

Organic Food Waste Management



Abstract

Food Waste management is considered as one of the burning issues in today's world. Most of us don't think twice before throwing away our food and are completely unaware about the massive environmental impacts it has been creating to our surroundings. Although it may not strike as a world's greatest problem for us, food waste management has been evoking serious affairs to the entire climate change among other things. Whilst most of us may not consider throwing a little or more portion of our food into the bin as an issue, food waste largely consists of environmental and socio-economic impacts. This paper assists to put a light into food waste as a serious issue in Australia as well as globally meanwhile identifying its problems and how we can help reduce them via innovative solutions.

Keywords: food waste, UN SDG, climate change, restaurants, households

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Food Waste Management

Introduction

Food waste as simple as the word sounds, it has greater consequences to our environment as well as economy. While it is the human nature of most to not give a second thought about the food we are throwing away, only a few minorities are more concerned about the actual wastages and its consequences. Majority of us are concerned about what we consume but not about what or how much we are wasting or throwing away in garbage. Although it might seem natural for us to throw away food in our everyday lives, a great part of the world population are heading to sleep hungry and starving while the other half have built up a dishonorable and an absolutely pointless issue of their own i.e. Food Waste (Trvst, 2019). World hunger is still a global phenomenon (Global food waste and its environmental impact | Green living, n.d.) and food loss and food waste has truly become a matter of global concern (Food Loss and food waste, n.d.).

As per the FAO's 2011 research, 1/3 of the food globally is wasted or lost annually so much so that it has become a priority in the global and political agenda such as UN SDG (United Nations Sustainable Development Goals) as Target 12.3 so as to increase global awareness about the problem (Food Loss and food waste, n.d.). It is a fact that all of us need food and we are fortunate enough to receive a variety of items in the grocery stores, nonetheless the relationship we have with the food waste is generally out of the picture and hence irrelevant. But, what we don't realise is that this relationship has already been amassing global scale problems which needs to be solved without any further delay (Trvst, 2019).

What is Food waste?

In simple terms, we can define food waste as the loss of food that is not eaten or are disposed of for different reasons. According to FAO, “food waste refers to the decrease in the quantity or quality of food resulting from decisions and actions by retailers, food service providers and consumers” (Food Loss and food waste, n.d.). Put another way, food waste can be defined as “food appropriate for human consumption being discarded, whether or not after it is kept beyond its expiry date or left to spoil. Often this is because food has spoiled but it can be for other reasons such as oversupply due to markets, or individual consumer shopping/eating habits” (Food and Agriculture Organisation of the United Nations, 2013, p.9).

The wastages can transpire from different stages i.e. from production, harvesting, processing, retailing, transportation and consumption. Oftentimes food waste can be unintentional or accidental, however, it can also be intentional at certain times. One of the main causes of food waste in recent times can be blamed on globalisation i.e. the human desire to get everything everywhere all year round. This has created an unnecessarily longer supply chain, increasing the chances of food going to waste during the long journey. Additionally, more than 40% food waste occurs in the retail and consumption stage in most developed countries whereas 40% of the food waste occurs in post-harvest and processing levels in developing countries (FAO, G. 2011). In other words, food loss at the initial phase of the supply chain is a major issue for many developing countries. Contrary to it, are the developed countries, where food loss occurs at the later stages of the supply chain especially during consumption. Consumers hence play a significant role in the contribution of food waste in developed countries.

Although food waste occurs in different forms and in different stages, our primary focus is about the food waste management problems arising during consumption, both in households and in restaurants that occur on a daily basis.

Identification of the problem

It is no brainer to know that food waste is one of the troubling problems around the globe today. Many of us waste food because of several reasons whereas millions of people are hungry every day. People waste so much money and resources to produce food and wasting that food costs more than people realize. It is very unlikely that people willingly waste food but it is our poor planning, reckless shopping habits and lack of awareness that is contributing to this mass problem. While diving into how the food waste occurs, we have to consider where most of the food is being wasted. Various research suggests that household food waste contributes the most followed by primary production and manufacturing. The majority of food waste during the production process is because of poor harvesting techniques, spills, attacks by insects, poor weather conditions etc. (Aschemann-Witzel, J., De Hooge, I., Amani, P., Bech-Larsen, T., & Oostindjer, M. (2015).

In the manufacturing process human error is the leading cause of most food waste followed by product change and deficit product outcome along with the packaging, best-before date and visual appeal in some cases. Besides consumer behavior, another important area of loss is product changes. For instance, if you're making a tomato sauce and want to make a mustard sauce after completing it, then this means the whole process must be cleaned. This whole process contributes a significant amount of loss (Dora & Gellynck, 2015). Meanwhile in households the majority of study finds that people buy more than they are ever going to consume and while preparing food they cook so much which they are never going to eat as a result huge amounts of

leftover food ends up in the dumpster. Likewise, restaurants offer huge serving portions that an average person cannot completely finish and some even have eat-all-you-can buffets and buy one get one free offer that does nothing but increase food wastage.

Furthermore, one-third of all globally produced food is wasted or spoiled. The Food and Agriculture Organisation of the United Nations states that almost one fifth of the food produced goes to food waste which costs approx. 2.6 trillion USD annually ending in landfill each year which will be enough to feed 815 million people worldwide (World hunger, poverty facts, statistics, 2018). Besides that, American households throw away up to 150,000 tonnes of food they buy every day (Milman, 2018) and organic matter in landfills provides 20% of all methane emissions, a potent greenhouse gas that contributes considerably to climate change.

Apart from the wastages of resources (land, water, energy, fuel) and costs required to produce all the food which aren't consumed, food waste with no proper planning or management severely impacts our climate through Greenhouse gas emissions (GHGs). This will ultimately contribute towards an ever-increasing Global warming (World Biogas Association, 2018) among other things.

Food waste Globally

As discussed above, the global food waste statistics suggest that over produced food if handled correctly is enough to feed the entire planet. Food waste costs the global economy a whopping US\$940 billion dollar each year which is on the rise every year (Ozharvest, 2014). In that instance nearly one third of the world's agricultural land is currently used to produce food that will never be consumed.

Although as per the record of the FAO, low income countries and high-income countries waste almost the same amount of food i.e. 630 and 670 million tonnes of food respectively, the

amount of wastages differ in various stages. For example, households in the United Kingdom wastes an estimate of 6.7 million tonnes of food annually, totaling to one-third of the 21.7 million tonnes purchased. Meanwhile, every year China wastes 50 million tonnes of grains i.e. one-tenth of the country's total grain output (Worldwide Food waste, n.d). In addition to it, as per the research conducted by Denmark's largest non-profit organisation working against food waste named "Stop Wasting Food" has accumulated the following facts:

- a) There are over 7 billion people on the planet out of which 925 million people are starving. Yet annually 1.3 billion tonnes of food is lost or wasted which is enough to feed 3 billion people.
- b) Roughly 33% of the food is produced worldwide for human consumption among which 1.3 billion tonnes is loss or wasted.
- c) Food loss and waste accounts for around 4.4 gigatonnes of ozone harming substances (GHGs) which when put in context that if food waste and loss were its own nation, it would amount to be the world's third-biggest GHG producer after China and the USA.
- d) The food currently wasted in Europe, Latin America and Africa could actually feed 200 to 300 million people respectively.

Food Waste in Australia

Like the other countries of the world, food waste management in Australia is intricate as it involves a large number of elements occupied with producing, transportation, sales, redistribution and discarding food. According to Food Waste Facts (2020), "7.3 million tonnes of food is lost or wasted each year. Among which 1.2 million is recycled, 2.9 million is recovered and 3.2 million is sent to landfill and that 75% of all food that is sent to landfill comes from

households”. Australia suffers nearly AU\$20 billion each year on economic cost due to food waste despite having a productive and profitable agricultural business industry that can feed up to 60 million people globally (Australian Government, 2017).

As a part of the NSW Government study “Love Food Hate Waste”, 1200 NSW households were surveyed so as to find a better understanding of community, attitudes and behaviors which concluded that an average NSW households throw up to AU\$1036 of food annually (Food waste fast facts, 2014) which was multiplied by the number of households across Australia. As per the ABS 2011 Census, 7,760,320 households were populated which when multiplied by AU\$1036 is AU\$8.04 billion. Hence, food waste has been a prevalent problem in Australia despite having a productive agribusiness industry.

Some of the Food waste facts in Australia based on the study done by Australian Government (2017) are given as below

- 1) Food waste cause AU\$20 billion loss to economy,
- 2) 3.1 million tonnes of perfectly edible food are thrown away by households,
- 3) Industrial and commercial industry waste approx. 2.2 million tonnes of food, resulting in huge amount of waste disposal charges along with lost product costs to business
- 4) Food waste costs to households vary from AU\$2,200 to \$3,800

Although the Australian state and territory governments are working towards solving the food waste management problems with the Government actually investing AU\$10 million to support research involved with food waste reduction, the problem would not minimise dramatically unless each individual is aware and are conscious about their actions and attitudes which is less likely to happen anytime soon (Australian Government, 2017).

Food Waste in Households and Restaurants

Household is the leading source of food waste around the globe as well as in Australia (Foodprint, 2018). People's poorly planned shopping habits, our culture of cooking more than we can eat and not consuming leftover food is contributing heavily to total food waste. Average Aussie household is responsible for 4.9 kgs of food waste to landfill each week which is roughly 34% of all wasted food in Australia. Restaurants, hotels, catering and canteens are other places which deal with huge amounts of food every day.

Some of the reasons how food waste occurs in households and in restaurants are listed below:

Households:

- a) No proper meal plans due to lack of awareness
- b) Over preparing and larger portion meals
- c) Cultural behavior; some people use only certain part of food items as bread crusts, apple peels etc. that leads to waste
- d) Confusion over labels ex. expiry dates

Restaurants:

- a) Larger serving sizes
- b) Overbuying stock
- c) Consumer attitudes towards leftover foods etc.

Environmental impact of food waste

Not only the economic cost, Food waste has a consequential impact on the environment as well. All the natural and human resources that are used for growing, processing, packaging, transporting and marketing that food are also wasted (FAO, 2013). Wasted food emits about 3.3

billion tons of Co₂ equivalent of greenhouse gas emission that is released in the earth's atmosphere every year. The huge area of land and water resources used to produce food is going to waste and has been contributing towards climate change and loss of biodiversity. Similarly, other key impacts on the environment due to food waste are:

- a) Food waste that goes to landfill breaks down to create methane that is 86 times more powerful than Carbon Dioxide enhancing Global warming and climate change (Footprint, 2018)
- b) 28% of the agricultural areas of the world is used to produce food that goes to waste (Trvst, 2019)
- c) Freshwater pollution. For instance, in the US alone more than 25% of water is used and polluted due to food waste (Footprint, 2018)

Food Waste Solutions

Like explained above, Food waste is a bigger problem than we realise. And wasting food not only means wasting money but also waste of water and energy. Moreover, when food rots in landfill a harmful methane gas is produced which has a huge effect on the ozone layer and contributes to climate change (Kubala, 2017). Therefore, reducing food waste not only makes economic sense at small and large scale but also helps us save our environment by stopping the waste to end in landfill as well as feed the hungry people. The positive part of the food waste is, it can be reduced and even as an individual or a household if we start reducing our food waste by a single slice of bread a day, it can make a large difference as a whole for the environment and for our wallet as well. It is really important for a person to fully understand the seriousness of

this situation in order to solve the problem. And the solutions are really very common and easy to follow. Simple change in daily habits can reduce a lot of food waste as human behaviour is the main cause of it. Always remember that small efforts can bring in the big changes (A guide to reducing Food Waste).

Even though, Food waste occurs on a bigger platform and solutions can also be found in large amounts, here I would like to focus on some of the solutions of Food waste for households and restaurants.

Food Waste Solutions for Households and Restaurants

The basic principles to any waste management is the 3 R's Strategy (Reduce, Reuse and Recycle) which will reverse any waste effect. Therefore, we must consider this strategy as the main solution of the food waste.

Reduce:

We must reduce our food waste by pre planning our meal and only buying the food that we actually eat. Also serving the portion size that won't later end in landfill will help in reducing the food waste. This step can be started by an individual or household as well as by restaurant.

Restaurants can offer various serving sizes like small, medium and large. Even though many of the restaurants already have introduced this menu. Most of all the restaurant or food industry are still serving one size, these restaurant and food industry can also be encouraged to have this menu.

Reuse:

We can always find the second use of our food which is about to end in a bin, therefore we must consider the alternative way to use the food before throwing it in landfill. For instance: fruits and vegetables with the near expiry date can be frozen or can be converted into juices or smoothies and food that cannot be frozen or converted into juice, we can cook them and introduce a new recipe. Most restaurants will always have consumers with different tastes so they can introduce something new with reasonable prices, which will help to control the food waste. Or there are various digital platforms such as YouTube which show us the various ways to reuse our food, we can always take inspiration from them and make something worth the cost.

Recycle:

Non-edible foods like vegetable peels, eggshells and tea bags can be composted. Restaurants and households can practice this process. Bread waste, soybean waste is collected and recycled into animal feed by local companies in Singapore. Australia can also encourage companies to use such plants. Singapore also introduced a plant to convert waste into methane which could be used to generate energy but sadly, the plant was shut down in 2011 (Singapore, 2008).

Effective Food Planning:

As explained above, the most convenient way to reduce is to plan the food consumption. Making a list of things that are essential for cooking a meal, and only buying those things is the proper planning process. Even having something in stock is good if we know how to store them properly. For restaurants it might be quite unreal to pre-plan food consumption for a day, but as a

whole they can keep track of the dishes that are consumed more and make a list of those ingredients required to prepare that dish and order accordingly.

Store food Correctly:

Massive amount of Food waste is the result of improper food storage. According to Dana Gunders from Natural Resource Defence Council in the UK two-thirds of household food waste is due to the food decay due to improper storage (Gunders, 2012). Always use the right temperature while storing the food not only in the household but restaurants have to be more careful and monitor their refrigerator on a daily basis as failure of the fridge or freezer lead to huge amounts of food loss. Making a habit of labelling the food to avoid confusion is also a great way of storing food.

Food banks:

The Non-Profit initiative where perfectly edible foods are collected, stored and distributed to the hunger relief charities or to the peoples who can't afford to purchase food is known as Food Banks. It not only provides food to the hungry but also protects the environment by stopping the food waste from going to landfill. This solution is applicable to both households and Restaurants. Every household and restaurant can donate leftovers or the food that is likely to end in bins to the food banks. Restaurant and food industry can take self-initiation and place a refrigerator or a free food booth outside their restaurant after their operating hour with the leftover food to provide food to the local homeless people who would otherwise sleep hungry.

Composting:

The decomposition process to turn food scrap and garden waste into compost is known as composting. As a matter of fact, the rotting of food and vegetables is not healthy for the environment and ozone layer. Hence, it is an eco-friendly process for food waste management. It is useful for both household and restaurant. Even if there is not enough land for composting in the household, the various sizes of bins available in the market can help us compost the food waste. It is positive as it not only stops the food waste to land in landfill but by providing the compost to our soil, which improves the health of soil.

Besides these some of the general solution can be food waste disposer which will reduce the food waste to end in landfill, creating animal feed with the leftover, policy support that can reduce food waste by establishing a voluntary commitment to reduce food waste, business can also support technology and normalise the food waste consideration into business practise and as a individual we can change our behaviour and adopt practices and attitudes towards avoiding and reducing food waste.

Moreover, there are already various organizations working worldwide to reduce food waste in creative ways like Food cam, Feed in, Copia, Feeding America etc. being involved and supporting these organizations will also help in reducing food waste.

Recommendations

While we search for the solution to resolve the food waste crisis, various things need to be taken into account. In the midst of searching for an effective solution, our research suggests that none of these solutions work effectively if people are not willing to save food. First, people who are aware about this food waste crisis need to be mindful about how to make others realize that this food waste crisis is real and it affects everyone on a various levels. There are limited studies about behavioural reasons of food waste but few available resources and our online survey suggest that there are mainly two reasons for food waste i.e human behaviour towards handling food and other factors that are not associated with the human attitude on how they perceived food waste.

First and foremost, the behavioural factors of food waste are related to the daily attitude of people towards handling food and not knowing or being reckless regarding food. Majority of people don't have the knowledge of the severity of the impact of the food waste on their lives and on the surroundings that they live in. The term food literacy is emerging as the authorities and relevant parties are concerned that if this increasing food waste trend is not prevented, it will be a massive problem in every sector of our society in the future. And the first step towards resolving this crisis should start with the social awareness of food waste and the benefits of saving food. Since prevention seems to be the most promising way to deal with the food waste issue, consumption level has the highest potential for prevention. (Haugaard & Lähteenmäki, 2016). Governments and various organizations are campaigning to educate people on how to manage food waste effectively. For instance, One of the Australian state, Victoria, has introduced an education campaign strategy “Victorian waste education strategy” which focuses

on community awareness on food waste and litter management including assisting waste and resource recovery education for schools. Building a successful food literate generation is not an easy task, every parent should be obligated to teach their kids about the impact of food waste and how they need to save food since the early days of kids' life. Authorities around the world should also integrate food waste management education in school curriculum and kids need to be taught in school and later in life, which enables a future generation who are actually willing to save food. Similarly, the government and local authorities should encourage local food service institutions to save food and give tax deductions based on their performance to reduce unnecessary food waste.

Whereas, the other determinant for food waste which is not related to consumer behaviour is human limitation and to food waste is another determinant of food waste that is not related to human behaviour are other technical errors while handling food during the different phases of the food cycle from harvesting to consuming. Huge amount of food is wasted at the various stages until the food is reached in the consumer's plate. these. While harvesting, farmers lost a lot of food due to lack of good harvesting technique, poor weather conditions and at the storage unit. Farmers tend to discard crops that look appealing to the consumers hoping that they will not be purchased by consumers. Similarly manufacturing costs, a huge amount of food because of overproduction, damaged goods and all other items that are associated with the standard procedure of manufacturing. Meanwhile, in retail and wholesale, poor planning, oversupply, unsold goods, expired goods and spillage because of the temperature changes contributes to food waste. while assessing these factors, the question arises how we solve these problems? The answer is Technology.

Food tech industry is an emerging business and innovators around the world are seeking for better and creative ways to solve these issues. There are now smart devices available as an alternative to our existing devices to reduce the food waste. For instance, refrigerators are now able to send notifications in peoples cell phones if some product is about to expire or some stuff needs to be purchased. These smart devices enable consumers to better plan for their food and waste less. Use of automation seems to be crucial in reducing food waste while harvesting, producing and manufacturing processes. State-of-the-art robots can handle food fast and increase accuracy of handling while reducing the cost of labor and food wastage. There are various R&D projects that primarily focus on building powerful robots to aid reduce food waste including a collaborative initiative between University of Lincoln's National Centre for Food Manufacturing and Olympus Automation (OA). Likewise, artificial intelligence can be used to predict future food demand of people and act accordingly in wholesale and retail where a huge amount of food is wasted due to oversupply.

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