff that wasting food is bad, immoral and unnecessary. Additionally, owners and employers of the restaurants can control FW by improving their skills through getting the knowledge of professionals and managerial practices. In this way, they can check up and keep watch on the daily routines of their restaurants staff that everything is going in a proper way and they are trying their best to minimize the wastage in the restaurants.

On the other hand, they can determine and order a reasonable amount of food to purchase as stock which should not more than for the one week and make sure the proper storage of this stock because the storage system and food waste has direct relationship. The proper food handling is also very essential because poor physical handling of food items while stocking and using the food item is also a cause of wastage in restaurants, may be it varies from culture to culture or sector to sector but it has a huge effect on how much food goes to waste.

When we talk about culture, it can also play a major role in shaping food handling behavior but, understanding different cultures require a new set of studies and linking it with food handling regarding reducing food wastage through different qualitative techniques. While the current study's results can provide important approaches to guide intervention to deal with food wastage within the restaurants of Oslo. Additionally, restaurants can be persuaded that minimizing the food waste can be economical effective as well; therefore the management of the restaurants should be focused on different motivators and barriers coming in the way of food waste reduction. However, some factors could be fixed as restaurants sized and business models but, they should make efforts for their own benefits.

7 Conclusion and recommendations

This thesis is the first empirical research which deals with management practices for handling FW in the restaurants of Oslo. The data collected from interviews for this research give the important knowledge about origin and diminution of FW in restaurants. This paper does not deal with accurate amount of FW generated in the restaurants but focused on qualitative elements in the restaurant businesses which are the reason of FW.

According to the government regulations and guidelines, restaurants should take their own initiatives through communicating and training their staff, minimizing over production of food and upgrading their menus. I have tried to highlight the economic and financial impacts of FW in restaurants but there is very little research in the literature regarding this matter so there is still need of research evaluating the economic benefits of reducing FW.

In conclusion, it is very important to understand that, FW reduction in restaurants is a manageable activity and should be the component of restaurants' management system because it is influenced by decisions and activities made at different levels of the business. It can be emphasized especially by the role of skilled workers, everyday leadership, planning and management activities, introducing portions sized and documentation and audit of the all activities initiated regarding this matter. Policies of the restaurant businesses should address and include the range of behaviors and motivations for reducing wastage in the restaurants. The management of the restaurants should target the individual's values and facilitate improvements to encourage them to prevent FW in restaurants because it is an issue which demands attention, awareness, ethical considerations regarding environment and society, setting targets and taking authentic actions particularly for diminish the wastage.

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9 Appendix

9.1 Interview questionnaire

1. Can you please tell me about yourself, what is your position at this restaurant?
2. Can you describe briefly your experience in the restaurant sector?
3. What do you think of food waste? How will you describe it?
4. How much foods waste your restaurant producing per day?
5. How are you dealing with food waste in your restaurant?
6. Do you think food waste as an issue that needs to be dealt and, how we should deal with it?
7. Have you concern about how much food goes to waste and its effects on environment and society in the big picture?
8. What are the main causes of food waste at your restaurant?
9. Which type of food mostly goes to waste?
10. Are you following any national/international guidelines regarding food waste?
11. Are you providing specific training to your staffs to prevent food waste?
12. Are you the part of any association related with reducing food waste in Oslo or Norway?
13. Are you following any special techniques or strategies to avoid food losses?