Food Waste Management in Food and Beverage Department of Hotel 4.0

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Abstract

Food waste problem has become a significant global issue that directly affects the environment, especially a major contribution of food from the Food and Beverage Department of Hotel 4.0. The objective of this paper is to study and suggest process in reducing waste within the Food and Beverage Department of Hotel 4.0 both in demand and supply perspective. Results show that the process in pre-order planning, ordering, receiving, storage and preservation, cooking, controlling, consuming, food processing, and food waste recycling are the main factors in reducing food waste. Also, technology has become the great equipment in controlling and supporting food waste reduction to the department.

Keyword: *Food Waste, Food and Beverage Department, Behavior*

1. Introduction

Food is an essential nutrient for human body in order to stimulate growth, to maintain life, to provide energy, and to repair deteriorated body cells. Also, food is one of the four basic human needs that is required when the body feels hungry or needs food (Maslow, 1943). One of the challenging problems that humanity is facing is starvation and the abundancy of food leading to food waste problem. Food waste results in ethical dilemmas as there are still around 925 million people in the world living in developing countries. They are currently facing the famine and the food needs are intensifying over the world (Pham, Kaushik, Parshetti, Mahmood & Balasubramanian, 2015). The United Nations is aware of food waste issue, therefore, they set the sustainable Development Goals in reducing food waste in retail and consumer levels of the world.

National Geographic has reported that the annual food produced in the United States of America (USA) turns to 30% waste or approximately 162,000 million dollars. In addition, the amount of food waste in United Kingdom (UK) appears to be approximately 10 million tons or 250-400 million pounds per year. In Denmark, food waste reaches to about 700,000 tons per year. In France, 10 million tons of food waste per year similarly in UK which is approximately 16 million euros (Thaweethong Hongwiwat, 2018). Food and Agriculture Organization of the United Nations or FAO has reported that food that turns into waste is around 1300 million tons or one-third of global food production. There is a process of destruction every year throughout the supply chain from production to consumption (Gustavsson, Cederberg, Sonesson, Van Otterdijk & Meybeck, 2011). These food wastes are enough to help one-eight of the world's famine population (Fao, 2012) and by 2050, the demand for food may increase from 50% to 70%.

In Thailand, food waste problem has become the national agenda and government policy by the ministry of agriculture and cooperatives. Office of Agricultural Economics establishes a 10-year food security strategy framework to secure food supply in order to have enough food, and to make best use of raw materials to maximize benefits. In 2030, Thailand has set the gold to reduce food waste to 50% under the sustainable development policy of the United Nations (Koohawichanan, 2017).

This paper focuses on Food Waste Management in Food and Beverage Department of Hotel 4.0. This paper will lead the economy with technology as it is one of the important factors in the Tourism industry. Food and catering service providers in tourism and hospitality industry agree on the abundance of food waste during the preparation process in their services (Chaiyasen, 2016). Therefore, food waste

management is an important issue that should be considered in all activities relating to food whether, avoidance, reducing or waste recycling as well as production and consumption chain (Papargyropoulou, Wright, Lozano, Steinberger, Padfield & Ujang, 2016).

2. Objectives

To study the forms and guidelines of the Food Waste Management in Food and Beverage Department of Hotel 4.0 in the view of entrepreneur and customer.

3. Concepts of problems and approaches to food waste management

Currently, a survey shows that 1/3 of food in the world is abandoned while 11% of the world's population is starving and most of them lives in Asia Pacific region (Srijaroon, 2016). Currently, abandoned food causes damage to the global economy of around 900,000 million US dollars per year. This leads to the "Food waste" crisis. Many countries begin to put attention on food that can be consumed especially in the hotel industry where they exceedingly supply food for guests, parties or buffet in hotels, etc. The cause of this crisis is caused by the distribution system which has an inappropriate controlling processes, this include food and product preparation that is beyond necessary.

There are various types of food waste. Either perishable or discarded food that is unsuitable for human consumption. Products that have exceeded expiration date or damaged but still maintain nutritional value that may not meet the standard requirements. Especially vegetables, fruits and raw materials that may be damaged or are smaller in size than the standard requirements, the appearance of food is not appealing but still maintain good quality can be consumed but is often discarded rather than chose to be processed or improved.

The impact of the food waste crisis directly effects the economy on a large scale. If there is a massive amount of discarded food, this suggests that the economic investment is impractical. Food waste will be discarded instead of being produced and consumed to improve the living conditions of humans. These waste are dumped without any benefits made. However, if hotel businesses can reduce the amount of food that is discarded and consume, this will be result in the reduction of food expenses. The amount of food in the market has a higher proportion which causes the price of the products to decrease accordingly. This results in the level of food security to increase. It also affects the dimensions of the environment (Banjongsiri, 2018). Most food waste disposal methods use landfill. When rotten, food waste will release methane gas and can impact global warming 25 times compared to carbon dioxide. This negatively affects the Earth's atmosphere and also the loss of resources such as water resources, cultivated areas, and labor.

More than half of food waste is from the food and beverage department of the restaurants and hotels which is considered to contain massive food waste. As the hotel must supply enough food and beverage to serve customers. Leftover food must be discarded without being stored and distributed to staff in order to maintain the hotel's food standards. It is likely that staff will tend to cook more than necessary once leftover food is distributed to staff in order for them to take home.

In 2020, it was found that industrial entrepreneurs involved in food and beverages tend to focus on environmental care as the key to the solution. Reducing disposal of unnecessary food by placing importance to processing and adding value to materials.

Guidelines for waste management have been issued by the European Union Parliament and Commission for all Member States to take action. The guidelines suggest ways to manage the problem of food and material waste in cooking which include sequential agricultural products consisting of 5 steps (Papargyropoulou, Lozano, Steinberger, Wright & bin Ujang, 2014), these are

1. Prevention through loss by calculating the amount of production in order to meet the industrial needs and household consumption to prevent materials or agricultural products that are beyond demand.

2. Allocation (Optimization) by donating excess food to those in need (Redistribution to people) or to feed animals.

3. Fertilizer and other uses from recycling.

4. Energy generation through incineration (Recovery).

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5. Disposal by wastewater treatment, incineration, and landfill.

In England, variety of food and beverage innovations have been developed. Since it was found that food was discarded on the label, specifying the expiration date, although in truth food can still be eaten. Therefore, smart labels on food packaging have been developed in order to acknowledge consumers about food quality and expiration date (Mondéjar-Jiménez, Ferrari, Secondi & Principato, 2016). The product label informs the quality of food. Labels that are simple, appealing with vibrant colors indicate the freshness of the product. However, if the labels become bumpy several hours before the product is no longer fresh, this helps reduce unnecessary food waste. As for the production source, the concept of using unhealthy raw materials or failing to select quality is reduced. The Food and Beverage Department will then produce more food and beverages. There is a solution to pick vegetables. These unappealing fruits are brought to cook in order to bring out the delicious taste. The value of these fruits are added through storytelling about cultivation and apply technology to produce food and drinks (Halloran, Clement, Kornum, Bucatariu & Magid, 2014).

In parts of the United States of America, the use of incentive measures is present. Beginning with the law that covers civil and criminal liability for food donors in good condition for charity. This causes food and beverage businesses to become interested in donating food simultaneously in various states. In the United States of America, tax privileges are given to people who donate food to foundations or charities. In California, tax privileges are granted with a credit of 10% of donated goods given to restaurants and farmers that donate food or agricultural products. Additionally, in Missouri, 50% of the food value donated but not more than 2,500 dollars per year tax credit is given to donors in the area (Parfitt, Barthel & Macnaughton, 2010).

Australia is another country with well-defined policies and measures to promote the management of food waste. It was announced to reduce the amount of food waste up to 50% by 2030 or another 18 years. In oder to achieve the goal, the government has allocated a budget of 1.2 million Australian dollars to support organizations that manage food waste, these include OzHarvest, Secondbite, Fareshare, Foodbank Australia, etc. (Ridoutt, Juliano, Sanguansri & Sellahewa, 2010).

4. Format and guidelines in reducing food waste in the Food and Beverage Department of the Entrepreneur

In the Food and Beverage Department of the hotel, improper food handling in the production process or lack in planning may in the production process can result in food loss. Starting from transportation to human consumption, food left in the final process can still be consumed or feed animals instead of disposing without making any use. Food waste does not include inedible parts. The cause of food waste in Food and Beverage Department is related to the following issues:

Planning Issue is one of the reasons the amount of food waste increases due to the purchase of more materials needed than necessary and lack of plan before purchasing. Therefore, planning before purchasing and preparing checklists are critical in reducing food waste.

Food Date Labeling: Misunderstanding of labels regarding shelf life/expiration dates on product labels such as “Best before Date”, “Used-By Date” resulted in a disposal of large amount of edible food (Gustavsson et al, 2011). The label “Best-Before Date” shows the date the product still retain its original characteristics, including color and taste under. If the product is expired as specified on the label, consumers can decide to consume or to refrain considering its color, aroma or taste. On the other hand, “Used-By Date” is the last day that can be consumed. If more than the specified date, it will be harmful to health as microorganisms may form in the product.

Portion size: The bigger the size, the product is likely to be picked by buyers. As the product is cheaper in price compared to the smaller products. This suggests that the size of the product or container affects the amount of food waste. Accordingly, in restaurants, if a large container, dish or bowl is used, consumers may scoop out larger quantities of food. In addition, chefs may as well use large pan or spatula in spooning out larger quantities of food (Freedman & Brochado, 2010).

Storage: The condition in storing food such as humidity, light, temperature will affect the deterioration and spoilage of raw materials. If the storage conditions are not suitable, it can lead to more food waste. However, with suitable storage conditions, product lifespan will be extended (Gustavsson et al, 2011)

Cooking Skills and Knowledge: Cooking and food preparation skills are required when working in Food and Beverage Department. With the right skill in food preparation and cooking techniques, food waste from over-preparing will be reduced. (Graham-Rowe, Jessop & Sparks, 2014)

Using raw materials: Food supplies that are purchased in the wrong time may lead to waste and spoilage as they do not meet the quality standards.

Another important part is the knowledge in creation. Executives should raise awareness in food waste problems to employees and customers. This may require changes from the primary section of the food management line. Quantity control must be carried out to meet customers need. This can be done by placing food on the buffet line in the right amount in order to prevent the occurrence of food waste with staff constantly filling.

5. Concepts about forms and guidelines on reducing food waste from consumers in the Food and Beverage Department

Food waste problem has affected 3 sustainable development issues.The 3 issues incude environment, economy, and society. Food waste from households, restaurants or from consumers behavior in purchasing is considered as food loss in the final stage of production. The Theory of Planned Behavior (TPB) explains the food waste from consumers behavior. The TPB theory suggests the concept of social psychology which is developed from the Theory of Reasoned Action by Fishbein & Ajzen (1975). Theory of Reasoned Action describes the behavior that results from an intention in performing such behavior under the 3 influences as follows (Fishbein & Ajzen, 1980).

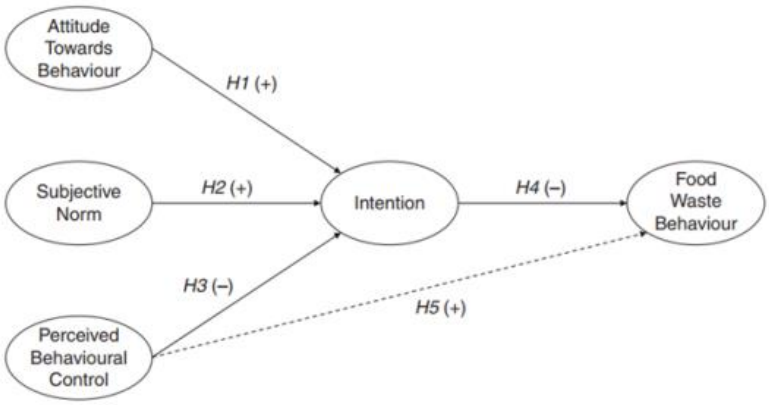

Figure 1 TPB base model to explain food waste behavior

1. Having the right attitude and behavior is likely to create positive results. On the other hand, if the behavior causes negative impact, it will result in an inappropriate actions. For instance, if we feel guilty in causing food waste or leftover, it is possible that we will prevent waste occurring twice. (Positive behavior: Positive attitude in reducing junk food) (Olsen, Sijtsema & Hall, 2010).
2. A Subjective Norm is an important group of people. They tend to influence actions. Others are likely to follow actions performed by this group of people. For example, if a friend or family member thinks that food waste should be reduced, it will lead to an action that would prevent food waste.

3. Perceived Behavioral Control is an awareness on how easy or difficult it is to behave (Ajzen, 2002). If such behavior can be performed including the ability to control and to achieve desired results, people will tend to act accordingly. However, if we believe that preventing food waste is difficult and complex, the motivation to reduce food waste will drop. Therefore, building the right behavior in reducing food waste must start on a daily basis. Ordering food more than necessary at once is one of the examples.

Graham-Rowe et al. (2014) is one of the studies that confirms the use of TPB theory. The research has surveyed the reduction of junk food in households by applying the TPB theory and found the decline in wastes from fruits and vegetables as predicted based on the 3 influences of the Theory of Planned Behavior (TPB) and Russell et al. (2017) explaining the behavior of producing junk food with TPB (Graham-Rowe, Jessop & Sparks, 2015).

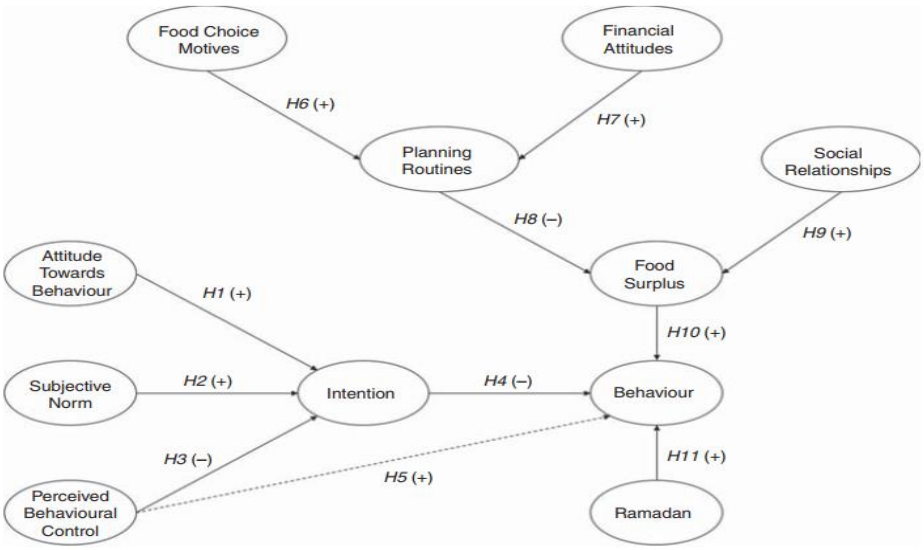

Figure 2 Extended model to explain food waste behavior

In addition, the research of Ahmad et al. (2018) titled "A Consumer Behavioral Approach to Food Waste" has further studied other factors that affect food waste behavior, including food choice motives, financial attitudes, planning routines, social relationships, food surplus, contextually, and Ramadan. There are presented from the TPB theory from the model. It is found that when Planning Routines from Food Choice Motives and Financial Attitudes helps reduce the amount of food waste.

In contrast, Social Relationships has become the critical factor in causing food waste. For example, by cooking large quantities of food to welcome guests may result in leftover. Therefore, changing the way we think is important in lowering inappropriate behaviors.

Examining and confirming the findings by these two models suggest that the behaviors that cuase food waste can be explained through the TPB theory, including other relevant factors such as Planning Routines or Social Relationships. This aims r to raise awareness on food waste and to make change in consumers behavior in reducing the amount of food waste from households and eating out.

Table 1 Guidelines for reducing food waste in the food and beverage department within the hotel

Procedure	Process
1. Pre-order planning	Planning before buying raw materials as to prevent unnecessary waste. 1. List out necessary food supplies to be used in cooking. 2. Check if the raw materials are placed in the cabinet or the refrigerator.

Procedure	Process
	3. List out ingredients and make note of what is needed to be purchased as a reminder.
2. Ordering	Ordering efficient raw materials should be considered as follow: 1. Order raw materials according to the specified list and quantity. Avoid ordering to collect because it will cost storage costs. 2. Order raw materials that have the size of the product packaging that fits with the need to consume. Avoid purchasing large sized products as it will affect the quality when storing. 3. Use computer systems in ordering products by calculating past sales statistics instead of ordering products according to the head of the department.
3. Receiving	Receiving raw materials with care, both in quantity and quality. Taking into consideration as follows: 1. Food and Beverage Department should carry out a thorough inspection on the ordered ingredients, both in terms of quantity and quality by focusing on the freshness of raw materials. As fresh raw materials have shorter shelf life and are at risk of loss. 2. Date and type should be specified before being brought in a chilled container. Raw materials that do not meet the standards should not be accepted. 3. Restaurants should have items in stock to prevent unexpected events such as delivering of unqualified materials.
4. Storage and preservation	Effective food storage to reduce loss should be stored t as follows: 1. Based on shelf life and type, food should be stored in a suitable place for such type. Perishable food, such as meat, should be kept in a freezer whereas vegetables should be stored in the vegetable compartment of the refrigerator to prevent unpleasant odor and contamination. 2. Inspections on food storage shelves and refrigerators should be carried out in order to be able to identify expiration date. The understanding of product labels such as 'best-before date', 'used-by date', or 'expiry date' must be understood correctly. 3. Information about food or raw materials should be provided before storing in refrigerator. This includes, the type of food, date manufactured, or who made it, etc. 4. Minimum stock determination: Food and Beverage Department should set a minimum stock for raw materials. As this will help solve the problem in having much to keep and leading to waste. It consumes the cost of storage and management as well. 5. The storage must be organized and easy to handle. Also, the entry date of raw materials should be specified by labeling FIFO (First In First Out) using stickers as it is effective and will not contaminate. 6. Proper temperature control: Raw materials especially meat are expected to be stored for a long period of time. They should be stored in freezer with temperature lower than -18 degrees Celsius. Raw materials that must be used. However, raw materials such as fruits and vegetables are required to be stored in freezer with temperatures around 2-6 degrees Celsius as they are used instantly.
5. Cooking	With the right skill and knowledge in cooking, food waste can be minimized as follows: 1. The amount of food that is suitable for cooking (Proper Portioning) should not produce more food or exceed the number of customers. As this will cause excess in food waste. Restaurants with buffet lines may have menus that will only be made when ordered. 2. Not only added on the existing menus, excess raw materials can also be processed, applied or modified into other menus. For example, using less fresh shrimp to mince or blend to make dumpling or deep-fried shrimp cakes, whether it is in large amount or have short period of shelf life. A standard formula must be specified when cooking in order to have fewer errors and clear standards. 3. The use of raw materials for the most benefit: Restaurants generally want to reduce costs, however, they often discard excess raw materials without considering to make the best use of materials. It is advised to use the excess raw materials for maximum benefit, such as boiling bone and vegetable scraps to make broths and sauces, taking the head and neck of the fish into a special menu such as fish head spicy soup, grilled salmon

Procedure	Process
	neck with soy sauce or making food for staff to avoid useless discarding, etc.
6. Controlling	1. Define Standard Operating Procedures (SOP) for all employees to follow to reduce errors. From the process of checking stock, ordering raw materials, receiving raw materials, storage, preservation, cleaning, raw material preparation, cooking, serving to washing dishes and handling waste to strictly control employee procedures. 2. Monitoring the number of customers: if amount of food waste is highly present, the quality of food should be checked. If the quality is fine, amount of food served can be reduced to the right amount.
7. Consuming	Food waste often occurs in the process of consumption. If the consumer wants to reduce the amount of food waste, they should consider the following: 1. They should avoid scooping too much food than necessary. Consumers can add more needed. In addition, choosing smaller food containers such as rice dishes or curry cups will help reduce the amount of waste as smaller containers will allow you to scoop less food. 2. Food ordered should be eaten completely before making new order.
8. Food Processing	Food left from meals can be processed for longer storage and can be recooked as follows: 1. Food preservation is a keeping process to delay the spoilage of vegetables, fruits, or meats, such as pickled cabbage, dried fish, fruit jams, etc. 2. Food processing in many types of cooked food can be processed into new foods if they cannot be completely eaten.
9. Food Waste Recycling	Recycling can be done in many ways to reduce final waste in household, such as to feed animals such as cats, dogs, catfish, or to be made as compost.

6. Conclusion and Recommendation

Hotel businesses are reputed as the most energy-efficient and waste-releasing industry. There should be a way to manage food waste in hotels especially the Food and Beverage Department. Therefore, hotel managers should put attention in reducing the amount of food waste and must place importance to both the entrepreneur and customers perspective. This can be done by providing knowledge about the importance in reducing food waste within consumer. On the entrepreneur's side, this could be achieved from the beginning to the end of the service process. This includes pre-order planning process to estimate the order of products and in order to avoid ordering more than is necessary. In the ordering process, purchasment of materials must be ordered as specified.This can be done by using technology to help manage and to reduce errors. The receiving process should consider the quality and quantity of raw materials ordered in order to obtain materials that meet the standards.. The storage and preservation process must have excellent storage conditions in order to reduce damage. In the cooking process, cooks must be creative in creating menus based on ingredients that may be of lesser quality. The controlling process includes control, check, set standard in the procedures for employees to follow. This process comes with good awareness within staff. Staff training is important for restaurants. This will build up loyalty within staff and the organization. Staff will feel that they are the owner of the store and proud to be part of the restaurants. Leading into helping restaurants to save up and to handle the restaurants' benefits. In addition, restaurants should have a good communication system between kitchens. The use of modern technology such as POS systems to be placed in the store. As taking orders by hand and delivering them in the kitchen can highly lead to error-prone and time-consuming. Therefore, POS systems can help reduce communication errors and save time as well as lowering the chance of misunderstandings. In addition, it is also necessary for customers to have the right behavior and awareness in helping to reduce the amount of food waste. The hotel or Food and Beverage must establish awareness of the food waste impact on the environment. Customers shall be aware of the problems that can occur if ordered food is not comepletely wating as it can lead to food waste. Therefore, customers must avoid ordering food more than necessary. Customers should take into consideration and show an understanding on the culture of the hotel food services. These include the change in sizes of dish, buffet line adjustments to Live Station in order for the hotel to be able to control the number of ingredients used.

Customers are also suggested to plan in selecting the type of restaurant, the characteristics of service as well as their hunger levels. Planning before selecting the restaurant will result in an order to predict behavior and choose restaurants that are appropriate for their own eating can also help reduce the amount of food waste. Food processing may use food preservation methods to extend food life, such as pork can be modified into dried pork through the sunlight, cabbage can be pickled, etc. Food waste recycling is used to reduce the amount of food waste as well as fermentation of food waste to fertilizer or in feeding animals.

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