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Food Waste Mitigation Strategy Hotel X in West Java

Nadine Diaz Salsabila, Woro Priatini, Purna Hindayani*

Fakultas Pendidikan Ilmu Pengetahuan Sosial, Universitas Pendidikan Indonesia, Indonesia

*Correspondence: E-mail: nadinediazsalsabila@upi.edu

ABSTRACT

The generation of food waste in hotels is inevitable and the amount is uncertain despite the hotel's preventive measures. Food waste has a negative and detrimental impact on the hotel business because it makes more costs in purchasing and producing food so that a mitigation strategy is needed to minimize food waste generation. The research was conducted at four-star hotel X in West Java. This research aims to produce a prevention strategy to reduce food waste in hotels. The method used was qualitative. Data collection techniques include interviews, observations, and documentation studies. The results showed that the average food waste generated by hotels every day reached 128 kg. With this high number, action is needed to reduce food waste. Strict hotel regulations make food waste management options limited. Therefore, consistency in implementing mitigation strategies and openness and commitment from the hotel to make policies related to food waste are needed.

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1. INTRODUCTION

Hotels are tourism businesses and part of the profit-oriented hospitality industry (Dhir et al., 2020). The hospitality sector continues to carry out operational activities every day, resulting in a lot of waste, one of which is food waste. Food waste refers to food fit for human consumption that is discarded, either after or because it is not stored, exceeds the expiration date or is allowed to spoil. Globally, each year the hospitality industry produces an average of 289,700 tons of waste, including 79,000 tons of food waste (Bhajan et al., 2022). Food waste is a global issue that requires further attention and handling. The Food and Agriculture Organization of the United Nations defines food waste as a reduction in the quantity or quality of food resulting from decisions and actions by retailers, food service providers, and consumers. In 2021, it was found that as much as 931 million tons of food was wasted (United Nations Environment Programme, 2021). In this report, Indonesia is the first country in Southeast Asia to produce food waste with 20.93 million tons of waste each year. Indonesia is also the second largest food waste producer in the world, producing around 300 kg of food waste per capita per year (The Economist Intelligence Unit, 2017). Food waste generation in Bandung City, Indonesia, is mostly found in hotels, dominated by leftover ingredients or food waste and can be influenced by the buffet concept (Brigita & Rahardyan, 2013).

Food waste in the hospitality industry is defined as unwanted and discarded food, such as leftovers from guests' plates and waste during the cooking process (Pirani & Arafat, 2016). Hotel food waste is divided into three types, including waste from the cooking process, waste from guest plates, and waste from buffets (Papargyropoulou et al., 2016). Waste from guest plates dominates at 54%, followed by waste from buffets at 40% and waste from production at 6%. Hotel food waste excludes inedible food ingredients such as bones, seeds, leftover oil, flavorings, and food coloring (Wang et al., 2017). This means that the prevention of food waste generation must focus on things that can be avoided. Food waste is something that must be considered by tourism businesses. A reduction in costs will be felt by tourism businesses if they manage food waste. This is necessary for the financial sustainability of the business (Curtis & Slocum, 2016).

Food waste in hotels is inevitable due to the nature of the tourism sector that hosts guests with different cultures, lifestyles, and eating habits. Female guests may generate more food waste than male guests for reasons of service hygiene (Tekin & İlyasov, 2017). Guests from one country may generate more food waste than guests from other countries (Juvan et al., 2018). One of the main causes of food waste in hotels is also due to the failure of hotels to plan and provide meals based on guest demographics. The hotel's habit of providing more food to meet guest expectations in terms of variety and value is also one of the reasons for food waste (Papargyropoulou et al., 2016). Hotels are part of the profit-oriented hospitality industry. Food waste means that the economic value contained in the food is also wasted. Food waste causes restaurants, hotels, and catering businesses to incur more costs in purchasing and producing food (Juvan et al., 2018).

The problem of food waste also occurs at four-star hotel X in West Java. Despite taking several precautions, the generation of food waste is inevitable and the amount is also high. The food waste generated varies from carbohydrates, proteins, to vegetables. The wide variety of food serving services in the hotel generates a lot of food waste. However, the hotel does not have a specific strategy designed to minimize food waste and no action is taken to mitigate or treat the food waste that arises.

Therefore, a mitigation strategy is needed to reduce and minimize food waste generated by hotels. Reducing food waste can also protect food sustainably, make efficient use of

resources, reduce adverse effects on the environment, maintain food security and nutritional needs.

2. LITERATUR REVIEW

Food waste in the hospitality sector is food wasted as part of the preparation/cooking process or waste from guests' plates. Most hotels do not have a figurehead or staff responsible for handling food waste. Most hotels have a sign in the staff canteen encouraging staff to reduce food waste, but rarely do hotels have a similar sign in the guest restaurant area. This is because hotels assume that they are selling an "experience" to guests and not to "patronize" guests in terms of environmental sustainability (Pirani & Arafat, 2016).

In operation, hotels need to control food production. However, there are several difficulties that affect the generation of food waste. Some of these difficulties according to (Davis et al., 2013), such as:

- a. The perishable nature of food: Food, be it raw or cooked, has a limited shelf life. It requires the right quality and quantity according to the demand forecast, and must be stored and processed properly.
- b. Unpredictable business volume: Although sales forecasting is done, it is often not very precise with reality. The fluctuating volume of business impacts the quantity of ingredients to be purchased.
- c. Unpredictable menu mix: Restaurants often offer a variety of menu options for customers whose preferences are hard to guess. Effective forecasting is required.
- d. Short cycle of food operations: The short cycle means that the company has to make regular financial statements. Perishable food items also cannot be purchased too much before they are needed.
- e. Departmentalization: F&B operations are divided into different departments, make different products, and have different regulations.

Food waste in hotels and restaurants can be influenced by the type of outlet. There are differences in food waste generated between restaurants with a la carte and buffet systems. With a buffet system, the main cause of food waste is due to overproduction. Whereas in a la carte restaurants, the main cause of food waste comes from leftover food on consumers' plates (Silvennoinen et al., 2015).

In addition to adversely affecting the business by incurring more costs in purchasing ingredients and food production, the presence of food waste also contributes negatively to the economy, environment, and social (Papargyropoulou et al., 2014). Wasted food causes losses, so efforts to reduce food waste can be an investment in reducing the money lost due to food waste.

Food waste is organic waste that will decompose and produce harmful gases in the form of greenhouse gases which then evaporate into the atmosphere and cause global warming. The total potential global warming impact caused by food waste in Indonesia over the past 20 years is equivalent to 7.29% of total greenhouse gas emissions. In addition, the carbon produced along the food chain and the reduction of forest land due to more land being taken to produce food or become food waste disposal sites further exacerbate the impact of food waste on the environment (Seberini, 2020).

Economic losses due to food waste can be felt by both producers and consumers. In Indonesia, it is estimated that the economic loss due to food waste in a year is 107-346 trillion rupiah (Badan Perencanaan Pembangunan Indonesia, 2021). Meanwhile, globally, it is estimated that the loss is 1000 billion dollars per year. The magnitude of the food waste problem has been outlined in the Sustainable Development Goals (SDGS) by the United

Nations, with the aim of reducing part of the food waste per capita by 2030 and reducing part of the food loss along the production flow.

While a lot of food goes uneaten and wasted, there are still many people who suffer from hunger and do not have access to enough food. According to the [Global Hunger Index \(2022\)](#), by 2022 Indonesia ranks 77th out of 121 countries in hunger. Indonesia has a score of 17.9 which means it has a moderate level of hunger. Another social impact is the loss of nutrients from wasted food. These include carbohydrates, protein, vitamin A, and iron ([Badan Perencanaan Pembangunan Indonesia, 2021](#)). Food waste can arise from any actor along the food supply chain, from producers, distributors, to consumers. Food service businesses can generate food waste due to incorrect handling of food preparation or poor storage ([Parfitt et al., 2010](#)). [FAO \(2021\)](#) explained that some of the main causes of hotels generating food waste include failing to optimize buffet design, failing to plan food production based on guest demographics, and lack of strategy in utilizing excess food that is still feasible. Food waste can arise at three operational stages, namely the pre-kitchen stage, the kitchen stage, and the post-kitchen stage. Thus, the principles of food waste prevention in hotels can also be categorized in these three operational stages ([Filimonau & De Coteau, 2019](#)).



Figure 1. Principles of food waste prevention in the operational phase
Source: Filimonau & De Coteau, 2019

The pre-kitchen stage includes planning activities carried out to produce food such as demand forecasting, procurement, stock management and menu design. At this stage, things that can be done to reduce food waste include effective forecasting, knowledge of negotiations, good cooperation with suppliers, regular stock checks, knowledge of menu calculations, and portion size planning. The kitchen stage includes storage, preparation, plating, and serving. Things such as the ability and knowledge and skills in cooking and serving food and portion size control can be a prevention of excess food. The post-kitchen stage includes customer service and after service activities. Preventive measures include proactive cooperation with customers, the use of advanced methods of redistributing food, and the openness of companies to take effective approaches to managing food waste.



Figure 2. Food Waste Prevention Flow

FAO explains that reducing food waste in hotels, restaurants and caterers can be done by preventing food waste and managing surplus food. Prevention of food waste can be done in 3 stages: planning, handling, serving. Meanwhile, surplus food management is done by donating and diverting energy. In the planning stage, actions that can be taken are the use of data, menu design and involving stakeholders in determining ingredients and event planning. In the handling stage, attention is paid to receiving ingredients, storing ingredients, preparation, plating, and serving food. The serving stage is divided into two, including during service and after service.

Excess food donations are given to others in need through channeling organizations such as food banks. Energy diversion takes the form of actions in recycling waste into compost and biogas. Measures that have proven successful in reducing food waste include counting food waste, involving employees and providing training on food waste, reducing overproduction,

evaluating purchasing and storage systems, and reusing leftovers (Clowes et al., 2019).

3. METHODS

The method used in this research is qualitative with a case study approach. Qualitative research is interpretative research, which uses interpretation in examining the problem involving many methods (Mulyana, 2018). Researchers analyze, try to understand, and interpret phenomena based on the meanings that people give to them. Qualitative research uses an inductive mindset and is based on objective and participatory observation of a social phenomenon.

Case study research includes a series of intensive, detailed, and in-depth scientific activities about a program and actual ongoing events (Rahardjo, 2017). The scope of the case study area is narrow so that case study research does not produce generalized conclusions. Data collection techniques were conducted by interview, observation, and documentation study. An interview is a form of communication between two people, where one person wants to obtain information from another by asking questions based on a specific purpose (Mulyana, 2018). Observation is defined as a way of collecting information or data by observing and recording the phenomenon under study (Mania, 2008). Meanwhile, documentation studies can complement the data and reinforce the data collected. After the data is obtained, data analysis is carried out. Data analysis in qualitative research is an integral part of data collection, data reduction, data presentation, and conclusion drawing.

This research was conducted at a four-star hotel in West Java. This hotel was chosen because it has not taken further action in tackling the problem of food waste even though it produces quite a lot of food waste every day. Researchers conducted interviews with the head chef, cost control, steward, and hotel management. Interviews were conducted to obtain data and information on how actions taken by the hotel in minimizing food waste. Observations were carried out in a directed and systematic manner on operational activities at the hotel. Observations were made by paying attention to employee behavior and the condition of the hotel kitchen area to see its relationship to food waste generation. Documentation studies were conducted in the form of records of hotel food waste generation data and the amount of material purchases for two months, namely January and February 2023.

4. RESULTS AND DISCUSSION

The results found that the total food waste generation during January and February 2023 was 7,560 kg or 7.5 tons of waste. If averaged, per month it produces 3,780 kg or 3.7 tons of waste and per day produces 128 kg of waste. While the total purchase of materials in the two months was 35,642 kg or 35.6 tons. If calculated, the percentage of food waste reaches 21%. On days when there is an event in the hotel, the amount of waste will be more than on days when there is no event.

4.1. Pre-Kitchen Stage

In the pre-kitchen stage, food waste prevention that can be done includes effective forecasting, good cooperation with suppliers, checking ingredient stocks regularly, knowledge of menu calculations, and portion size planning. At this stage, Hotel X makes several efforts to minimize the amount of food waste. Preventive steps taken include menu design, guest analysis, forecasting, allocation of funds, and maintaining food costs. Menu design is done by considering that food cost does not exceed 35%.

Guest analysis is done by serving food according to the needs and preferences of guests. An example of the application of guest analysis carried out by the hotel is to serve a breakfast

menu with common foods that are preferred by all races and ages. This is because hotel guests consist of various races and nations. In addition, for example, when the majority of guests are Indonesian, more rice is served because of the tendency of Indonesians who prefer to consume rice as the main food.

Forecasting is done to be able to determine the amount of food ingredients needed. The results of the forecast will be used as a consideration in purchasing food ingredients so that the forecast is made as accurate as possible. The allocation of funds is adjusted to the budget and events held by the hotel. Food purchases are given a budget of 30% of revenue or profit, so an accurate menu calculation is required. Stock management is also applied in the pre-kitchen stage by recommending the application of the FIFO or first in first out system. However, in practice, this is often not implemented properly, resulting in food ingredients that are damaged before use and become food waste. Foodstuffs such as perishable vegetables will be very easy to spoil if the FIFO system is not done properly and thoroughly.

This pre-kitchen food waste prevention analysis is applied by the hotel in all food serving for guests, from breakfast buffet, ala carte, lunch & dinner buffet, to exhibition. Food waste prevention at the pre-kitchen stage is the best and easiest option to reduce the amount of food waste compared to other measures such as reutilization or composting. Preventive measures can also help reduce the problem of food waste from the beginning, making this stage one of the most important and crucial stages in the food waste prevention planning

4.2. Kitchen Stage

At the kitchen stage, food waste prevention can be done when employees have the ability and knowledge to cook and serve food, knowledge of cooking equipment, and control portion sizes. From the results of interviews and observations, it was found that Hotel X is also trying to make efforts in reducing food waste from the kitchen stage. These efforts include the application of good and correct SOPs in the storage and cooking process. Food ingredients should not be placed on the floor and should be properly placed in the storage room, as well as separating wet and dry ingredients. At the storage stage, it is advisable to avoid the danger zone, which is a temperature of 5-60°C where bacteria multiply optimally. Overstocking is also something that should be avoided as it can be one of the reasons for food waste.

At the kitchen stage, the ability and knowledge of staff in processing food will greatly affect the optimal efforts to minimize food waste. Some waste from cooking process can be utilized such as vegetable skins that can be made into broth and vegetable stems such as broccoli stems can be processed. This knowledge of food ingredients can minimize food waste because when staff do not know, these ingredients may be thrown away, so the ability and knowledge of staff who process food will also affect the incidence of food waste. From the observation, food waste at the kitchen stage often arises if those who process food ingredients are trainees or casual daily workers who are not monitored by staff. So it is very necessary for head chefs to monitor and direct in daily operational activities

4.3. Post-Kitchen Stage

In the post-kitchen stage, namely the serving aspect, hotels have a more complex system than restaurants. Hotel food serving has various systems including buffet, takeaway box, plate by plate, and one set. The most common presentation is buffet and takeaway box. With the buffet system, the hotel adjusts the number of portions to the needs of guests. The number of main meals served is 100% of the total pax order, while for fruits, pastries, stalls, and appetizers are served as much as 20-50% of the main meal. However, with a buffet system, guests tend to take more food because there are varied choices. With the buffet system, there

will be more waste from guests' plates. Therefore, it is recommended for hotels to use medium-sized or smaller plates. It is not recommended to use large plates as guests will tend to take more food.

In the post-kitchen stage, preventive measures that hotels can take include proactive cooperation with consumers, distributing excess food, and the company's openness to take an effective approach to managing food waste. Hotel X has made efforts to proactively cooperate with consumers by placing a board to reduce food waste in the restaurant area. The board contains a message for guests to take food in moderation and stop food waste. The use and placement of this board is still limited in implementation so it is recommended to be more consistent. Place this board in the restaurant area and also in every buffet area organized by the hotel.

On the utilization and distribution of excess food, the efforts made by Hotel X are limited in implementation. This is due to the hotel's strict policy regarding the maximum time food is served. The standard for food to be at room temperature is 4 hours, making it difficult to be able to utilize and redistribute excess food. If it is still utilized, unwanted things can occur such as food poisoning which can endanger the people who eat it. The most common utilization of this hotel is to give excess food that is still feasible to the employee canteen, but this is also very limited in implementation because the hotel has prepared a separate budget for the employee canteen.

In addition to the employee canteen, the hotel conducts donations but this is rarely implemented. Especially for donations, the hotel prefers to give new food, not excess food that is reused. This is done for fear of contamination of the food. When excess food cannot be utilized and redistributed, it is discarded. This causes a high food waste rate because the options for managing food waste owned by the hotel can be said to be limited

4.4. Food Waste Mitigation Strategy

Overall, food waste generated by Hotel X arises mostly from the kitchen stage and the post-kitchen stage. At the kitchen stage, food waste arises in poor storage and in the cooking preparation process and cooking process such as unused, cut, and wasted parts of food ingredients. In the post-kitchen stage, food waste arises from excess food either from the buffet or from leftover guests' plates. Excess food that cannot be utilized and redistributed due to strict hotel regulations causes food to be discarded even though it is still suitable. All of this causes a high rate of food waste generated by the hotel. So that a mitigation strategy is needed to minimize and overcome the generation of food waste. The following mitigation strategy is adapted from FAO and developed to be applied by hotel X.

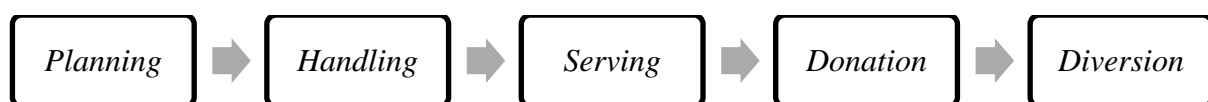


Figure 3. Food Waste Mitigation Strategy Flow

The mitigation strategy consists of five stages, namely planning, handling, serving, donation, and diversion. From each stage, steps are made to minimize or overcome food waste that can be applied by hotels. The planning stage includes planning such as menu design, forecasting, and procurement. The handling stage includes receiving, storing, and cooking processes. The serving stage includes activities during service and after service. The donation stage includes activities to donate excess food, while diversion includes waste recycling management such as composting.

Planning: In planning the menu design, use food ingredients that have the least amount of waste. Discuss food waste reduction strategies at every banquet event order meeting. Review inventory or stock items before ordering to avoid overstocking and to check the condition and quality of ingredients in storage. Accurate forecasting such as the number of guests arriving and the amount of food ingredients needed so as to minimize food waste. Inform guests about the amount of leftover food and if possible, educate guests about food waste and the hotel's efforts to reduce it. Effective and purposeful cooperation and communication within the F&B Product department and with other related departments.

Handling: Ensure that the goods received are in accordance with the quality agreed with the supplier. Upon receipt, immediately move the goods to the storage room. Ensure to apply FIFO, labeling, and temperature standards and avoid danger zones. Conduct regular monitoring and education regarding food storage. Ensure recipe specifications are available for each menu and ensure cooking equipment is in good condition. Plan to process wasted ingredients from the cooking preparation process such as vegetable bones and skins for broth. Avoid preparing more food than predicted unless necessary. Educate and train staff to reduce food waste through proper storage and processing.

Serving: Serve plates to guests that are medium or small in size, not too large as this may cause guests to take more food but not finish it. Always check the quality of food before serving and during serving. Place signs in buffet and restaurant areas encouraging guests to reduce food waste and to take food in moderation.

Donations: If there is a large amount of excess food, communicate with the chef in charge. Create a standard whether the excess food can still be reused or not. For example, the maximum time the food is served, or the quality of the food in terms of appearance, taste, texture. Excess food that is reused must be processed with attention to the hygiene and safety of the food. Consider working with third parties such as food banks to donate excess food. Consideration, commitment, and openness from the hotel are needed to make the donation. Steps that can be taken are:

- Identify a trusted and experienced food bank community partner.
- Develop standard operating procedures for handling food to be donated.
- Inform and train staff on the procedures.
- Collect data and compile performance reports.

Diversion: Educate staff to always segregate waste properly, through official training held by the hotel or through daily briefings. Record and document waste so that it is recorded how much waste the hotel produces. Consider working with a waste bank that manages and recycles organic waste. Another alternative step is to work with maggot farmers who process organic waste into feed for maggots. Food waste, which is organic waste, can be recycled with proper management. This is recommended so that not all food waste generated ends up in landfills

5. CONCLUSION

Food waste is an important issue in hospitality and other food businesses. Wasted food means wasted resources along the food chain, from growing to processing. Unconsumed food ends up in landfills, taking up more land and creating methane and carbon dioxide gases that negatively impact the environment. Economic value is also wasted on food waste. Ingredients are purchased with economic value and processed using resources such as water, electricity and gas that also have economic value. Moreover, every ingredient purchased and every meal served by the hotel has been considered for profitability. The cost reduction will be felt by hotels and other food service businesses if they implement food waste management.

Food waste will not be absent in operational activities. What can be done is to develop strategies and implement them as an effort to minimize and overcome food waste. The mitigation strategy that has been prepared can be implemented by the hotel, but commitment and consistency are needed for the hotel to be able to truly minimize food waste. With the high average amount of food waste generated by Hotel X every day, which is 128 kg, a policy is needed from hotel stakeholders to further manage food waste. Weighing and recording of waste generation should continue to be carried out to determine the amount of waste generated by the hotel. The openness of hotels to be able to collaborate with food waste-related institutions such as food banks to donate food or waste banks to recycle waste is also highly recommended.

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