FOOD WASTE PREVENTION IN DENMARK

Name:

Institution:

Date:

Table of Contents

[Chapter 1: Introduction 6](#_Toc477344621)

[**1.1 Statement of Problem** 6](#_Toc477344622)

[**1.2 Background of the Study** 7](#_Toc477344623)

[**1.3 Purpose of the Study** 8](#_Toc477344624)

[**1.4 Objectives** 9](#_Toc477344625)

[*General objective* 9](#_Toc477344626)

[*Specific objectives* 9](#_Toc477344627)

[**1.5 Research Questions** 9](#_Toc477344628)

[1.6 Significance of the Study 10](#_Toc477344629)

[**1.7 Assumptions** 11](#_Toc477344630)

[**1.8 Conclusion** 12](#_Toc477344631)

[Chapter 2: Literature Review 14](#_Toc477344632)

[**2.1 Introduction** 14](#_Toc477344633)

[**2.2 Definition of Food Waste** 15](#_Toc477344634)

[**2.3 Definition of Food Waste Prevention in Denmark** 16](#_Toc477344635)

[**2.4 History of Food Waste Prevention in Denmark** 18](#_Toc477344636)

[*2.4.1 Previous Trends of Food Waste Prevention in Denmark* 18](#_Toc477344637)

[*2.4.2 Current Trends of Food Waste Prevention in Denmark* 20](#_Toc477344638)

[**2.5 Regulatory Policies Relating to Food Waste Prevention in Denmark** 22](#_Toc477344639)

[*2.5.1 Past Regulatory Policies Relating to Food Waste Prevention in Denmark* 22](#_Toc477344640)

[*2.5.2 Current Regulatory Policies Regarding Food Waste Prevention* 24](#_Toc477344641)

[**2.6 Impacts of Food Waste Prevention** 27](#_Toc477344642)

[*2.6.1 Effects of Food Waste Prevention on the Denmark Hospitality Industry* 27](#_Toc477344643)

[*2.6.2 Benefits of Food Waste Prevention on the Denmark Economy* 29](#_Toc477344644)

[*2.6.3 Negative Impacts of Food Waste Prevention on the Denmark Economy* 32](#_Toc477344645)

[**2.7 Prevailing Information Gap** 35](#_Toc477344646)

[Chapter 3: Methodology 37](#_Toc477344647)

[**3.1 Introduction** 37](#_Toc477344648)

[**3.2 Background of the Study** 37](#_Toc477344649)

[*3.2.1 Benefits of Food Waste Prevention in Denmark’s Economy* 37](#_Toc477344650)

[*3.2.2 Impact of Food Waste on the Hospitality Industry in Denmark* 38](#_Toc477344651)

[**3.3 Survey and Findings** 39](#_Toc477344652)

[*3.3.1 Case Study* 39](#_Toc477344653)

[**3.4 Quantitative Data** 39](#_Toc477344654)

[*3.4.1 Secondary Data* 39](#_Toc477344655)

[*3.4.2 Description of Data* 41](#_Toc477344656)

[**3.5 Limitation of the Study** 42](#_Toc477344657)

[Chapter 4: Findings and Discussions 43](#_Toc477344658)

[**4.1 Introduction** 43](#_Toc477344659)

[**4.2 Analysis of the Personal Profile Data** 47](#_Toc477344660)

[**4.3 Analysis of the Food Waste Practices Data** 49](#_Toc477344661)

[**4.4 Analysis of the Food Waste Data** 52](#_Toc477344662)

[**4.5 Regression Analysis** 64](#_Toc477344663)

[**4.6 Impact of Excessive Food Waste on Denmark’s Economy** 71](#_Toc477344664)

[*4.6.1 Background of the Study* 71](#_Toc477344665)

[**4.7 Effects of Food Waste Prevention on the Economy of Denmark** 72](#_Toc477344666)

[*4.7.2 Magnitude to Which Food Waste Prevention has favorably affected the Economy* 73](#_Toc477344667)

[*4.7.3 Magnitude to which Food Waste Prevention affects Denmark’s Food Industry* 74](#_Toc477344668)

[**4.8 Future Impacts of Food Waste Prevention on the Economy of Denmark** 75](#_Toc477344669)

[**4.9 Future Research on the Effect of Food Waste Prevention on the Denmark’s Food and Hospitality Industries** 76](#_Toc477344670)

[Chapter 5: Conclusion 78](#_Toc477344671)

[**5.1 The Extent to which the Denmark’s Economy Profits from Food Waste Prevention** 78](#_Toc477344672)

[**5.2 The Extent to Which the Food Waste Harms the Economy of Denmark** 78](#_Toc477344673)

[**5.3 How Food Waste Prevention Affects the Hospitality Industry of Denmark** 79](#_Toc477344674)

[**5.4 Reasons for the Increased Food Waste Prevention in Denmark** 80](#_Toc477344675)

[**Chapter 6: Solutions and Recommendations** 81](#_Toc477344676)

[**6.1 Solutions** 81](#_Toc477344677)

[*6.1.1 Policies to Encourage Food Waste Prevention* 81](#_Toc477344678)

[*6.1.2 Ways of Minimizing the 1.7 Billion Dollars Food Waste in the Coming Years* 82](#_Toc477344679)

[*6.1.3 New Strategies to Prevent Excessive Food Wastes in Danish Restaurants and Canteens* 83](#_Toc477344680)

[**6.2 Recommendations** 84](#_Toc477344681)

[*6.2.1 Techniques in which the Demark Government can Improve Food Waste Prevention Strategies* 84](#_Toc477344682)

[*6.2.2 Other Ways of improving Food Industry other than Food Waste Prevention* 85](#_Toc477344683)

[**6.3 Suggestion for Further Research** 86](#_Toc477344684)

[**6.4 Other Sectors that Food Waste Prevention Affects Apart from the Economy** 87](#_Toc477344685)

[**6.5 Methods of Enhancing Food Industry in the Economy of Denmark** 88](#_Toc477344686)

[References 90](#_Toc477344687)

# Chapter 1: Introduction

## **1.1 Statement of Problem**

Annual food wastage in Denmark has been reported to be about 15.75 tons from the Danish canteens. According to Francis et al. (2008), food waste in Denmark amounts up to 25% during packaging. Also, the European Commission published that 14% of the total food waste in Europe is facilitated by the restaurants. It is a norm for most people to scrape the dishes after a large meal. However, very few people pause to think about the significance of their actions. This has impacted on the magnitude of global food waste. According to a report by the UNEP and the World Resources Institute, more than a third of the total food produced worldwide gets lost or is wasted during food production and consumption. The food wasted is worth over 1 trillion US Dollars (Wrap, 2014). Moreover, it was noted that 1 in every four calories which are intended for consumption is usually wasted. Such statistics have been shocking especially considering the magnitude of hunger in the world, volatile food prices as well as social unrest.

Furthermore, it is important to note that consumers in industrialized countries have been wasting about 222 million tons which are almost equal the amount of food produced in the sub-Saharan Arica (230 million tons) (World Bank, 2013). It is very shocking to conceptualize these statistics especially with the deaths due to food scarcity in mind. Also, the amount of food that is lost and wasted every year is equal to over half of the world’s annual cereals crops. Besides the impacts of food wastage, while people suffer and die from hunger, it is worrying to note that organic waste in the United States is the second highest component of the landfills which has been the largest contributor to methane gas emissions. In fact, 30 to 40% of the total food supply in the United States is wasted. Besides the fact that developing countries, especially in Africa, are largely affected by hunger, about 310 billion US dollars of food is wasted annually (Williams, Wikstrom, Otterbring, Lofgren & Gustafsson, 2012). In this regard, the issue of food wastage is a major concern not only in developed but also in developing countries. A focus on food wastage in Denmark has shown numerous measures being taken to limit food wastage. Nonetheless, the food industry has been neglected in waste prevention with most countries including Denmark focusing on households and retail food waste prevention. Additionally, most of the research on food waste in Denmark primarily focuses on management of food waste.

## **1.2 Background of the Study**

Food waste has become a major global issue that is increasingly receiving attention from governments as well as other organizations including NGOs. According to Gustavsson, Cederberg and Sonesson (2011), between 30% and 50% of the total produced food for consumption ends up as food waste. The last decade has seen a growing interest in food waste across the globe. Research has indicated that food wastage leads to environmental degradation as well as economic inefficiency raising several ethical issues. The European Waste Framework Directive required all member states to create and implement a national waste prevention program so as to reduce the food wastage. However, it was challenging to come up with adequate measures for most countries considering that household food wastage contributes to the largest portion of food waste in European countries. Although food wastage differs from country to another concerning quality and quantities, it was estimated that household food waste amounts to about 42% in European Union countries (Wansink & Ittersum, 2014).

According to a report by the Danish Environmental Protection Agency in the year 2012, a typical family that is living in a detached house throws away about 304 kilos of food every year. The report finds that of the food thrown away, about 168 kilos are still edible (Wansink, Ittersum & Payne, 2014). This implies that every Dane wastes over 42 kilos of edible food annually. Through the survey, it was established that just like other European countries, most of the foods that are wasted are vegetables, fruit, cakes, and bread. Single people were found to throw away mostly non-processed food which was associated with the fact that it is very difficult to buy enough small portions. On the other end, families with four people were found to throw away mostly the processed food. Such findings have necessitated governmental input to reduce the amount of food waste and solve the food crises in most countries. It should be noted that the total per capita food production has been about 900 kilos annually in the rich countries while in poor countries it is about 460 kilos. Recent reports in Denmark have indicated that over seven hundred thousand tons of food is wasted annually. This food is worth more than 1.7 billion USD. In this regard, it is important to evaluate the problem food wastage in the country so as to come with measures of food prevention.

## **1.3 Purpose of the Study**

The purpose of the study was to investigate the issue of food waste in Denmark with the aim of providing measures that can be taken to prevent further food waste. It was noted that more than 50 percent of the food that is wasted occurs during the production or upstream (Wansink & Deshpande, 2001). More food is also wasted during yield handling as well as storage and processing stages. According to reports by the UN, the more food is wasted then, the more the environmental impacts. It was noted that most food is wasted and ends up in the landfills. This is the main contributor of methane gas to the environment and considering the greenhouse effects of methane to the globe, and then food waste should be prevented at all costs. It is not only the responsibility of the government but also of individuals to ensure that food is conserved. However, such measures require an investigation and research to establish the measures that can be taken especially in Denmark.

Earlier research has established that food wastage has immensely contributed to the great waste of the fresh water as well as groundwater resources. According to Wansink, Brasel and Amjad (2010), more than three times the volume of Lake Geneva is wasted through the production of food that ends up being wasted. In fact, a wastage of a kilo of beef represents over 50,000 liters of water which was used in the production of the meat. This study was, therefore, very important to establish important aspects of food waste prevention. In the study, an investigation of the factors contributing to food wastage was conducted. Such factors are paramount during a quest for food waste prevention. Measures for food reduction also ought to be stipulated in a manner that the public understands. The research would also be vital for other researchers conducting research on food production in Denmark and other parts of the world.

## **1.4 Objectives**

### *General objective*

The general objective of the study was to investigate food waste in Denmark with the aim of providing recommendations for food waste prevention measures that can be taken in the country.

### *Specific objectives*

* To investigate food waste prevention measures in Denmark.
* To find out how food industry in Denmark can benefit from food waste minimization and prevention.
* To evaluate the players in the fight against food waste in Denmark.
* To recommend measures for food waste prevention in Denmark.

## **1.5 Research Questions**

In order to effectively carry out the research, a number of research questions were formulated. These research questions are listed below.

1. What are the chief sources of restaurant and canteens food waste in Denmark?
2. How can food industry in Denmark benefit financially from food waste minimization and prevention?
3. What are the prospects for food waste prevention regime in Denmark as of 2016?
4. Who are the stakeholders and players in the fight against food waste in Denmark?
5. What are the anticipated present and future undertakings with regard to streaming the food waste prevention regime in Denmark?

## 1.6 Significance of the Study

Food waste has been one of the major contributors to hunger in most parts of the world (Stuart, 2009). This has triggered a call for all social levels including environmental groups to call for massive campaigns so as to bring awareness of the problems associated with food wastage. Moreover, researchers have argued that wasting of food is ethically wrong hence, measures must be put in place to prevent the vice. Although people throw away food every day in different parts of the world, the implications are ethically wrong, and measures should be taken to come up with prevention measures (Filho & Kovaleva, 2015). The government of Denmark has tried to come up with various measures to deal with the issue of food wastage. However, the success rate has not been very high implying that several measures should be taken differently. This research, therefore, is very significant to the people of Denmark as well as government and other people involved in food waste prevention. It is clear from the research objectives that all the stakeholders and individuals involved will be investigated and guidelines provided regarding the necessary measures that should be embraced.

Furthermore, other research has established that food waste has become problematic in developed countries including Denmark (Milne, 2013). According to their argument, the alleviation of hunger has become more complex than it was before. A lot of food gets wasted once it has got to the household from the marketplace since people do not feel a responsibility of sharing with others. Also, consumer choices from one part of the world have a huge impact on the food situation in other parts of the world. Investigation of such problems implies that there would be a better discretion and attitude towards food prevention. Moreover, some challenges regarding food waste are as a result of the failure of commitment by many stakeholders and scholars. If scholars and researchers take a key step towards the investigation of the matter, then it will impact positively to the call for food waste prevention. This study is, therefore, paramount not only in Denmark but also in other parts of the world where food waste has been prevalent. The research also offers recommendations that are in line with the current situation in Denmark which is vital for the government and other key players. The actionable plans stipulated in this research are fundamental in curbing food wastage in Denmark.

## **1.7 Assumptions**

The research makes several assumptions to complete the research effectively. Some of the assumptions that were made during data collection are that the sampled data collection restaurant represents the scenario in all parts of Denmark. Furthermore, the research assumes that data obtained from the sampled population who offered responses to the questionnaire represents the views of all Danes. It should also be noted that the research made use of a quantitative and a qualitative research approach assuming that the two methods would be effective in answering the research questions. Another assumption that was made is that food waste scenario in Denmark represents other cases from other parts of Europe and beyond hence, recommendations of Denmark would be applied in other countries.

## **1.8 Conclusion**

Food waste is a major concern across the globe and many more researchers ought to take responsibility and evaluate the issue. Due to the challenges facing many countries including Denmark about food wastage, there is need to focus on measures that can be taken to curb this unethical practice. This research was, therefore, instigated to find some of the solutions that can be taken by the government and other stakeholders to minimize food wastage. A thorough analysis of food wastage situation is provided in the research so as to highlight some of the initiatives that private and public demand national level stakeholders should undertake in the country. As noted in the problem statement, despite the progressive measures and efforts that have been put across in Denmark to curb the issue of food wastage, over 30 percent of food is still lost which could be of much help to other countries (Parﬁtt, Barthel & Macnaughton, 2010).

Moreover, there is need to minimize the issue of food wastage in the world considering that over one trillion US dollars are wasted annually concerning food. Many developing countries, especially in Africa and far Asia, face hunger and starvation throughout the year. This is a very saddening occurrence considering the amount of food wasted in all parts of the world including Denmark. One of the challenges that have faced many countries is to fail to come up with regulations that can help to minimize food waste. It was hence, vital for this study to investigate the issue of food wastage in Denmark with the aim of establishing recommendations that can be taken to minimize food waste. Considering that restaurants are chief sources of food waste in the country, it was important to conduct a study focusing on them as shown in the study objectives. Noting that food waste has become a major issue of global concern, it is very important for the research to be conducted to pave the way for more researchers who are interested in the topic of food conservation. One of the ideas that directed the research was the fact that saving food from one area of the world contributes to saving someone else’ problems from other parts of the world.

# Chapter 2: Literature Review

## **2.1 Introduction**

Global demand for food is largely driven by the economic and population growth as well as urbanization. According to research by Plumb and Downing (2013), one of the fundamental factors that can help meet the increasing demand for food and also decrease the pressure on the food production is minimizing food waste and food losses. Food waste has become a societal problem with most people arguing that it is unethical to waste food. In fact, Quested & Johnson (2009) argued that it is not only a societal challenge but also an environmental, economic, and nutritional challenge. The case of Denmark is just but an example of how food waste is prevalent in most parts of the world. Considering that Denmark is one of the most progressive countries concerning food waste prevention, then the issue is even bigger concern in other parts of the world. Countries like the United States despite being developed contribute enormously to food wastage. Reports have indicated that the amount of food that is wasted is more than half of the cereals that are produced in the whole world every year.

Furthermore, Schneider (2008) explained that more food reaches the landfills and incinerators in the United States than any other single material every day. Reduction of food waste has a positive impact especially in developed countries for the reduction of environmental losses and addressing the global issue of climate change. It was noted that over 20% of the total emissions of methane come from landfills. Considering the detrimental effects of methane to the environment. It is important to reduce a number of landfills and one way of doing so reducing food waste. In fact, Sheth, Gardner and Garrett (2008) posit that reducing food waste which helps in keeping the wholesome and nutrition food in the communities will help in addressing the over 42 million Americans who live in food insecure households. Some of the suggestions that have been put across to people include becoming more smart and considerate while purchasing food keeping in mind when it will be eaten. Moreover, people should be aware of the amount of food that they throw away hence, plan for the meals and bringing the leftovers from hotels and restaurants in reusable containers. Also, people should become more mindful eaters who save on food, money, and the environment.

## **2.2 Definition of Food Waste**

Food waste which is also referred to as food loss refers to food which is lost uneaten or is discarded. Causes of food waste have been numerous which essentially occur at the stages of production, processing, retailing as well as consumption. According to recent findings, the global food waste is between 30 to 50% of the total food produced. According to Koivupuro et, al. (2012) the fact that supply chain over the last years has become more complex has impacted on food losses and waste in different parts of the world. According to the research, the supply chain has become longer due to market globalization as well as higher consumer expectations with the variety of choice and freshness of the food products. There has been a growing distance between the producer and the consumer with more intermediaries who contribute to more food loss. However, Kantor, Lipton, Manchester and Oliveira (2007) distinguished between food loss and food waste where he argued that food loss takes place during cultivation, harvest, as well as post- harvest treatment among other earlier stages of the supply chain. On the other hand, food waste takes place in the later stages of the supply chain, particularly during retail and consumption. It was noted that food that was dedicated to human consumption but ended up in the litter bins is referred to as food waste.

Moreover, food waste can be seen as the food that is eliminated from the supply chain although it was dedicated for the human consumption. Harrison, Rathje and Hughes, (2010) explained that food losses could occur in different stages of the supply chain for food and such occurrences are influenced by the different players concerning what they do. According to Gustavsson, Cederberg and Sonesson (2011) losses in the developed countries like Denmark have been largely influenced by unfavorable weather conditions as well as sorting out due to the rigorous quality standards which do not justify the expenses that are occurred during harvesting. Further food losses occur during washing, slicing, boiling, peeling, and sorting out. Further food loss is experienced during the aspect of transportation and distribution by the retailers and wholesalers. Despite the measures that have been taken to ensure food is not wasted during these processes, a vast amount of food is still lost before it even gets to the consumer. Furthermore, food is lost in cases where it exceeds the expiry date, logistical constraints, as well as non- compliance with the food safety requirements. Food waste by the consumers is also very prevalent especially due to the wrong purchase and consumer preferences (Graham-Howe, Jessop & Sparks, 2014). Also, food is wasted by the consumer due to inadequate storages, lack of essential knowledge on reuse of leftovers and cooking of meals that are more than required. However, there are also societal and economic factors that have been contributing to food waste such as urbanization, prosperity, rising number of single households, and decreasing prices of food in different parts of the world.

## **2.3 Definition of Food Waste Prevention in Denmark**

Reduction of food waste in the supply chain has become a major priority in Denmark. According to a report by the Danish government, it is the responsibility of all the actors throughout the supply chain to meet the Sustainable Development Goals (SDGs) including food waste prevention (Godfray, et, al., 2010). According to them, food waste prevention involves the regulation of the food supply chain so as to ensure that most of the food reach their destination. Moreover, this involves sensitization of the public regarding consumption of the food which has become a major concern in the country. It should be noted that Danish food industry has been very famous for the butter, bacon, and biscuits. For many years, the Danish food industry has been on the front line for effective food consumption. For example, the pig production in Denmark has seen all parts of the pig utilized as food, feed, or even biodiesel. Food waste prevention in Denmark therefore, means that all food that is produced for human consumption should end up as so. Also, all the remnants during food production which are not edible should be processed to other products as shown by the case of pig production.

Moreover, the Danish government has introduced a National Bio-economy Panel whose role is to advice regarding food waste and loss and which how it can be converted into resources. Through this, the government is able to ensure food waste prevention in all the parts of the food supply chain. This is done through the establishment of the strategies for the food waste reduction national target where all the actors work together to achieve the set objectives. According to Ganglbauer, Fitzpatrick and Comber (2013), Denmark has initiated more programs and campaigns for food waste prevention than any other European country. Danish government has been very aggressive to reduce food waste since they believe that a reduction of food waste is a help to the economy. Moreover, Evans, Campbell and Murcott (2013) argued that reduction of food waste does not only make good sense from the environment perspective but also from the business perspective. This idea was borrowed by Denmark who believes that prevention of food waste is a key economic and environmental factor. To achieve this, the government has conducted special innovation which helps the stakeholders to participate in food waste reduction. It is, therefore, noted that food waste prevention in Denmark is a responsibility of everyone unlike most other countries making it a national concern in the country (FAO, 2013).

## **2.4 History of Food Waste Prevention in Denmark**

### *2.4.1 Previous Trends of Food Waste Prevention in Denmark*

Food waste prevention in Denmark has a long history. For several decades now, the Danish government has been on the forefront to curb food waste and promote environmental conservation. In the early 1990s, there was a big perception in the country that food waste referred to only the food staff that is discarded (Evans, 2012). In this regard, the government undertook various measures to ensure sensitization of the consumers to make better use of the food staff. The government initiated numerous programs to discover why there was a lot of food waste in the country where they established that some of the reasons why edible food was discarded were due to economic and aesthetic reasons. However, these food wastes generated negative externalities from the economic point of view. At some point, food waste campaigns took center stage in all national televisions initiated by the government and promoted by other private actors in the industry. As the country was developing to further industrialization, there was a lot of food staff generated which implied that more food was available in the market. However, consumer behavior is always affected by the availability of food as Evans (2011) described in this research. Towards the end of the 90s, a lot of programs were already at a place in the country to promote good behavior for food waste prevention.

According to a report initiated by the national government of Denmark, most people are not aware of the amount of food they throw away. The report established that people are just ignorant of the fact that the food they pour in the dustbins can be consumed at a later date. For people to understand this, there was a need for the organizations in the country that are both public and private to sensitize people so that they can understand the implications of food waste. Earlier research in the country showed that food wastage is influenced by the family composition. The study found that larger families wasted less food staff than smaller families and also adults wasted more food than children. In this regard, several agencies like the Danish Environmental Protection Agency were put up to promote good practices. One of the ways that the government would enhance environmental protection was through conservation of food and prevention of food waste. The Danish ministry of environment played a vital role in the development of programs that would enhance better food consumption practices. In fact, Beretta, Stoessel, Baier and Hellweg (2013) argued that Denmark was making very progressive steps due to the involvement of the government and other actors.

Furthermore, Denmark was very aggressive in evaluating food prevention measures so that they could develop a framework for better ways of food waste prevention. Through numerous research in the country, the government established that food waste prevention could only be achieved through a multi- stakeholder collaboration which involves both the public and the private actors. To achieve this, they enhanced a point of departure of this issue where they directed food system thinking by all the actors who were involved. Such measures enhanced research, initiatives, and interventions which help in minimizing food waste. According to Blair and Sobal, 2006), there was the need to make use of the natural resources in a manner that was socially, environmentally, culturally, and economically sustainable. This included the good use of food crops and food staff. However, these measures were still seen as narrow considering the bulk of food wastage in the country. Considering that the country was losing billions of US dollars annually through food waste, there was a need for food waste reduction measures. The growth of the food should, therefore, have been more objective beyond just production.

### *2.4.2 Current Trends of Food Waste Prevention in Denmark*

Since the issue of food waste became a reality in most countries across the globe, Denmark has undertaken numerous measures to reduce food waste. Denmark identified food consumption as the most polluting activity in the country triggering a series of developments to ensure that food is conserved in the country. However, recent research has shown that despite the technological development of food waste management systems, a lot of food is wasted during the supply chains. It was noted that there are some the supply chain actors who influence the decision-making in the country causing a dynamic flow. Also, these supply chain actors make independent decisions; hence, the network structure becomes very difficult for the food waste prevention decisions. However, the government has cooperated with some of the NGOs such as the Stop Wasting Food Movement Denmark. This is the biggest non- governmental organization in the country whose objectives is to reduce food wastage. Such movements have ensured that consumers are inspired through innovative solutions where food waste can be prevented. In this regard, many companies can now understand the aspect of food waste prevention in Denmark. The government has, therefore, played a vital role towards preventing food waste in supermarkets. In fact, Blair and Sobal, 2006) explained that all of them had implemented initiatives to prevent food loss through their competition for market share.

According to a report by the EU, Denmark is one of the countries in the whole world which has the highest proportion of the supermarket chains that focus on the food waste management. In fact, the government has been able to create a sense of responsibility in the supermarkets who sell goods that are nearing sell by date at discounted rates. Other measures that have been taken include selling the products that are nearing sell by date in small packages. Bowen (2008) established that there is even technological development in the country for food waste prevention. This includes the use of the smartphone apps where customers and business relations are facilitated. Some of the measures that have been taken include sensitization to the consumers regarding good and safe practice regarding food that is mislabeled or the packaging has been scratched. Moreover, the government together with other stakeholders have initiated a lot of regulations and changed several of them regarding food donations so as to facilitate food waste prevention. For example, the Danish government changed the legislation regarding donations of the non- animal food to the charity. While it was very difficult to conduct the same by the retailers, the new legislation together with the changed taxation on food donations have made it easier for the activities to be carried out minimizing food wastage.

According to Buchner, et, al. (2012), Denmark has come a long way already regarding food waste prevention although there is still a big room for improvement. The country has been changing rules and is working hard to change the EU legislation which will aim to pave way for more organizations, companies, and citizens to get the best value for the good and edible food that is produced. Currently, the government has been developing action plans for all to follow up in both national and international arena. All the policy areas that have been a center for development are based on the priorities for the core sustainable growth experiences. Some of the measures have seen REMA 1000 which is one of the largest supermarket and food supply chains in the country no longer offering discounts that will entice the shoppers to overbuy food which ends up being wasted (Chandon & Wansink, 2002). In addition, numerous food waste areas have been developed by many stores. Moreover, the Danish Parliament hosted the Better Food for More People Summit whose aim is to promote better food consumption and enhance food waste prevention measures. This shows that the Ministry of Environment and Food has been on the fore front in realizing success in food waste prevention. In fact, Campden (2011) explained that food waste has been a major agenda for the last three governments in the country and is likely to be a significant agenda in future. This has made arguably all people in the country to start thinking about the environment, and one of the major topics is food waste prevention.

## **2.5 Regulatory Policies Relating to Food Waste Prevention in Denmark**

### *2.5.1 Past Regulatory Policies Relating to Food Waste Prevention in Denmark*

As noted by Defra (2011), Denmark did not have a very well established framework for food waste management in the past. However, there were several regulatory policies that were initiated by the government to curb wastage and promote environmental conservation. One of the legal frameworks in the earlier days was the Waste tax that was issued in the year 1987. The tax was introduced due to the problem of dioxin emissions that resulted from incineration. Also, the tax was meant to support the action plan for the waste and recycling. The purpose of the tax was to increase the proportion for waste management and prevention. However, the ministry of environment noted that to deal with the issue of wastage then the problem of prevention was to be addressed. However, it was not possible at that time to deal well with the problem of food waste since the government promoted the practice of incineration over the landfill. By the year 1991, it was noted that the rate of landfill would be same with the rate of incineration. However, the policy was not very effective in reduction of food waste but rather the management of food waste.

Another regulatory framework which played a vital role in food waste prevention was the Environment Protection Act of 1998 (Dunn, 2011). Although the Act was not primarily geared towards the issue of food waste, it was found that food constituted a very significant portion of landfills which in turn dealt a major blow to the environment. To enhance a sustainable social development, human beings have to protect the fauna and flora (European Commission, 2016). Besides industrial waste which was a major concern in the country, food waste had also reached worrying levels with a majority of the people feeling that there was need to prevent food waste. In this regard, several statutory were established by the year 2006 so that food waste would be managed in a better manner. For example, the statutory number 1650 of 2006 regulated the input quality of the food waste that would be delivered in for biogas production (Adhikari, Barrington, & Martinez, 2006). Initially, a lot of food that was seen as waste was used in the biogas digesters. However, researchers found that most of the food that ended up in the biogas plants were of high quality and could still be edible. Through the policy, the food was to be assessed before it is input to the digester so as to make sure that only the food that was not edible and not fit for human consumption would be used for fuel production.

Furthermore, the country established a charter that related to the issue of less avoidable food wastes. Initially, this was initiated to regulate a number of food wastes that were avoidable. It was noted that although food losses and wastes during the supply chain were difficult to regulate, there was a huge amount of food wastes which was avoidable. This charter would later be endorsed by other countries within the European Union in the quest of preventing food wastes. One of the biggest challenges that the policy faced was implementation. Although it was very easy for the policy to be adopted, there was a challenge on how the same would be enforced in the homesteads where a majority of food wastage in noted. However, a new avoidable food waste would be remunerated with the aid of the 19 member states although it was largely influential in Denmark. By the year 2010, the country had formulated policies in the hospitality industry which would see a reduction of food served to the customers (Saraiva & Andersson, 2015). One thing that should be noted is that food is very expensive in Denmark as compared to other European countries. Through the policy of food reduction in the hospitality industry, public kitchens were required to serve fewer food than it was before so as to reduce food waste. For example, most canteens and public kitchens recycled the excess food which was still edible and diversified the same in the coming meals.

Another policy that was initiated by the Danish government to prevent food waste was the Danish Food Administration policy. This was a policy that was initiated requiring Danish Veterinary and Food Administration town hall canteens to convert their food procurement to the organic food. During this process of conversion, the total food was almost halved. According to a study by Boldrin, Andersen, Møller and Christensen (2009, the process contributed to a reduction of food waste by a whopping 46%. In fact, some of the canteens like Fredensborg reduced its food waste by 50% as food had dropped from 43.2 kgs per day to 21.6 kgs per day after the conversion process. This reduction was also contributed by a decrease of the buffet that was initially served but later left unattended. Another regulation policy in Denmark that was used in the prevention of food waste was triggered by the study by the TNS Gallup which showed that every 2nd Dane would like to have a doggy bag in restaurants (Buzby & Hyman, 2012). This triggered the Stop Wasting Food Policy which was promoted by the Stop Wasting Food Movement by the Ministry of Agriculture where Denmark would benefit through food conservation. According to Buzby, Hyman, Stewart and Wells (2011), the policy was radical and required people to become aware of the challenges that were associated with food wastage and hence promote food conservation.

### *2.5.2 Current Regulatory Policies Regarding Food Waste Prevention*

Food waste prevention framework in the country has seen Denmark become the leader in food waste prevention. One of the policies that have been adopted includes the food resource efficiency. Through the policy, the country was able to target a reduction of avoidable food waste by 50%. Several groups have been lodged by the government in the call for food waste prevention who have in turn assembled some the plant health, food chain, and animal stakeholders. Furthermore, the country has been able to adopt a circular economy policy which sees the end product being introduced again to the production line. According to Engström and Carlsson Kanyama, (2004), the policy has achieved a food waste reduction of 30% since its adoption. Furthermore, the Danish government initiated a program where all its legislations would be reviewed to evaluate the impact they had in food waste management, food use optimization and food waste reduction in the country. Through this, the country can come up with working policies so as to ensure food waste is prevented from the farm to the consumption. Many reports argued that to deal with the issue of food waste effectively, legislations should be enacted with the participation of the stakeholders' something the Danish government was aware of.

Denmark has also introduced a national plan for the food waste which is incorporated with the strategy for Denmark without food. As a policy, the country has agreed to recycle 50% of the household waste. This is because the country has been incinerating over 80% of the household wastes in the past. However, the recent policy will see over 50% of the food that would have been wasted being recycled for consumption. Besides, the government has come with a Refood Label which aims at implementing a national label for the sustainable cafes as well as restaurants in Denmark (European Parliament Council, 2008). Another very effective policy is the use more waste less program that was launched in 2012 and has been effective to date. According to FAO (2014) Danish Environmental Protection Agency has been on the forefront of articulating ideas and giving tips regarding reduction and prevention of food wastes. This policy has seen the public become aware of the food waste reduction measures; hence, they can prepare food which will be eaten and save the possible left overs for reuse. Through the program, food waste prevention is enhanced at a very high rate.

Furthermore, the country has instituted various programs and policies in the learning institutions in order to fully make the public aware of the food waste and the benefits of prevention. The government has undertaken policies that require food waste programs to be initiated in the learning institutions. Through the educational efforts that the Danish government has developed, there is an increase in public awareness, and people become more responsible. Graham Rowe, Jessop and Sparks (2015) argued that the efforts that have been made by the government through educational policies have been the biggest contributor to responsible citizens. To achieve a common goal, the country initiated a standardized policy which has been advocating for the support and development for the food waste donation and recycling infrastructure across the country. It was noted that having a very cost effective way for the business to recycle food waste is paramount for food waste prevention programs. This has enabled the entire country through the cities, municipalities, and counties being able to enact policies that go in line with the countries goals. In this regard, the country was able to enact policies which enhance food waste recycling impacting on the prevention of avoidable food wastage.

According to Heikkilä, et, at. (2016) food waste policies in Denmark have been in with the European Union Waste Framework Directive. According to the EU report, it is required that any country establishes a hierarchy for the waste prevention. In this report, waste prevention is the priority, this is followed by re- use and finally recycling. Although the EU has not established mandatory food waste reduction targets, Denmark introduced its policies where it targets a reduction by 50% by the year 2020. So far, several legislations have been in place for food waste reduction which requires manufacturers and supermarkets to reduce food waste by 30% by the year 2025. If the companies can achieve this, then it will be a very significant achievement for the entire country as a whole. According to a report by Halloran, et. al. (2014), reduction of food waste cannot be achieved without a clear framework of the government and support by all the actors involved. To ensure that the policies are successful, the company has guaranteed a collaboration with all the stakeholders who are participating in the food processes and consumption. Another policy which has helped reduction of food wastage is the food security policy. This policy requires efficient use of food products and demands for better consumption so as to reduce waste. Through the policy, it is necessary that there is enough food for consumption in the country. This has contributed to a reduction of food waste in Denmark.

## **2.6 Impacts of Food Waste Prevention**

### *2.6.1 Effects of Food Waste Prevention on the Denmark Hospitality Industry*

Reports have indicated that Denmark has one of the most successful hospitality industries not only in Europe but also in the entire world. According to reports conducted by the Jyllands-Posten Finans, Denmark enjoyed a record money making 2016 in the hospitality industry. In this regard, it was anticipated that over 6,000 additional rooms would be added in the coming three years so as to capture all the population. One of the primary reasons for the growing industry and the increase in profits in Denmark hospitality industry is the many reforms that have been undertaken. In the quest to ensure food waste prevention, the industry in Denmark has initiated programs where people are sensitized on better food usage. Although there have been challenges to educate especially foreigners on the need to do so as noted by Katajajuuri, et, al (2014), the method has managed to make a lot of people interested. Kjær & Werge (2010) pointed out that a lot of people who come from abroad to tour other countries are always very interested in learning a different culture from another country. In this regard, most people appreciate measures taken by Denmark to reduce food waste.

Furthermore, Denmark has become a role model when it comes to food waste prevention. According to Lundqvist, Fraiture, Molden, (2008) one of the important methods that can be used to attract tourists both local and international is having not only classy environment but also a clean one. Food prevention measures in Denmark have ensured a cleaner environment which has attracted a lot of people. Moreover, people are now willing to spend more time in the hotel rooms. This extra spending is a positive note to the hotels which make bigger profits every year. In fact, reports show that since the country became very aggressive in food waste prevention and initiated numerous programs from the year 2012, there has been an exponential growth in the country’s hospitality industry. Such developments have also seen an increase in investment in the industry by most people increasing a number of hotels and restaurants. This is a very positive impact on the countries especially the economic sector due to the increase in revenues generated. In this regard, the country’s hospitality industry has been boosted by the measures taken in food prevention.

Some of the measures that have been taken in food waste prevention have resulted in higher costs of food. In fact, a report by the European Union indicated that Denmark has the highest cost of food among the European countries. This has not been different even in the hospitality industry. However, this has been a boost to the hospitality industry which implies that the hotels can generate a lot of income from the small volume of sales. Moreover, through the initiatives for food waste prevention, the hotels and the hospitality industry as a whole can be able to manage their resources well (Marthinsen & Sundt, 2012). It should be noted that one of the biggest challenges that has faced a lot of industries is the proper management of resources. In this regard, the hotels and restaurants have been able to recoup a lot of money which would have, however, gotten to the needless waste and waste management. A reduction of waste is also a reduction of the money that is used in incineration and other methods of waste management. This implies that the hospitality industry has been boosted by the fact that fewer costs are used in waste management and hence, the noted booming of the industry.

According to research by Moll and Jose (2006), reduction of food through extending the product life can save up to 600 million dollars. Besides, this could help in saving over 0.23 million tons. Denmark’s hospitality industry has been on the run for money through taking up measures for reducing food waste. Extending of the shelf life for food has seen the industry save more and more money. Also, there has been a notable increase in resource efficiency in the hospitality industry in the country for the food and drink supply chain which also has a cost saving impact. Through the collaboration with the government entities as well as other NGOs has benefited the whole industry as a whole as food which would have ended up as waste is preserved and recycled by these entities. Through such food donation measures, the hotels can save on the costs for food waste management hence, making more profits. Surveys indicate that many hotels are now expanding due to the profits generated in the industry. However, Møller, Boldrin, and Christensen (2009) noted that caution should be taken as the industry grows since it may result in other unanticipated losses. This only shows that the hospitality industry in Denmark has been boosted by food waste prevention measures and is likely to continue growing.

### *2.6.2 Benefits of Food Waste Prevention on the Denmark Economy*

Food wastage prevention in Denmark played a very great role in the economy of the country as well as to one of Danish. According to research done in Denmark, it’s estimated that a third of all food goes to wastage, which totals to approximately $ 200 billion annually (Vandermeersch, Alvarenge, & Ragaert, 2014). Therefore, reduction of food wastage would save a lot of money annually. Less food wastage means direct saving for consumers, more productivity a well as more efficiency. Moreover, this would mean much saving to help the less disadvantaged that go hungry. According to a report in a journal Zanten, Mollenhorst and Oonincx (2015), food wastage in a household can save approximately $30 cost of food in a week. Hence, in a month a household saved approximately $120 of food that could be used for purposes in the household such as health care and education. This meant more money was saved out of less food wastage. Also, a household spent less disposal cost through food wastage reduction strategy. Food waste contributed to more than a third of rubbish bin. Therefore, waste disposal was so expensive for a household. Reducing the food waste assisted reducing the burden of paying bills for waste disposal. Since the little waste could be decomposed in the garden.

Food wastage prevention was not only beneficial to the household but also to business. Food wastage prevention strategies provided direct profit to businesses. Business like the restaurant pocketed a lot of profit through the initiative of less food wastage. This was done through the use small sized dining facilities like plates that would accommodate food enough for consumption contributing to less wastage of food. The study showed that a business could create estimated profit of $1 million annually through food recycling and prevention of wastages (Priefer, Jörissen, Bräutigam, 2016). Moreover, retailer saved a lot of money by selling perfect products that were more desired by the customer and this prevented wastage of goods as well as a loss to the retailer. Hence, clear that food waste prevention in Denmark played a great role to the business owners as well as to their customers.

In addition, prevention of food wastage contributed to the economy of Denmark indirectly. This can be illustrated through environmental benefits such as energy preservation. Less food wastage meant a clean environment and less money is required to keep the country clean. According to study Pressley, Aziz, DeCarolis, (2014), food wastage contributed to the pollution of environmental and this meant food wastage was an environmental hazard as well as a health hazard. Prevention of food wastage assisted in the reduction of greenhouse gases emission that contributed to change in climate. Therefore, food waste reduction led to less climate change cost that facilitates proper production of agricultural crops. Moreover, less food wastage meant less negative effect on the land use. Hence, the country required less production cost of food. This indirectly contributed to the economy of the Denmark as the saved money could be used in other sectors such as transport and health sectors. Also, a lot of energy, as well as fuel, was preserved that could be used in the transportation and recycling process of waste food. Furthermore, the country would spend lots money to get the lid of food disposals and landfills in order to maintain hygiene as well as climate change. Developed countries spend a lot of money on global warming affected, which is greatly contributed by the effects of waste like food waste that increase the emission on methane. Reduction of waste food in Denmark, therefore, not only assisted the global fight off global warming effect but also the economy globally. This is due to the reduced the cost set aside for climate change management strategies in order to reduce the effects of global warming.

Food wastage prevention in Denmark, also, greatly contributed to food security, which in turns impacted on the economy. Reduction of food wastage helped Denmark in food security where food storage for future use was available and well packaged to prevent spoilage. According to research, reducing food waste by half could block about 20% of about 50% food gap that was between the food available at the present and what would be required in 30 years’ time Nakakubo, Tokai & Ohno, 2012). Therefore, food wastage reduction saved the government a lot of stress to fight food insecurity as well as helped the country economy by saving money as well food produce. This assisted the country to feeds its citizen even when the production of food was very low. In addition, food wastage prevention helped individuals as well countries like Denmark to donate food the less disadvantaged countries and people like the developing countries. Donation played a great role in the economy of a country indirectly as it created a link in the global market. Moreover, prevention of agricultural food waste contributed to the economy of a country indirectly as saved food amounts to saved resources used that would have resulted to wastage. A study shows that farmers used approximately 675litres of water for irrigation in their farms (Messac, Ismail-Yahaya, Mattson, 2013). Therefore if the produced food was wasted, the water would ultimately go to wastage as well. Alternatively, the water would have served over purposes like for domestic use. Hence, reduction of agricultural food waste in Denmark indirectly contributed to the economy.

### *2.6.3 Negative Impacts of Food Waste Prevention on the Denmark Economy*

Despite the many benefits that come up with the initiative to prevent food waste in Denmark, there were few negative impacts felt on the economy of the country. It was noted that implementation of this initiative led to unemployment. Food waste prevention led to decrease in the waste disposal in the household. This resulted in reducing in a number of workers in municipal since the amount of waste to be collected drastically reduced. Furthermore, it was noted that some of these companies would separate the food wastes from the other disposal. The food waste would be used as animal feed especially for the pigs in the municipal farms and private firms (Manfredi, Scharff, & Tonini, 2009). Therefore, the initiative of food waste prevention affected the municipal and the private firms that took the advantage of the waste foods. This meant the use of the extra fund to purchase the feeds or either reduction in the number of animals in the farms. A research shows prevention of food waste in Denmark greatly affected the living standards of pig owners that depended on the municipal waste collection to feed their animals. This because the food waste collected was not enough to feed their animals. Furthermore, large-scale farmers that kept animals poultry and fishery they greatly depended on food waste for their feed. For example, they would raise maggots out food waste that would in return be used as animal feeds. Hence the initiative to reduce food waste affected the productivity of the animals as they were forced to either reduce the stock of the animals or purchase other feeds.

Food waste prevention resulted in land infertility and degradation. It was noted that most of the gardens where the owners would decompose their waste before the initiative started degrading. This is because the household had no organic waste to decompose on their farms anymore. A study shows that waste foods can be used to fertilize soils as well as to prevent soil erosion (Kim & Kim 2010). Soil infertility resulted to infertility of the garden hence, poor production. This affected the household since they had to dig extra cash from their pockets to purchase some vegetables like tomatoes, which would not have been the case if they had them in their gardens. In return, the economy in a house was affected and consequently affecting the economy of the country at large. In addition, food waste was used as a source of energy in Denmark. Private companies would use food waste to produce electricity; this was done through a process of anaerobic digestion. Therefore prevention of food waste greatly affected the revenue generated by these companies as they greatly depended on the food waste collected for sludge. For instance, Denmark was one of the countrys well known for its production of bioenergy through the use of waste food (Kim & Kim, 2010). Hence, reducing food waste directly affected the country’s economy. Since the price of electricity tends to rise with time causing bioenergy serve as an alternative source of energy.

Withdrawal of discounts offered by the supermarkets in order to reduce the amount of food wastage by the customer resulted in drastic reduction in the number of customers as well stock sold out daily. Despite the fact that they reduced the quantity of good, reduced number of customers and sells resulted in a deceleration of revenue generated. This meant a negative impact on the economy of the country. Also, it was noted that the supermarkets were forced to reduce their stocks in order to avoid expiry of items as the sale were minimal. Moreover, this blow was also, felt by the processing companies since they reduced the amount of stock produced out of few orders to supply to. Furthermore, the farmers were also forced to reduce their produce due to a decrease in demand for farms products. This affects them financially as the higher the produce the higher the return.

In addition, from a study Eriksson, Strid and Hansson (2015), it’s noted that prevention of food waste on the surplus would consequently lead to a decrease in prices of the commodities and in return a lower resource value was resulted. Therefore, this was a major challenge faced by business as they were forced to sell their commodities at a lower price to avoid spoilable that would lead to wastage. This resulted in a lower profit generated by the suppliers. Also, reduced food wastage on demand side was noted to affect the producer negatively. Since they would sell a lot of commodities at a lower price hence, a very low is generated in the process. This was out of the increase in demand for the commodities. In addition, some consumers were reported to have increased their food intake in order to reduce food wastage. This resulted in health problems like overweight that more expenditure on the consumer resulting in a financial crisis.

## **2.7 Prevailing Information Gap**

Although a number or researches have been conducted on the topic of food waste, there is still some information which is missing. It was noted that there is no clear distinction between food losses and food wastes. In this regard, some of the researches have used the words just interchangeably. In addition, most of the research that has been conducted about food waste have majorly focused on the impacts of food waste. However, very few researches have established the primary reasons why people waste food. Despite the efforts by some researchers to explain why people waste food in their homes, there was no clear indication as to the primary reasons for the same. Moreover, there are reports that about 40% of the food that is wasted is carbohydrates which include bread, potato, and rice (Food and Agriculture Organization of the United Nations, 2011). However, there is no information showing why these foods are wasted in large amounts unlike other types of food. In order to curb food wastage, it is important to have the primary reasons which contribute to food waste at home and in hotels.

The research seeks to establish the main sources of food waste in the canteens and restaurants in Denmark. This is in the quest with the current information gaps regarding food waste. Although the country has undertaken several initiatives to curb food waste, it is not clear why the state still makes huge amounts of food waste annually. Moreover, goals have already been set for minimizing food waste in Denmark. However, it is hard to establish how such targets will be achieved. Earlier researches have also not indicated the amount of investment which would be required in dealing with food waste management. As shown by Bernstad, Cour and Jansen (2011) in their study, food waste prevention could be spending more money than what is generated. However, such doubts should be eliminated, and measures are taken to undertake only the correct methods. It is also important to take note of the operational costs and ensure measures are undertaken to reduce turnovers at the end of the year. This would ensure sustainability of the sector and would acknowledge the initiatives taken to ensure food reduction. This research will, therefore, explore these investigation and information gaps in order to give viable recommendations regarding food waste prevention.

# Chapter 3: Methodology

## **3.1 Introduction**

The research used both a qualitative and a quantitative approach. Also, the research made use of the secondary sources so as to explore the food waste prevention in the hospitality industry in Denmark. One of the reasons the research used the secondary data is to establish the already existing developments that have been in the industry and the country. Information from the secondary sources included published journals, previous research papers, and governmental publications on the issue of food waste and prevention. Information from the published sources was very important for the data validation to give valid and viable recommendations. On the other hand, qualitative data was collected in order to assess the current state of the food waste prevention in the restaurants and canteens of Denmark. Several respondents were targeted with different capacities to ensure that all aspects of food waste were covered. To ensure that everything was covered, a case study was developed as shown in latter chapters regarding the data collection. Moreover, observation method was key to the qualitative data collection since it formed the basis for clarification. Interview method was also used in data collection. In this regard, the respondents were required to answer various questions by use of the questionnaire. Interactions with different respondents was also very helpful in validating the information regarding food waste.

## **3.2 Background of the Study**

### *3.2.1 Benefits of Food Waste Prevention in Denmark’s Economy*

To determine the food waste prevention impacts to the Denmark economy, a quantitative data was collected from the public publications and other governmental sources. These included weekly magazines, journals, and national gazettes. Some of the data that was collected included the impact of the food waste prevention to the economic growth concerning real GDP. Also, factors such as inflation were evaluated together with the impact of food waste prevention to the employment in various industries. Economic measures are critical since they help the government evaluate the validity of any of the projects that they undertake. In this regard, an analysis of the labor productivity in the agricultural sector was paramount. This was conducted in consideration of the intermediate skills and incidences of payments. It was interesting to evaluate the impact that food prevention has caused to the payments in the agricultural sector. To give a viable description of the situation in Denmark, both macro- economic and micro- economic factors were evaluated Christensen, Gentil, and Boldrin, 2009). Another factor that was evaluated was the sustainable growth that has been impacted by the measures taken to prevent food waste. This was informed by the facts established in the literature review on the economic impact of food waste prevention measures.

### *3.2.2 Impact of Food Waste on the Hospitality Industry in Denmark*

The literature review showed that food waste prevention in Denmark impacts largely to the hospitality industry in any country including Denmark (Campden, 2011). To evaluate this, both qualitative and quantitative data was collected. A qualitative approach was made to assess the status of restaurants and canteens in regard to the food waste prevention. This was achieved through surveys and interviews that were conducted by in restaurants were respondents were required to answer some questions. Some of the issues that necessitated this quest are the fact that most impacts of the measures taken are related to the canteens. Also, the interviews were conducted with the aim of getting personal opinions of sampled respondents who would offer some services in the restaurants. However, quantitative data was also collected from secondary sources to evaluate the status of the hospitality industry in general. It should be noted that the entire sector has a very fundamental consideration to the government since it revolves around livelihood of people. In this regard, a lot of information was collected from the secondary sources to evaluate how the industry in Denmark has been performing. An analysis of the same is shown in the latter chapters.

## **3.3 Survey and Findings**

### *3.3.1 Case Study*

I conducted a survey in the Mielcke & Hurtigkarl restaurant where I conducted several interviews to get primary data regarding food waste and food waste prevention measures. The restaurant has 15 employees who work in various sections. It should be noted that the restaurant was co-owned by Jacob and Ian and hence, all the decisions that could be taken were as a result of consultations. I had a survey about food waste for a whole week (7 days) in the restaurant from the morning at 9 am to 4 pm. In order to find out food waste in the restaurant, I measured the amount of food that they wasted every day and found that it was an average of 9kg. Most of the food that they wasted were in form of vegetables, fruits, meat, potatoes, and fish. In order to establish the awareness of the employees regarding food waste I initiated an interview with a few employees where I administered a questionnaire. The findings of the questionnaire are shown in the appendix and are discussed in the discussion chapter. Moreover, I used observation to understand food waste causes in the restaurant and the practices that were facilitating foot wastage. More findings were discussed and analyzed in the latter chapters.

## **3.4 Quantitative Data**

### *3.4.1 Secondary Data*

The study section applied a quantitative approach. The technique involves using mathematical or scientific data to understand the problem. The quantitative method focuses on the results from a large number of respondents, instead of focusing on few individuals. The approach was very important in this study because it helped in compiling statistics, questionnaires and opinion surveys with the aim of examining the findings to produce data-driven results.

This study targeted a population of Denmark citizens who worked in a restaurant or hotel or company. However, conducting a full census would be very expensive and time-consuming. Moreover, it would not have been possible to reach each member of the target population. Therefore, the study adopted a sample survey technique where a sample of size 150 was selected. The sampling method used was simple random sampling method. This sampling method was preferred because it was free from bias because all members in the target population had equal chances of appearing in the survey.

Data was collected using a questionnaire with both closed and open-ended questions. A questionnaire is an instrument used in research to gather information from respondents by giving their responses to a series of questions and other prompts. One of the major advantages which led to the adoption of questionnaires while avoiding other types of surveys is that they are cheap, they require less effort than the telephone or verbal surveys, and they provide standardized answers enabling an easy compilation of data. The collected data was categorized into three broad categories namely, personal profile, food waste practices and food waste variables. The personal profile variables included the positions held by the respondents in their respective restaurants, hotels or companies and work duration. The first food waste practices variable was the binary variable on whether the respondents practiced food waste safety prevention measures in their respective restaurants, hotels or companies. The second variable under the category of food waste practice was binary variable on whether the management provided food waste prevention measure training. The third variable under food waste practices category was a binary variable on whether the new employees inducted into the training program during orientation. The variables under the food waste category included the causes of food wastage, barriers to decreased food wastage at restaurants, fruits purchased in the largest volumes and vegetables purchased in the largest volumes. Other variables under the food waste category included the type of fresh fruits most wasted, vegetables most wasted, type of food products most wasted and most common causes for throwing out food. The type of food looked after to overbuy and end up overthrown, the amount of food waste produces every day and percentage of food thrown in the bin every day were also considered.

### *3.4.2 Description of Data*

Analysis of the data was done using SPSS software as a modern statistical tool for data analysis. First, the study conducted a descriptive analysis which aimed at offering a general description of the selected sample. The descriptive statistics included measures of central tendency such as means, median and modes, and measures of dispersion such as standard deviation and variance. Also, descriptive statistics provided information on the distributions by showing the coefficients of kurtosis and skewness. Secondly, the study conducted inferential statistics with an aim of inferring to the population parameters using the sample statistics. The study assessed the relationships between variables by conducting correlation and regression analysis. Comparison between two samples was done using T-test techniques. Presentation of the analysis results was then done using statistical tables and graphs. The most common graphs utilized included pie charts, frequency histograms, scatter plot diagrams and bar graphs.

The study also ensured that all necessary ethical considerations were made in the process of quantitative research. First, the study provided that the basic rules for questionnaire item constructions were followed. By doing so, the study made sure that the questions asked of the participants were not biased or having the tendency of leading the respondents towards a particular answer. Clear and comprehensive wordings was used allowing easy understanding of all educational levels. The study made sure that the personal information about the participants remained confidential and was not any place published in the public domain. The participants were also protected from any possible harm. Moreover, the study made sure that the participants took part following their consent which they showed by signing a consent form. In the form, the members of the population who agreed to participate in the survey were briefed on the goals of the study as well other relevant information such as schedule and what was expected of them.

## **3.5 Limitation of the Study**

The study utilized more of the close-ended questions than it used open-ended questions. Therefore, detailed information about the respondents’ opinions and thoughts was adequately obtained resulting in limited outcomes. Also, the study faced the limitation of findings as a result of having a large sample. The study gathered data from a large sample to fairly represent the diverse population. However, this limitation can be avoided in future by adapting a stratified sampling method instead of simple random sampling. Another limitation involved lack of adequate expertise for statistical analysis of the results. The quantitative approach yielded large data which required a statistical software for the analysis process. The researcher had to seek for analysis assistance from a person with a strong statistical background leading to increased cost.

# Chapter 4: Findings and Discussions

## **4.1 Introduction**

From the interviews and quantitative analysis conducted, it is clear that a third of the food that is served in Denmark is within the hospitality sector. In this regard, the sector has a very high potential for the food waste due to the high amounts of food that is found in this sector. According to the interviews, most of the food that was lost in the hotels came from left overs. Although it was very difficult for the hotel management to take care of the situation, measures have been taken to ensure that food is adequately served in the entire hospitality industry in order to reduce food waste. Through the quantitative methodology, the amounts of food waste were calculated in order to establish the avoidable food waste. This was in line with the food waste prevention measures that have been taken in the hospitality industry and the entire country as a whole. The results show that there is a gradual increase of about 6.7% of food waste reduction annually since the enumeration of the current strategies to reduce food waste in the country.

Inappropriate food conservation

Storage

Caring for a Pet

Consumption

Avoid of left overs

Over preparation

Preparation

Stocking

Excessive Purchase

Buying

*Fig: 4.1: Food Waste Model*

The food waste model above shows the various stages of food waste. One of the reasons why food waste has been very high is due to poor storage. The research established that very few people have adequate food storage facilities. This leads to the in appropriate food conservation methods that have facilitated more food going bad. Food which is in appropriately stored ends up as food waste. Besides storage, a lot of food gets wasted during the consumption stage. As shown in the food waste model, some people cook excess food so that they can give their pets such as dogs and cats. However, most people end up cooking food that they cannot finish with their pets. Most of the times the pets will leave behind a lot of unattended food which would have been otherwise edible. Such food only ends up being a left over. Another step that has facilitated food waste as shown in the model is during preparation. When people are cooking food, there is always the aspect of preparing more food than people can consume. As shown in the research, some people especially the ones in small families prepare excess food. Although this has been partially facilitated by the fact that it is difficult to get small portions of food products in the market, this has just been contributing to the food that gets wasted.

Plan Ahead

Buy What You Need

Recycle What You Can’t Eat

Eat it All or Store Leftovers

Store Correctly

Cook the Right Amount

*Fig. 4.2: Food Waste Prevention Model*

From the food prevention model above, it is clear that several measures can be taken by the domestic consumers in Denmark to reduce food waste. As shown in the model with the emphasis on the findings, people ought to plan ahead so that they don’t end up wasting more food. Food planning is an imperative part of every homestead so as to avoid food waste. This planning will trigger the actions that the people will take such as buying. In this regard, the model shows that people should buy what they need. A lot of food that gets wasted in Denmark and other parts of the country is as a result of buying what is not required (Smith, 2008). However, when people buy what they need they will minimize chances of food waste. Although people can buy what they expect, most people shop in bulk when they have money to avoid the tedious behavior of shopping. This implies that people should store correctly the excess food that they have. This storage will be of the food items that they need as shown in the prevention model.

Moreover, a lot of food has been getting wasted when people cook more food that they can finish. As shown in the model, people ought to prepare the food that they can finish. Besides, it is important to prepare food for people who are already available. In this regard, people will avoid food waste when they cook for visitors who do not show up. Also, the model for food waste prevention suggests that people should eat all the food that they are served with. People should, therefore, be encouraged to serve themselves food that they can finish. However, in the event that they do not finish the food, it should be stored appropriately for consumption later. Homesteads should, therefore, be encouraged to have proper food storage facilities (Adhikari, Barrington, & Martinez, 2006). This will reduce the tendency to pour the excess food in the houses. Also, people should be encouraged to recycle what they cannot eat. Although some people have been ignoring recycling of the food products, proper education can enhance people’s knowledge on how to recycle the food that they cannot take. However, it should be noted that the food waste prevention model mostly focuses on the domestic consumption. However, this will encourage better practices even in the restaurants and canteens.

## **4.2 Analysis of the Personal Profile Data**

The study found that a majority of the respondents were Chefs in the restaurants, hotels, and companies they worked for with a frequency of 74 (49.3%). The second largest group included the employers with a frequency of 50 (33.3%). The study also captured a significant group of owners of the restaurants with a frequency of 26 (17.3%). From the analysis, it is clear that a majority of the workers in the food industry are chefs while a significant group works as employers. The distribution of the sample based on the position the participants held in their respective restaurants, hotels or companies revealed that the sample was an excellent representative of the target population. Hence, the researcher was very confident that the information obtained from the sample statistics was an accurate reflection of the facts on the population.

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| --- | --- | --- | --- | --- | --- |
| **Table 4.2.1 What position do you hold in this restaurant or hotel or company?** | | | | | |
|  | | Frequencies | Percentages | Valid Percentages | Cumulative Percentages |
| Valid | Chef | 74 | 49.3 | 49.3 | 49.3 |
| The employer | 50 | 33.3 | 33.3 | 82.7 |
| Owner of the restaurant | 26 | 17.3 | 17.3 | 100.0 |
| Total | 150 | 100.0 | 100.0 |  |

The study captured respondents with good working experience. The results showed that a majority of the respondents with a frequency of 60 (40.0%) had worked for two years and above. Other groups of workers captured by the study had worked in their respective restaurant, hotels or companies for less than one year and one to two years with frequencies of 48 (32.0%) and 42 (28.0%) respectively. What was indicated by these results was that the responses given by the participants were done out of experience since a majority of the sampled individuals were highly experienced in their respective positions.

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| **Table 4.2.2: For how long have you been working here?** | | | | | |
|  | | Frequencies | Percentages | Valid Percentages | Cumulative Percentages |
| Valid | Less than one year | 48 | 32.0 | 32.0 | 32.0 |
| one to two years | 42 | 28.0 | 28.0 | 60.0 |
| two years and above | 60 | 40.0 | 40.0 | 100.0 |
| Total | 150 | 100.0 | 100.0 |  |

## **4.3 Analysis of the Food Waste Practices Data**

The study revealed that a significant proportion of restaurants, hotels, and companies within the food industry in Denmark practiced food waste safety prevention measures. According to the statistics, a proportion of restaurants with a frequency of 83 (55.3) practiced food waste safety prevention measures while a proportion with a frequency of 67 (44.7%) did not.

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| --- | --- | --- | --- | --- | --- |
| **Table 4.3.1: Do you practice food waste safety prevention measures in the restaurant?** | | | | | |
|  | | Frequencies | Percentages | Valid Percentages | Cumulative Percentages |
| Valid | Yes | 83 | 55.3 | 55.3 | 55.3 |
| No | 67 | 44.7 | 44.7 | 100.0 |
| Total | 150 | 100.0 | 100.0 |  |

Further, the study revealed that a majority of organizations in the food industry had managements which provided waste prevention measure training. From the analysis results, it was found that out of the 150 individuals who were sampled, 89 (59.3%) had the management of their respective organizations providing food waste prevention measure training. However, a significant proportion with a frequency of 61 (40.7%) of the respondents claimed that the management in the organizations where they worked did not provide food waste prevention measure training.

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| --- | --- | --- | --- | --- | --- |
| **Table 4.3.2: Does the management provide food waste prevention measure training?** | | | | | |
|  | | Frequencies | Percentages | Valid Percentages | Cumulative Percentages |
| Valid | Yes | 89 | 59.3 | 59.3 | 59.3 |
| No | 61 | 40.7 | 40.7 | 100.0 |
| Total | 150 | 100.0 | 100.0 |  |

The study revealed that a majority of the organizations whose management provided food waste prevention measure training did it at very low frequency. A majority of the respondents from the total of 81 respondents who agreed that the management in their respective organizations provided food waste prevention measure training claimed that the activity was not done often with a frequency of 35 (23.3%). Other groups of responses obtained were very often and fairly often with frequencies equal to 22 (14.7%) and 32 (21.3%) respectively. This meant that a lot needed to be done to ensure that a big proportion of organizations provide food waste prevention measure training.

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| **Table 4.3.3: If Yes in Q4 above, how often does the training take?** | | | | | |
|  | | Frequencies | Percentages | Valid Percentages | Cumulative Percentages |
| Valid | Very often | 22 | 14.7 | 24.7 | 24.7 |
| Fairly often | 32 | 21.3 | 36.0 | 60.7 |
| Not often | 35 | 23.3 | 39.3 | 100.0 |
| Total | 89 | 59.3 | 100.0 |  |
| Missing | System | 61 | 40.7 |  |  |
| Total | | 150 | 100.0 |  |  |

A majority of the organizations in the food industry in Denmark had their new employees inducted into the training program during orientation. The study obtained frequencies equal to 97 (64.7%) and 53 (35.3%) for those who agreed and those who did not agree that the new employees in their respective restaurants were inducted into the training program during orientation.

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| --- | --- | --- | --- | --- | --- |
| **Table 4.3.4: Are the new employees inducted into the training program during orientation?** | | | | | |
|  | | Frequencies | Percentages | Valid Percentages | Cumulative Percentages |
| Valid | Yes | 97 | 64.7 | 64.7 | 64.7 |
| No | 53 | 35.3 | 35.3 | 100.0 |
| Total | 150 | 100.0 | 100.0 |  |

## **4.4 Analysis of the Food Waste Data**

The study revealed that several reasons existed as to why a majority of the restaurants, hotels, and companies in the food industry had food wastage. According to the study, the most significant cause of food wastage was over-ordering of ingredients with a frequency of 38 (25.3%). A large proportion of restaurants, hotels, and companies in the food industry had food wastage as a result of plate waste from customers with a frequency of 36 (24.0%). Other significant reasons captured in the study as important causes of food wastage were food spoilage, wastage during food preparation and cooking and during service (portioning and serving) with frequencies equal to 27 (18.0%), 25 (16.7%) and 24 (16.0%) respectively. Clearly, some causes of food wastage were easier to prevent than others since some were direct as a result of the workers in the restaurant while others were as a result of the customers.

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| --- | --- | --- | --- | --- | --- |
| **Table 4.4.1: What is the cause your food wastage?** | | | | | |
|  | | Frequencies | Percentages | Valid Percentages | Cumulative Percentages |
| Valid | Over ordering ingredients | 38 | 25.3 | 25.3 | 25.3 |
| Food spoilage | 27 | 18.0 | 18.0 | 43.3 |
| During food preparation and cooking | 25 | 16.7 | 16.7 | 60.0 |
| Plate waste from customers | 36 | 24.0 | 24.0 | 84.0 |
| During service (portioning and serving) | 24 | 16.0 | 16.0 | 100.0 |
| Total | 150 | 100.0 | 100.0 |  |

However, the study also noted that there were some barriers to decrease food wastage in restaurants. The most significant barrier according to the analysis results was the lack of adequate food storage with a frequency of 33 (22.0%). The second most significant barrier to decrease food wastage in restaurants was the lack of time with a frequency of 30 (20.0%). Another very significant barrier to minimizing food wastage in restaurants was customers’ behavior, a factor supported by respondents with a frequency of 29 (19.3%). Other factors captured by the study as potential barriers to minimizing food wastage in restaurants included food hygiene regulations, insufficient labor skills set and others with frequencies equal to 22 (14.7%), 25 (16.7%) and 11 (7.3%) respectively.

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| --- | --- | --- | --- | --- | --- |
| **Table 4.4.2: What are the barriers to decrease food wastage at your restaurant?** | | | | | |
|  | | Frequencies | Percentages | Valid Percentages | Cumulative Percentages |
| Valid | Food and Hygiene regulations | 22 | 14.7 | 14.7 | 14.7 |
| Lack of adequate food storage | 33 | 22.0 | 22.0 | 36.7 |
| Lack of time | 30 | 20.0 | 20.0 | 56.7 |
| Insufficient labor skills set | 25 | 16.7 | 16.7 | 73.3 |
| Customer behavior | 29 | 19.3 | 19.3 | 92.7 |
| Other | 11 | 7.3 | 7.3 | 100.0 |
| Total | 150 | 100.0 | 100.0 |  |

Different fruits were purchased at different frequencies at various restaurants. According to the study, the kind of fruits that were purchased in the largest volumes in restaurants were Clementines, melons and bananas with frequencies equal to 19 (12.7%), 18 (12.0%) and 17 (11.3%) respectively. Oranges, exotic fruits such as mangoes, pineapples and passion fruits, and seasonal fruits such as berries, plums, and peaches were also significantly purchased in large volumes in the sampled restaurants with frequencies equal to 16 (10.7%), 15 (10.0%) and 21 (14.0%) respectively. Other kind of fruits captured in the study as being purchased in large volumes in various restaurants included grapes with a frequency of 13 (8.7%), apples with a frequency of 11 (7.3%), pears with a frequency of 11 (7.3%) and strawberries with a frequency of 9 (6.0%).

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| --- | --- | --- | --- | --- | --- |
| **Table 4.4.3: What kind of fruits is purchased in the largest volumes in your restaurant** | | | | | |
|  | | Frequency | Percent | Valid Percent | Cumulative Percent |
|  | Grapes | 13 | 8.7 | 8.7 | 8.7 |
| Apples | 11 | 7.3 | 7.3 | 16.0 |
| Bananas | 17 | 11.3 | 11.3 | 27.3 |
| Clementine | 19 | 12.7 | 12.7 | 40.0 |
| Melons | 18 | 12.0 | 12.0 | 52.0 |
| Oranges | 16 | 10.7 | 10.7 | 62.7 |
| Pears | 11 | 7.3 | 7.3 | 70.0 |
| Strawberries | 9 | 6.0 | 6.0 | 76.0 |
| Exotic fruit | 15 | 10.0 | 10.0 | 86.0 |
| Seasonal fruit | 21 | 14.0 | 14.0 | 100.0 |
| Total | 150 | 100.0 | 100.0 |  |

Different kinds of vegetable were also purchased at various frequencies at different restaurants. According to the study, the kind of vegetables that were purchased in the largest volumes in restaurants were cucumbers, potatoes and peppers with frequencies equal to 24 (16.0%), 18 (12.0%) and 17 (11.3%) respectively. Mushrooms, lettuce, and broccoli were also significantly purchased in large volumes in the sampled restaurants with frequencies equal to 16 (10.7%), 15 (10.0%) and 13 (8.7%) respectively. Other kind of vegetables captured in the study as being purchased in large volumes in various restaurants included cabbages with a frequency of 10 (6.7%), carrots with a frequency of 8 (5.3%), cauliflower with a frequency of 12 (8.0%), and onions with a frequency of 10 (6.7%). A small proportion of respondents equal to a percentage of 4.7% argued that there were other kinds of vegetables apart from the named ones which were purchased in large volumes in their restaurants.

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| **Table 4.4.4: What kind of vegetables are purchased in the largest volumes in your restaurant** | | | | | |
|  | | Frequencies | Percentages | Valid Percentages | Cumulative Percentages |
|  | Mushrooms | 16 | 10.7 | 10.7 | 10.7 |
| Broccoli | 13 | 8.7 | 8.7 | 19.3 |
| Cucumber | 24 | 16.0 | 16.0 | 35.3 |
| Cabbage | 10 | 6.7 | 6.7 | 42.0 |
| Carrots | 8 | 5.3 | 5.3 | 47.3 |
| Cauliflower | 12 | 8.0 | 8.0 | 55.3 |
| Lettuce | 15 | 10.0 | 10.0 | 65.3 |
| Onions | 10 | 6.7 | 6.7 | 72.0 |
| Peppers | 17 | 11.3 | 11.3 | 83.3 |
| Potatoes | 18 | 12.0 | 12.0 | 95.3 |
| Other | 7 | 4.7 | 4.7 | 100.0 |
| Total | 150 | 100.0 | 100.0 |  |

Different kinds of fresh fruits were wasted at various magnitudes at different restaurants. According to the study, the kind of fresh fruits that were wasted in the largest magnitudes in restaurants were exotic fruits such as mangoes, pineapples and passion fruits, Apples, bananas, Clementine, and pears with frequencies equal to 25 (16.7%) for exotic fruits and 17 (11.3%) for Apples, bananas, Clementine, and pears. Grapes, melons, oranges, strawberries and seasonal fruits such as berries, plums, and peaches were also significantly wasted to high magnitudes in the sampled restaurants. The frequencies were equal to 13 (8.7%), 13 (8.7%), 11 (7.3), 10 (6.7%) and 10 (6.7%) respectively. This was an indication that preventive measures for food wastage in Denmark needed to focus on all kind of fresh fruits.

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| **Table 4.4.5: What kind of fresh fruits are the most wasted in your restaurant** | | | | | |
|  | | Frequencies | Percentages | Valid Percentages | Cumulative Percentages |
| Valid | Grapes | 13 | 8.7 | 8.7 | 8.7 |
| Apples | 17 | 11.3 | 11.3 | 20.0 |
| Bananas | 17 | 11.3 | 11.3 | 31.3 |
| Clementines | 17 | 11.3 | 11.3 | 42.7 |
| Pears | 17 | 11.3 | 11.3 | 54.0 |
| Melons | 13 | 8.7 | 8.7 | 62.7 |
| Oranges | 11 | 7.3 | 7.3 | 70.0 |
| Strawberries | 10 | 6.7 | 6.7 | 76.7 |
| Exotic fruit (mango, pineapple, passion fruit) | 25 | 16.7 | 16.7 | 93.3 |
| Seasonal fruit (berries, plums, peaches) | 10 | 6.7 | 6.7 | 100.0 |
| Total | 150 | 100.0 | 100.0 |  |

Further, the study revealed that different kinds of vegetables were wasted at various magnitudes at different restaurants. According to the study, the kind of vegetables that were wasted in the largest magnitudes in restaurants were carrots, onions, peppers, broccoli and cauliflowers with frequencies equal to 19 (12.7%), 18 (12.0%), 17 (11.3%), 16 (10.7%) and 15 (10.0%). Other kinds of vegetables which were wasted to significant volumes in restaurants included mushrooms, cucumbers, cabbages and lettuce with frequencies equal to 11 (7.3), 13 (8.7%), 12 (8.0%) and 11 (7.3%) respectively. However, potatoes and other kinds of vegetables were also wasted but in small magnitudes, as revealed by the analysis were the two categories produced frequencies equal to 9 (6.0%) each. The results offered an indication that preventive measures for food wastage in Denmark also needed to focus on all kind of vegetables.

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| **Table 4.4.6: What kind of vegetables are the most wasted in your restaurant** | | | | | |
|  | | Frequencies | Percentages | Valid Percentages | Cumulative Percentages |
| Valid | Mushrooms | 11 | 7.3 | 7.3 | 7.3 |
| Broccoli | 16 | 10.7 | 10.7 | 18.0 |
| Cucumber | 13 | 8.7 | 8.7 | 26.7 |
| Cabbage | 12 | 8.0 | 8.0 | 34.7 |
| Carrots | 19 | 12.7 | 12.7 | 47.3 |
| Cauliflower | 15 | 10.0 | 10.0 | 57.3 |
| Lettuce | 11 | 7.3 | 7.3 | 64.7 |
| Onions | 18 | 12.0 | 12.0 | 76.7 |
| Peppers | 17 | 11.3 | 11.3 | 88.0 |
| Potatoes | 9 | 6.0 | 6.0 | 94.0 |
| Other | 9 | 6.0 | 6.0 | 100.0 |
| Total | 150 | 100.0 | 100.0 |  |

The study also conducted analysis to assess the type of food products which were wasted in the restaurants where the respondents worked. According to the study, the type of food products that were wasted in the largest magnitudes in restaurants were staples (rice, pasta and noodles), leftovers, beer and condiments (spreads, jams, relishes and sauces) with frequencies equal to 17 (11.3%), 17 (11.3%), 16 (10.7%) and 14 (9.3%). Other food products which were wasted in large volumes in restaurants included butter and cheese, yogurts and dairy desserts and soft drinks all with frequencies equal to 12 (8.0%). Also, some food products including fresh meat, fish and eggs, bread/rolls, wine, and packaged chilled food/ready meals were wasted in significant volumes with percentages equal to 7.3%, 6.7%, 5.3% and 6.7% respectively. However, milk and other kind food products were also wasted but in small magnitudes, as revealed by the analysis were the two categories of food products produced frequencies equal to 7 (4.7%) and 4 (2.7%). The results offered an indication that preventive measures for food wastage in Denmark needed to focus on all food products.

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| **Table 4.4.7: What type of food products are wasted in your restaurant?** | | | | | |
|  | | Frequencies | Percentages | Valid Percentages | Cumulative Percentages |
| Valid | Butter and Cheese | 12 | 8.0 | 8.0 | 8.0 |
| Milk | 7 | 4.7 | 4.7 | 12.7 |
| Condiments (spreads, jams relishes, sauces) | 14 | 9.3 | 9.3 | 22.0 |
| Fresh meat, fish and eggs | 11 | 7.3 | 7.3 | 29.3 |
| Yogurts and dairy desserts | 12 | 8.0 | 8.0 | 37.3 |
| Soft drinks | 12 | 8.0 | 8.0 | 45.3 |
| Staples (rice, pasta, noodles) | 17 | 11.3 | 11.3 | 56.7 |
| Packaged chilled food/ready meals | 10 | 6.7 | 6.7 | 63.3 |
| Beer | 16 | 10.7 | 10.7 | 74.0 |
| Wine | 8 | 5.3 | 5.3 | 79.3 |
| Leftovers | 17 | 11.3 | 11.3 | 90.7 |
| Bread/rolls | 10 | 6.7 | 6.7 | 97.3 |
| Other | 4 | 2.7 | 2.7 | 100.0 |
| Total | 150 | 100.0 | 100.0 |  |

A majority of the respondents argued that smell off and having bought more than what was needed were the most common causes for throwing out food in their restaurants with percentages equal to 16.7% and 13.3%. The proportion of respondents who argued that the common causes for throwing out food were needed space, past food data and moldy/slimy were equal to 13 (8.7%), 16 (10.7%) and 12 (8.0%) respectively. The proportions of respondents who felt that the most common causes for throwing out food were off appearance or texture, failure to like it, prepared too much food and other reasons were equal to 18 (12.0%), 15 (10.0%), 15 (10.0%) and 3 (2.0%) respectively.

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| --- | --- | --- | --- | --- | --- |
| **Table 4.4.8: What are your most common causes for throwing out food?** | | | | | |
|  | | Frequencies | Percentages | Valid Percentages | Cumulative Percentages |
| Valid | Smell off | 25 | 16.7 | 16.7 | 16.7 |
| Needed space | 13 | 8.7 | 8.7 | 25.3 |
| Past food date | 16 | 10.7 | 10.7 | 36.0 |
| Bought more than needed | 20 | 13.3 | 13.3 | 49.3 |
| Moldy /Slimy | 12 | 8.0 | 8.0 | 57.3 |
| Off appearance or texture | 18 | 12.0 | 12.0 | 69.3 |
| Didn’t like it | 15 | 10.0 | 10.0 | 79.3 |
| Needed space | 13 | 8.7 | 8.7 | 88.0 |
| Prepared too much food | 15 | 10.0 | 10.0 | 98.0 |
| Other | 3 | 2.0 | 2.0 | 100.0 |
| Total | 150 | 100.0 | 100.0 |  |

The study revealed that the type of food that most people look after to overbuy and end up throwing out were fruit and vegetables, and convenience foods with frequencies equal to 41 (27.3%) in both. Also, the study revealed that a significant proportion of respondents were looking after to overbuy dairy and meat and end up throwing out with frequencies equal to 34 (22.7%) in both.

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| **Table 4.4.9: What type of food do you look after to overbuy and end up throwing out?** | | | | | |
|  | | Frequencies | Percentages | Valid Percentages | Cumulative Percentages |
| Valid | Dairy | 34 | 22.7 | 22.7 | 22.7 |
| Meat | 34 | 22.7 | 22.7 | 45.3 |
| Fruit and Vegetables | 41 | 27.3 | 27.3 | 72.7 |
| Convenience foods | 41 | 27.3 | 27.3 | 100.0 |
| Total | 150 | 100.0 | 100.0 |  |

The distribution of the amount of food waste produced every day revealed that there were significant variations in the quantities. According to the analysis results, a majority of the respondents with a frequency of 47 (31.3%) claimed that they wasted more than 15 kilograms of food every day. A significant proportion of respondents with a frequency of 44 (29.3%) claimed that they wasted between 10 and 15 kilograms of food every day. Also, proportions equal to 23 (15.3%) and 36 (24.0%) claimed that they wasted less than 5 kilograms and between 5 and 10 kilograms of food every day respectively. The analysis results triggered further analysis which aimed at investigating whether the food waste practices influenced the variations of food waste produced every day. The advanced analysis was done using linear regression technique.

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| **Table 4.5.1: How much is food waste produced in everyday?** | | | | | |
|  | | Frequencies | Percentages | Valid Percentages | Cumulative Percentages |
| Valid | 1 -­ 5 kilograms/liters | 23 | 15.3 | 15.3 | 15.3 |
| 5 – 10 kilograms/liters | 36 | 24.0 | 24.0 | 39.3 |
| 10 – 15 kilograms/liters | 44 | 29.3 | 29.3 | 68.7 |
| 15 – more kilograms/liters | 47 | 31.3 | 31.3 | 100.0 |
| Total | 150 | 100.0 | 100.0 |  |

The distribution of the percentage of food thrown in the bin every day revealed that there were significant variations in the quantities. According to the analysis results, a majority of the respondents with a frequency of 31 (20.7%) claimed that they threw 5% of food into the bin every day. A significant proportion of respondents with a frequency of 23 (15.3%) claimed that they threw 25% of food into the bin every day. Also, proportions equal to 15 (10.0%), 12 (8.0%), 20 (13.3%), 11 (7.3%), 21 (14.0% and 17 (11.3%) claimed that they threw 3%, 10%, 15%, 20%, 30% and over 50% of food into the bin every day respectively. The analysis results triggered further analysis which aimed at investigating whether the food waste practices influenced the variations in the percentages of food thrown into the bins every day. The advanced analysis was done using linear regression technique.

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| **Table 4.5.2: What percentage of food do you throw in the bin in every day?** | | | | | |
|  | | Frequencies | Percentages | Valid Percentages | Cumulative Percentages |
| Valid | 3% | 15 | 10.0 | 10.0 | 10.0 |
| 5% | 31 | 20.7 | 20.7 | 30.7 |
| 10% | 12 | 8.0 | 8.0 | 38.7 |
| 15% | 20 | 13.3 | 13.3 | 52.0 |
| 20% | 11 | 7.3 | 7.3 | 59.3 |
| 25% | 23 | 15.3 | 15.3 | 74.7 |
| 30% | 21 | 14.0 | 14.0 | 88.7 |
| Over 50% | 17 | 11.3 | 11.3 | 100.0 |
| Total | 150 | 100.0 | 100.0 |  |

## **4.5 Regression Analysis**

The study conducted a regression analysis with the induction of new employees into the training program during orientation, practicing food waste safety prevention measures in the restaurants and provision of food waste prevention measure training by the management as the predictor variables and the amount of food wasted as the response variable. The summary of the model results produces r and r-square values equal to 0.711 and 0.506 respectively, the value of R, the coefficient of correlation, indicated that there was a moderate correlation between the amount of food wasted and the joint effect of the predictor variables. The results indicated that induction of new employees into the training program during orientation, practicing food waste safety prevention measures in the restaurants and provision of food waste prevention measure training by the management explained 50.6% of the variations in the amount of food wasted in the restaurants.

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| **Table 4.5.3: Model Summary results** | | | | |
| Model | R | R Squared | Adjusted R Squared | Standard E of the Estimate |
| 1 | .711a | .506 | .496 | .75122 |
| a. Predictors: (Constant), Are the new employees inducted into the training program during orientation? Do you practice food waste safety prevention measures in the restaurant? Does the management provide food waste prevention measure training? | | | | |

The analysis of variance yielded a computed value of F-statistic equal to 49.877 with a two-tailed level of significance equal to 0.000. Clearly, the level of significance associated with the computed F-statistic was less than the study’s set level of significance of 0.05 (5%). Hence, the null hypothesis that the regression model was not effective was rejected. A conclusion was made that the model was statistically effective and that the joint effect of the three explanatory/predictor variables on the amount of food waste produced every day was significant.

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| **Table 4.5.4: ANOVA Results** | | | | | | |
| Model | | S of Squares | D f | Mean S of Square | F-stat | Sign. |
|  | Regression | 84.442 | 3 | 28.147 | 49.877 | .000b |
| Residual | 82.392 | 146 | .564 |  |  |
| Total | 166.833 | 149 |  |  |  |
| a. Dependent Variable: How much is food waste produced in everyday? | | | | | | |
| b. Predictors: (Constant), Are the new employees inducted into the training program during orientation? Do you practice food waste safety prevention measures in the restaurant? Does the management provide food waste prevention measure training? | | | | | | |

The analysis revealed that the coefficients of the model were 0.236, 0.082, 1.213 and 0.472 for the model constant, induction of new employees into the training program during orientation, practicing food waste safety prevention measures in the restaurants and provision of food waste prevention measure training by the management respectively. What the values meant was that the regression equation associated with the fitted regression model was

Where y was the amount of food waste produced every day and x1, x2 and x3 the induction of new employees into the training program during orientation, practicing food waste safety prevention measures in the restaurants and provision of food waste prevention measure training by the management respectively.

The results of the regression analysis implied that the amount of food waste produced every day was expected to increase by 0.082 units for a unit change in induction of new employees into the training program during orientation holding other factors constant. Also, the results of the regression analysis implied that the amount of food waste produced every day was expected to increase by 1.213 units for a unit change in the act of practicing food waste safety prevention measures in the restaurants holding other factors constant. Further, the results of the regression analysis implied that the amount of food waste produced every day was expected to increase by 0.472 units for a unit change in the provision of food waste prevention measure training by the management holding other factors constant.

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| **Table 4.5.5: Coefficients analysis results** | | | | | | |
| Model | | Unstandardized Coefficient | | Standardized Coefficient | t-stat | Sign. |
| B | Standard E | Beta |
|  | (Constant) | .236 | .257 |  | .921 | .359 |
| Do you practice food waste safety prevention measures in the restaurant? | 1.213 | .141 | .572 | 8.601 | .000 |
| Does the management provide food waste prevention measure training? | .472 | .145 | .220 | 3.245 | .001 |
| Are the new employees inducted into the training program during orientation? | .082 | .131 | .037 | .626 | .532 |
| a. Dependent Variable: How much is food waste produced in everyday? | | | | | | |

The study conducted a second regression analysis with the induction of new employees into the training program during orientation, practicing food waste safety prevention measures in the restaurants and provision of food waste prevention measure training by the management as the predictor variables and the percentage of food thrown in the bin every day as the response variable. The summary of the model results produces r and r-square values equal to 0.791 and 0.626 respectively. The value of R, the coefficient of correlation, indicated that there was a strong relationship between the percentage of food thrown in the bin every day and the joint effect of the predictor variables. The results indicated that induction of new employees into the training program during orientation, practicing food waste safety prevention measures in the restaurants and provision of food waste prevention measure training by the management explained 62.6% of the variations in the percentage of food thrown in the bin every day.

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| **Table 4.4.6: Model Summary results** | | | | |
| Model | R-value | R Squared | Adjusted R Squared | Standard. E of the Estimate |
| 1 | .791a | .626 | .619 | 1.43357 |
| a. Predictors: (Constant), Are the new employees inducted into the training program during orientation? Do you practice food waste safety prevention measures in the restaurant? Does the management provide food waste prevention measure training? | | | | |

The analysis of variance yielded a computed value of F-statistic equal to 81.619 with a two-tailed level of significance equal to 0.000. Clearly, the level of significance associated with the computed F-statistic was less than the study’s set level of significance of 0.05 (5%). Hence, the null hypothesis that the regression model was not effective was rejected. A conclusion was made that the model was statistically effective and that the joint effect of the three explanatory/predictor variables on the percentage of food thrown in the bin every day was significant.

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| **Table 4.5.7: ANOVA results** | | | | | | |
| Model | | S of Squares | D f | Mean S of Square | F-stat | Sign. |
|  | Regression | 503.213 | 3 | 167.738 | 81.619 | .000b |
| Residual | 300.047 | 146 | 2.055 |  |  |
| Total | 803.260 | 149 |  |  |  |
| a. Dependent Variable: What percentage of food do you throw in the bin in every day? | | | | | | |
| b. Predictors: (Constant), Are the new employees inducted into the training program during orientation? Do you practice food waste safety prevention measures in the restaurant? Does the management provide food waste prevention measure training? | | | | | | |

The analysis revealed that the coefficients of the model were -1.736, 0.139, 2.758 and 1.435 for the model constant, induction of new employees into the training program during orientation, practicing food waste safety prevention measures in the restaurants and provision of food waste prevention measure training by the management respectively. What the values meant was that the regression equation associated with the fitted regression model was

Where y was the amount of food waste produced every day and x1, x2 and x3 the induction of new employees into the training program during orientation, practicing food waste safety prevention measures in the restaurants and provision of food waste prevention measure training by the management respectively.

The results of the regression analysis implied that the percentage of food thrown in the bin every day was expected to increase by 0.139 units for a unit change in induction of new employees into the training program during orientation holding other factors constant. Also, the results of the regression analysis implied that the percentage of food thrown in the bin every day was expected to increase by 2.758 units for a unit change in the act of practicing food waste safety prevention measures in the restaurants holding other factors constant. Further, the results of the regression analysis implied that the percentage of food thrown in the bin every day was expected to increase by 1.435 units for a unit change in the provision of food waste prevention measure training by the management holding other factors constant.

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| --- | --- | --- | --- | --- | --- | --- |
| **Table 4.5.8: Coefficients analysis results** | | | | | | |
| Model | | Unstandardized Coefficient | | Standardized Coefficient | t-statistics | Sign. |
| B | Standard E | Beta |
|  | (Constant) | -1.736 | .490 |  | -3.546 | .001 |
| Do you practice food waste safety prevention measures in the restaurant? | 2.758 | .269 | .592 | 10.245 | .000 |
| Does the management provide food waste prevention measure training? | 1.435 | .278 | .305 | 5.172 | .000 |
| Are the new employees inducted into the training program during orientation? | .139 | .251 | .029 | .554 | .580 |
| a. Dependent Variable: What percentage of food do you throw in the bin in every day? | | | | | | |

## **4.6 Impact of Excessive Food Waste on Denmark’s Economy**

### *4.6.1 Background of the Study*

From the analysis conducted from the quantitative and qualitative data, it was established that various sectors in the country contribute differently to the amount of food waste. However, the hospitality industry, in general, has a lot of implications since most of the foods are served from there. The hospitality sector was looked into in three sections mainly Horeca, restaurants, and hotels were one of the section. The other section was the canteens and catering while the last one was the public and private cost sector. Horeca is mainly private, and the information from this sector was mainly obtained from the operation statistics and public statistics. It is important to note that some of the hotels in Denmark mainly offered breakfast. This implies that the amount of waste which would be expected from these sectors would be less compared to other restaurants which offer full meals.

On the other hand, the relationship between the canteens and the catering segment as well as the cost sector was not very easy to comprehend. It was, however, noted that the first line of the professional private operators would serve the international companies within both the public and the private sector. In addition, there are the services from the second line of the professional public operators who sell their services to the private sector in most cases (Boldrin, Andersen, Møller, & Christensen, 2009). However, they still serve the public sector. Since the operations of the canteen were very different, the amount of wastes generation was also different. In addition, the measures that would be taken as shown from the interview were very different. It was noted that some of the canteens would purchase more food which is prepared. The implication of this is that some of the food would imply a push for the waste generation upwards the supply chain.

## **4.7 Effects of Food Waste Prevention on the Economy of Denmark**

*4.7.1 Magnitude to Which the Economy of Denmark Benefits from Food Waste Prevention*

A study conducted showed that the food waste prevention measures that have been taken in Denmark had impacted positively on the economy of the country. One of the notable pros for the food waste prevention in Denmark is the growth of food industry. According to the findings, the agricultural products in Germany have grown to a huge level. It should be noted that agricultural products from the country are exported to over 100 countries worldwide. These significant achievements have been made due to the measures that have been taken towards food waste prevention. It is very encouraging to note that Denmark has become one of the major exporters of agricultural products in the recent years. Moreover, food waste prevention has ensured further research to realize technological developments that can be enhanced to ensure better food consumption. The economy has, therefore, benefited from the technological advancements in the agricultural and hospitality industries due to the presence of more foreigners.

Furthermore, there is a tendency in the country of developing world-class higher learning institutions (Lundqvist, Fraiture, & Molden, 2008). This is as a result of the need for research and development in the area of food waste prevention. Moreover, very many people are coming nowadays to the country to benchmark especially in the hospitality industry. Due to the measures that have been taken, the reports indicate there is likelihood of an additional 5000 hotels and restaurants being constructed every year. The sector has also been booming in the recent years with a majority of the hotels expanding due to the high profits made. The analysis shows that most of the hotels which were using a lot of money in the waste disposal and management have reduced this cost by almost half. This implies that the hotels can make a lot of profits from both the local and international tourists.

### *4.7.2 Magnitude to Which Food Waste Prevention has favorably affected the Economy*

According to the reports by the European Union, the country has been named an agricultural superpower and has become one of the leading food industry hubs in the entire Europe. Despite the high costs of food products in the country, there is a strong tendency of developing a system which appreciates the institutions. This has meant that some of the largest food companies in the world have placed activities in the country. The reason this has been done is to ensure proximity with the customers. Denmark is, therefore, realizing industrialization even in sectors which would have taken many more years to develop. Some of the other significant achievements that have been made include being the world’s 2nd largest meat exporter (FAO, 2014). In addition, the 6th largest dairy company is also based in Denmark. Food prevention measures have also ensured that the amount of waste is greatly reduced ensuring that the revenues generated are very high.

Furthermore, Denmark has become the largest receiver of the food research funds from the European Union. As shown from the surveys, many institutions have invested in research and development of the food industry. The majority of the initiatives that have been taken are to ensure that the food waste prevention strategies are developed. It should be noted that Denmark has been exporting over 80% of their processed equipment. Besides these major achievements, the country has become a front runner in the industrial biotech with the history dating back to the 19th century. However, the significant developments have been enhanced by the need for research in the field of food and agriculture. Considering that about of 14% of the total food supplied in the world come from Denmark, then it can be seen that food waste prevention measures have been very successful.

### *4.7.3 Magnitude to which Food Waste Prevention affects Denmark’s Food Industry*

The survey shows that there is plenty of food which is conserved through the measures that have been taken to ensure food waste prevention. According to the findings, the country has achieved a growing food industry especially in regard to exports. As noted earlier, Denmark contributes to more than 14% of the total food exported in the entire globe. Considering that Denmark is a very small country, then this is a massive development in the food sector. The call for quality has been enormous in the recent years especially regarding food. Quality measures must, therefore, be taken by any producer of food so as to ensure that the food meets the quality standards for human consumption. In this regard, the country has initiated measures that ensure that the food they produce and the package is of undoubted quality. According to the European Union, Denmark mark of quality is very reliable in the entire world.

According to the findings, Danish companies have become pioneers in regard to the organic and natural food development. In this regard, Denmark has become an ideal test for these procedures. Food industry has therefore, grown to a level where the country produces more than three times of the food that they require. Food prevention measures have necessitated technologies which have significantly advanced the food sector in the country. Denmark can give access to both the unique food technology clusters and the international and vibrant agricultural sector. According to the findings, the food sector in Denmark is attracting people from other countries to benchmark on the ideas of food waste prevention. Such developments are very important to the economy of Denmark. Moreover, development of food industry implies a significant increase in a number of exports of the country which in turn boosts the revenue collection.

## **4.8 Future Impacts of Food Waste Prevention on the Economy of Denmark**

Considering the developments that have been taken due to the food waste prevention in Denmark, there is a significant hope for the growth of the Danish economy. The food industry is likely to continue developing at a very high rate which will, in turn, implicate to the economy of the country. Food waste prevention measures imply a further reduction of the food which is being wasted in the country in the processes of processing and the entire supply chain for the food products. A reduction of food waste implies an efficiency in the entire food sector which will boost the income generated from the food industry Graham (Rowe, Jessop & Sparks, 2015). According to the reports that were found from the public publications, it is clear that there is a relationship between packaging and food waste. This has influenced the amount of food generated. Denmark has grown and will continue growing as long as these measures are undertaken.

Food waste minimization will have a direct impact on the economic growth. Some of the factors that facilitate economic growth are the gross domestic product. In a country like Denmark where agriculture is a major backbone of the economy, any step towards fewer losses of food means better income. In this regard, there is a possibility that the country will make a significant progress due to an increase of the amount of revenues generated. Food waste prevention measures in Denmark create a culture of food waste prevention. Such a culture has a very positive impact on the economy of Denmark since it means that people are more responsible. The findings show a clear relationship between food waste prevention and income generation which shows that in a capitalistic state, people are likely to harvest more profits. Moreover, people will invest more in a country where the sector is doing very well. In addition, there will be more financial input in the research for better products by the investors.

## **4.9 Future Research on the Effect of Food Waste Prevention on the Denmark’s Food and Hospitality Industries**

Although there is plenty of information regarding food waste prevention in the country’s supply chain, there is still more information which needs to be sort in relation with the entire sector. As shown in the literature gap, there is scanty of information regarding the food waste prevention in homes. Further research ought to be conducted in order to establish how food waste trends are in the domestic homes. Despite the surveys which were conducted in this research together with the quantitative data that was obtained from the secondary sources, there is no clear information regarding food wastage in the domestic homes. The study focused more on the hospitality industry and production and processing of food. It is however, not clear about the causes and measures that can be taken to prevent food waste in domestic homes.

Furthermore, there needs to be a clear description of the presence of the animals and food disposal. It was highlighted that in areas where there are animals, they can consume the remnants of the food. However, there needs a clear research whether this can still be classified as a method of waste prevention. In addition, there should a clear description of the food waste management and food waste prevention. There are some concerns that some of the food that is discarded is facilitated by preparation problems. In this regard, people should be aware of the preparation methods that facilitate food waste and the ones that prevent food waste. Further research should therefore, be conducted in the homesteads to establish food preparation methods which facilitate food waste and the ones that prevent food waste. In this regard, it will be possible to ensure that effective measures regarding food waste prevention can be taken.

# Chapter 5: Conclusion

## **5.1 The Extent to which the Denmark’s Economy Profits from Food Waste Prevention**

A majority of the workers in the food industry were chefs although the study noted significant proportions of employers and owners of the restaurants. Also, the study concluded that the target population had a good experience in the food industry with a majority of the selected individuals having worked in their respective job positions for more than two years.

The analysis of food waste practices led to a conclusion that a significant proportion of restaurants, hotels, and companies within the food industry in Denmark practiced food waste safety prevention measures. Also, the study concluded that a majority of organizations in the food industry had managements which provided waste prevention measure training. However, a majority of the organizations whose management provided food waste prevention measure training did it at very low frequency. Further, the study concluded that a majority of the organizations in the food industry in Denmark had their new employees inducted into the training program during orientation.

## **5.2 The Extent to Which the Food Waste Harms the Economy of Denmark**

The study concluded that that induction of new employees into the training program during orientation, practicing food waste safety prevention measures in the restaurants and provision of food waste prevention measure training by the management explained 50.6% of the variations of food wasted in the restaurants. The amount of food waste produced every day was expected to increase by 0.082 units for a unit change in induction of new employees into the training program during orientation holding the act of practicing food waste safety prevention measures in the restaurants and provision of food waste prevention measure training by the management constant. Also, the amount of food waste produced every day was expected to increase by 1.213 units for a unit change in the act of practicing food waste safety prevention measures in the restaurants holding induction of new employees into the training program during orientation and provision of food waste prevention measure training by the management constant. Further, the amount of food waste produced every day was expected to increase by 0.472 units for a unit change in the provision of food waste prevention measure training by the management holding the act of practicing food waste safety prevention measures in the restaurants and induction of new employees into the training program during orientation constant.

## **5.3 How Food Waste Prevention Affects the Hospitality Industry of Denmark**

The analysis of the food waste led to conclusions that several reasons existed as to why a majority of the restaurants, hotels, and companies in the food industry had food wastage. The most significant cause of food wastage was over-ordering of ingredients followed by plate waste from customers. Other significant reasons captured in the study as causes of food wastage were food spoilage, wastage during food preparation and cooking and service (portioning and serving). The study also found out that there were some barriers to decrease food wastage in restaurants. The most significant obstacle according to the analysis results was the lack of adequate food storage. The study concluded that different kind of fruits and vegetables were purchased at various frequencies at various restaurants. Also, the different kind of fruits and vegetables were wasted at differing amounts at different restaurants. According to the study, the type of food products that were wasted in the largest magnitudes in restaurants were staples (rice, pasta, and noodles), leftovers, beer and condiments (spreads, jams, relishes, and sauces). A majority of the respondents argued that smell off and had bought more than what was needed were the most common causes for throwing out food in their restaurants. Further, the study concluded that the type of food that most people look after to overbuy and end up throwing out were fruit and vegetables, and convenience foods.

## **5.4 Reasons for the Increased Food Waste Prevention in Denmark**

Another important conclusion made by the study was that induction of new employees into the training program during orientation, practicing food waste safety prevention measures in the restaurants and provision of food waste prevention measure training by the management explained 62.6% of the variations in the percentage of food thrown in the bin every day. The percentage of food dumped in the bin every day was expected to increase by 0.139 units for a unit change in induction of new employees into the training program during orientation holding the act of practicing food waste safety prevention measures in the restaurants and provision of food waste prevention measure training by the management constant. Also, the percentage of food thrown in the bin every day was expected to increase by 2.758 units for a unit change in the act of practicing food waste safety prevention measures in the restaurants holding induction of new employees into the training program during orientation and provision of food waste prevention measure training by the management constant. Further, the percentage of food thrown in the bin every day was expected to increase by 1.435 units for a unit change in the provision of food waste prevention measure training by the management holding the act of practicing food waste safety prevention measures in the restaurants and induction of new employees into the training program during orientation constant.

# **Chapter 6: Solutions and Recommendations**

## **6.1 Solutions**

### *6.1.1 Policies to Encourage Food Waste Prevention*

In order to encourage food waste prevention, numerous policies should be enacted in Denmark. Although the country has already established numerous policies and legislations, there is the need for the country to develop more. As shown in the research analysis, a lot of food is wasted in the hospitality industry. In this regard, the state should come up with a policy that requires every hotel and restaurant to come up with measures to ensure food is not wasted. Some of the steps would be to require customers serve themselves and then weigh the food that they want to eat. This implies that the customer will most likely serve food that they can finish. Moreover, the same can apply to canteens where food will be served in regard to the amount of food that one can take. Such initiatives would look into food waste prevention measures.

Besides, every restaurant should come up with measures of food preservation. Installation of refrigerators and other food preservation measures will encourage more people to eat food which would have ended in the litter bins. Further, the country should enumerate legislations where people who have excess foods in their fridges and are less than a month to the sell by date to take them to the collection centers. This food will be taken to other firms and organizations for donations especially to the developing countries and others taken to the schools and other facilities that consume food in large volumes. It is important to note that there is need to have adequate storage, hence, there should be a policy which emphasizes on every homestead acquiring a food storage equipment. Most of the families will be able to store more food for consumption later instead of discarding as waste. This will significantly prevent food waste of edible food.

### *6.1.2 Ways of Minimizing the 1.7 Billion Dollars Food Waste in the Coming Years*

Despite the efforts that the country has taken in regard to prevention of food waste in the country, there is still over 1.7 billion dollars’ worth of food which are lost every year in food wastage. In order to minimize this, the country needs to develop more initiatives where people are encouraged to cook food according to the people who are there. One of the reason that was found facilitating more food waste in homesteads is the fact that some people cook food waiting for someone who does not show up. In order to minimize this, there is need to ensure that people are sensitized regarding good kitchen behavior. Moreover, the government should come up with systems of collecting food which is almost reaching the sell by date and deliver to other areas which can consume the food in bulk.

Denmark should also invest more in research and development in order to evaluate their strategies and seek to establish whether there are better practices. Despite its success in waste management, the country is still among the top countries producing along of waste per homestead. Developing a strategy of encouraging people to buy only the amount of foods they can consume will lower the amount they will waste. In addition, it is crucial for the non- profit organizations to initiate programs for public awareness regarding disadvantages of food waste. Such forums which can be conducted in hospitals and avenues for community development will make the public more aware of their personal initiatives towards a reduction of food waste. Reduction of food waste in the country will also require only the foods with the longest life span being sold in the supermarkets. Although the supermarkets have initiated programs to discourage people from buying more than they require, they need to ensure that only food with far expiry date is left on their shelves while the rest is donated or exported to the poor countries.

### *6.1.3 New Strategies to Prevent Excessive Food Wastes in Danish Restaurants and Canteens*

Prevention of food waste in the Danish restaurants and canteens will be very significant to the food waste prevention in the entire country. Some of the strategies that should be deployed include the hiring of professional team to manage food waste. These professional teams should be able to audit the waste with the capacity of the canteen and advice on the way forward. To avoid food waste in the preparation stage, restaurants should ensure that they deploy better pealing techniques to potatoes and classifying vegetables in regard to their leafy nature. Since it was noted that about 10% of the food is wasted inform of garbage, then proper pealing will ensure that the food that would have been otherwise, lost is preserved.

An analysis of the food waste trends in the restaurant, the management should be able to adjust the menu. This includes analyzing the left overs to establish the items that have the largest proportions in the waste. Restaurants should, therefore, adjust their menu in order to reduce the portions of the quantity of such foods. This will not only encourage food waste prevention but will also reduce the food cost and automatically increase the profits. The staff in the canteens and restaurants should, therefore, be educated on the rules of movement. Every employee must be aware of the requirements in regard to food waste prevention measures. It will also be effective for the management to invest in high-quality kitchen equipment. Some kitchenware such as specialized knives will be essential in the preparation of food which will have an impact on the quantity of food waste.

## **6.2 Recommendations**

### *6.2.1 Techniques in which the Demark Government can Improve Food Waste Prevention Strategies*

Danish government can be able to enumerate measures that will enhance the applicability of the strategies in place. Some of the measures that the government can use are to recycle the food. Through establishment of food collection centers, it is possible to have an established system of food recycling, especially from hotels and restaurants. Food which is of poor quality can also be collected and taken back to the industries for analysis of safety. Such food can be sold at lower prices to the countries which experience high rates of hunger. Another technique that the government can utilize is the collaboration of other non- governmental organizations which collect and buy food to deliver to other countries. This implies that people will have somewhere to dispose of their excess food which can, in turn, be consumed in other countries.

In addition, the Danish government can initiate programs that will reward the restaurant or the canteen which will save more on food waste. In this incentive, the government will put in place measures to keep an eye on the proportion of food waste in the country. Such measures will encourage the institutions to develop measures to save more. The government should also invest in peer education programs in schools. This will promote not only better understanding on food waste prevention measures but also food waste management. Such students will have good manners concerning food practices both in school and at home. More programs in universities need to be developed in regard to food waste prevention and management. Moreover, some of these courses in food waste management and prevention should be made compulsory. Once the government initiates this, more people will become aware of the importance of food waste prevention measures.

### *6.2.2 Other Ways of improving Food Industry other than Food Waste Prevention*

Besides food waste prevention, improving the quality of food is a very important step in improving the food industry. From the findings, it was evident that measures to improve food quality are paramount. This means that improvement in the quality of food will boost the food industry in Denmark. This is because much more food will be generated and exported even in the developed countries. In addition, the ministry should encourage measures of introducing methods which promote processing of healthier food. It was noted that most of the food that gets wasted is the processed food. Such food is likely to have more amounts of fat, sugars, and salt. Taking measures to reduce proportions of elements in the food will have a very significant impact on encouraging more people to purchase the food. This will boost the agricultural sector and the food industry in general since most people will adopt the foods.

Another method that can boost the food industry in Denmark is a use of modern technology in production. Investing in new technological inputs and facilities has a very positive impact on the production. Moreover, technology helps in increasing efficiency in the entire food chain which is very essential in preventing food waste. In addition, more research should be established in the food processing industry in order to develop foods that are high in nutrients. One of the reasons people are having health complications in the recent times especially in the developing countries is poor diets. Also, people in developing countries suffer from malnutrition. Developing food that is rich in nutrients will not only encourage food consumption but will also boost the health of people. Food industry ought to produce foods that are healthy to the people for it to be the success. Healthy people will over better manpower to work for the betterment of the food industry.

## **6.3 Suggestion for Further Research**

Despite the significant findings that have been established in this research and other previous researches that were established in the food industry in Denmark, further research ought to be conducted in order to determine more details of food waste prevention. For example, the reports found out that the canteens ion Denmark can be engaged in some activities including services to the customers, the operation of the canteen as well as other staff. In order to come up with more effective measures for the food waste prevention, further research ought to focus on how the activities in the canteens promote food waste. In this regard, the researcher will be able to establish some of the measures that can be taken regarding food wastage in the country. Also, there is a huge number of people who ignore food waste prevention. Further research should be conducted to assess the perception of people and the reason they don’t participate in food waste prevention.

In addition, more research should be established in the country to determine the relationship of the food waste with other sectors in the country. Although there is evidence that food waste prevention has an impact on the economy both positively and negatively, food waste prevention should be assessed in terms of impacts in the entire agricultural sector. It should be noted that a lot of the people have a perception that food waste prevention is an initiative of the government and they don’t have a role to play in the same. However, researchers can try to evaluate the factors that make people be more responsive to food waste prevention measures. In the same case, people should establish the impact of international set standards on the local communities. There is little information to show how people are influenced by the international and national standards set. When this is established, it will be easier to develop measures that are effective with the people in question. Considering that Denmark is a small country, more research should be conducted on why the country still has a very high amount of food waste.

## **6.4 Other Sectors that Food Waste Prevention Affects Apart from the Economy**

Besides from the economy, food waste prevention in Denmark affects the aquatic farming. This is because the country has established systems for aquatic farming which has been developing very well. Further, the prevention measures have been very impactful to the forestry sector. Considering the boost that food waste prevention has in the food industry, a lot of people are investing in the agricultural sector. This has implied that most people are clearing the available trees in the quest for agricultural development. Such developments have, therefore, impacted on the employment levels in the country. Many people are now working in the food industries which can even afford to pay them better due to the high profits that are made in the country. High employment rates have impacted positively to the communities and have immensely raised the standards of living in the country. Also, the country can be able to tap into the local talents in the production sector. It should be noted that the measures that have been taken have impacted positively to the production sector.

Furthermore, the country has developed in the textile industry. Most people who are undertaking measures to ensure that food waste is prevented have been utilizing the wastes of food containers in the textile industry. Moreover, the country has advanced the shipbuilding industry. A strong ship building industry has impacted by the vast exports from the country with the majority being food and agricultural products. In this regard, transportation of such products is key to the extent that ships must be available for water transportation. Also, the telecommunication industry and the business services have gradually increased. This is a result of the need for research regarding the food industry which has taken shape in the country. However, further developments will require more investments not only by the government but also by the private investors.

## **6.5 Methods of Enhancing Food Industry in the Economy of Denmark**

Food industry has been very vital to the economy of Denmark that it needs to be enforced further. In the modern day Denmark, it is very difficult to distinguish the economic sectors of agriculture and industry. In this regard, there needs important developments in the forest industry. Further research should be conducted to introduce species that are very well acquitted with the climate of Denmark. This will imply that besides the agricultural sector just being viewed as a producer of the food products, also the raw materials for other industries like the paper industry will be promoted. In this regard, people will not only major in the food products but also in the production of other agricultural products. This will promote the development of the sector in the quest for economic development.

Another method that can be used is the promotion of fish industry. Although the country has a well- developed aquatic industry, a lot ought to be done to increase the harvests that are made. The government should sponsor people who intend to put up fresh water species so as to promote the fresh water fish production. The government of Denmark should also invest more in research for food crops that can generate more yield. This will promote a number of the yields of the food industry enhancing some food exports. According to the findings, export is the major source of revenue in the country. This implies that more food should be generated to improve the amount of exports. This will form a major backbone to the economy of Denmark making food industry a major aspect consideration. Moreover, the government should provide and encourage a variety of diets in the hospitality industry including traditional meals from across the globe. Many tourists will be attracted and even encouraged to spend more time in the country since they would feel at home. This would encourage the growth of the hospitality industry promoting even further economic development.

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