

# From Excess to Efficiency: Managing Food Waste at Buffet Restaurant in Thailand

Sukri Hayeebueraheng\*  
Nuttavikhom Phanthuwongpakdee\*\*

## Abstract

The food waste situation in Thailand is exacerbating as food industries are major contributors to food waste, especially buffet restaurants, in which the goal of food waste reduction might harm the customer expectation about the services, and this study aims to examine the surplus food management to reduce food waste in a freestanding buffet restaurant chain, using the qualitative approach based on the Food and Agriculture Organization of the United Nations (FAO) Food Waste Management Model, especially prevention and optimization. The qualitative approach in this study was in-depth interviews with the managers and employees involved in food waste management. The study found that currently, the studied buffet restaurant chain has attempted to reduce food waste through various activities such as “Full of No Food Waste”, which gives rewards to customers who do not leave leftover scraps to incentivize them. In addition, major obstacles to food management were found to be a lack of knowledge on behalf of the employees and overestimation on behalf of the consumers. The guideline for surplus food management to reduce food waste in the buffet restaurant chain was found to be an increase in training and lecturing frequency for the employees to reduce and prevent waste with more tempo as well as building consciousness among the consumers to understand the problem and impact of food waste in the environment, and optimization such as designing dishes that optimally use the ingredients with focus on cost effective and diverse use of food. In the future, there might be technologies to collect food waste information in restaurants to analyze the root cause and seek waste management guidelines with better effectiveness.

**Keywords:** Surplus Food Management; Food Waste; Buffet Restaurant; Sustainability

**Received:** July 24, 2024 | **Revised:** December 2, 2024 | **Accepted:** December 26, 2024

---

\* Graduate Student, Contemporary Development and Development Practice (Contemporary Development and Developmental Evaluation) Puey Ungphakorn School of Development Studies, Thammasat University.

\*\* Thesis Advisor, Doctoral Degree, Puey Ungphakorn School of Development Studies, Thammasat University.

## Introduction

In modern society, food production has evolved beyond subsistence, playing an important role in satisfying the global demands. However, a huge amount of food becomes surplus, leading to considerable food waste. The Food and Agriculture Organization of the United Nations (FAO) defines food waste in the State of Food and Agriculture 2023 report as the decrease in the quantity or quality of food resulting from decisions and actions by retailers, food service providers, and consumers (FAO, 2023). Across the world, an estimated one-third of food produced, approximately 1,300 million tons, is discarded every year (FAO, 2011). Food waste is regarded as one of the most challenging issues in the world today with enormous environmental and socio-economic consequences (Banjongsiri, 2018). One of major sources of food waste is freestanding buffet restaurants and yet there was little investigation into such kind of restaurants (Wu & Teng, 2022). Thus, the study focuses on freestanding buffet restaurants because their operational model creates unique challenges compared to other types of restaurants, such as à la carte or fast food. In the Thai context, cultural factors like the emphasis on hospitality and the mindset of 'value for money,' where diners aim to maximise their expenditure, further exacerbate food waste (Kla-aim & Nelson, 2019; Jitpleecheep, 2021). These dynamics justify the study's focus on buffet restaurants in Thailand, offering insights into managing these challenges within this specific context.

Decreasing food waste in buffet restaurants has been argued to require a more expansive glance at systemic issues within the food industry and supply chain. Papagyropoulou et al. (2014), and Filimonau and Gherbin (2017) contend that these systemic issues are directly influenced by the actions of managers and staff at the operational level. Restaurant management decisions regarding procurement, portion sizes, and handling surplus food are important intervention points in the food waste hierarchy (Papagyropoulou et al., 2014). Hence, focusing on the perceptions and behaviors of these key actors is essential for addressing food waste at the restaurant level, even within the context of larger systemic challenges (Filimonau & Gherbin, 2017). Numerous studies have already examined consumer behavior in relation to food waste, such as the work by Itthiophakorn (2021), Papagyropoulou et al. (2019), and Setiawan and Puspitasari (2023), which highlight the importance of empowering consumers to manage food more efficiently. However, Wu and Teng (2022) stated that there was little investigation into buffet restaurants, especially in Asian countries.

Apprehending the reasons behind the large amount of food waste in buffet restaurants requires academic investigation beyond operational inefficiencies. The socio-cultural factors that shape behavior and the internal practices of restaurant staff play a crucial role in how food is managed. The complexity of these interactions calls for a more in-depth exploration of how actors within this system contribute to, engage with, and manage food waste. Furthermore, the buffet restaurants have a unique challenge that food wastage is a sensitive data for restaurants and disclosing such data might harm the restaurants' reputation, so they are naturally reluctant to share such data with academicians (Sakaguchi et al., 2018). Another challenge is that customer expectations are a significant factor to food oversupply and waste, and thus food waste reduction measures must be carefully tailored not to excessively harm the customer expectations (and subsequent business survivability).

In Thailand, food waste is a pressing issue. The Department of Pollution Control indicated that in 2017, Thai households generated 27.37 million tons of food waste, or 1.13 kilograms per person per day (Information Technology & Communication Centre, 2023). Among the contributors to food waste, buffet restaurants stand out due to their high volume

and service structure. The buffet model, characterized by overproduction and self-service, often leads to large amounts of food waste where uneaten food is discarded may not be properly disposed (Makro HoReCa Academy, 2020; Wu et al., 2021). In addition, Makmek (2023) stated that while the Thai food chain grew immensely due to popularity among the tourists, food waste was at 30% which was considered high compared to impoverished countries.

Thus, this study delves into the intricate social, cultural, and operational dynamics behind food waste in one of Thailand's buffet restaurant chains, especially on the operational dynamics within buffet restaurants, an area that has been comparatively underexplored and presents an opportunity for waste reduction. An interpretivist approach is employed to uncover how restaurant managers and staff perceive and engage with food waste. This approach contrasts with more positivist perspectives that focus on quantifiable data, as it prioritizes the insights gained from personal and organizational interpretations of waste management processes. By developing a thorough understanding of these dynamics, the study aims to propose guidelines for reducing food waste. These guidelines, aligned with the Food Waste Management Model and culturally adapted to the local context, can potentially reduce food waste in buffet restaurants, proposing hope for more sustainable consumption, while also able to retain the consumer satisfaction.

## Contexts and Perspectives

Cohen and Avieli (2004) defined a buffet as a meal service where guests pick food according to their own preference and consume their selected portion. Juvan et al. (2017) also noted that buffets are a very popular method of serving food due to their variety of dishes, which leads to higher guest satisfaction and reduced service staff costs. However, this came at the cost of high food waste. Kundamal (2022) stated that nearly half of the food at buffets is wasted, contributing to over 108 billion pounds of food wasted in the United States, translating to 130 billion meals, worth more than \$408 billion each year. Silvennoinen et al. (2015), in a study of 51 food service outlets in the Finnish food service sector, found that one-fifth (20%) of the food prepared was wasted due to buffet services and overproduction. This issue is compounded by overproduction and cooking necessities. The challenges in reducing food waste in buffet restaurants lie in the culture and expectations of customers, as well as difficulties in predicting demand and the perishability of ingredients.

According to the Food Waste Index Report 2021 published by the United Nations Environment Programme (UNEP), food services were a major contributor to food waste, accounting for 26% of the worldwide food waste or 244 million tons out of 931 million tons per annum (UNEP, 2021). According to the Makro HoReCa Academy (2020) and Wu et al. (2021), especially those with self-service options, generally generate more food waste compared to the traditional delivered-by-waiter method. While many buffet restaurants still struggle with high levels of food waste, some have begun adopting waste reduction strategies to address this challenge.

The operation of many buffet restaurants generates food waste at every stage, from receiving raw ingredients to trimming, cooking, and setting up the dishes. The increase in waste at self-service buffets primarily stems from the need to overprepare food to ensure a diverse and abundant selection throughout the dining service. Much of this overprepared food remains uneaten and is discarded. Additionally, the self-service setup encourages diners to take more food than they can eat to "maximize" their value for money, resulting in many leftovers, further contributing to food waste (Makro HoReCa Academy, 2020).

Buffet restaurants present unique challenges, particularly in terms of culture and customer expectations. Cultural norms and practices can influence dining behaviors as shown in Filimonau et al. (2020), Juvan et al. (2017), Li and Wang (2020), and Sirieix et al. (2017), which have examined how these differences manifest in food waste patterns. For example, tourists from non-Western countries tend to leave more food compared to Western ones. In many Asian cultures, ordering large amounts of food is often seen as a sign of generosity and wealth, leading to overordering and subsequent waste. For example, Filimonau et al. (2020) found through the interviews of senior managers in full-service restaurants that food waste in China is heavily influenced by mainstream Han Chinese culture, where families tend to order more food than they can eat. Li and Wang (2020) noted that Chinese cruise ship passengers left more food compared to their Western counterparts due to fear of missing out and a preference for Chinese dishes served in buffet restaurants on board. It was also observed that non-Western older passengers tended to scramble for food more than younger ones.

Conversely, Western tourists, especially in countries with strong environmental awareness, tend to be more conscious about food waste, partly due to long-standing campaigns promoting sustainability and responsible consumption (Juvan et al., 2017). However, within the Western world, Juvan et al. (2017) revealed that Russian guests produced more food waste compared to other Western nationalities, while Austrian guests produced the least, which could be attributed to the intense food waste awareness campaigns in Austria. Nevertheless, some Western European nations, particularly France and the Czech Republic, have cultural practices that encourage leaving leftovers, contributing to higher food waste in those countries (Sirieix et al., 2017).

In Thailand, Kattiyapornpong et al. (2023) found that only one out of five hotels allocated resources for food waste reduction efforts, as hotels feared that asking guests to reduce waste might negatively impact guest satisfaction and expectations. This reluctance to prioritize waste reduction reflects a broader challenge within the Thai hospitality industry, where sustainability goals often in conflict with the perceived need to ensure customer satisfaction. This gap in efforts becomes even more pronounced in buffet restaurants, which are known to produce large quantities of food waste.

Based on the literature review, it is observed that previous researchers have mainly focused on food waste in households and hospitality businesses, and many studies concentrated on how to reduce food waste in hotels (Itthiophakorn, 2021), à la carte restaurants (Filimonau et al., 2020; Juvan et al., 2017; Silvennoinen et al., 2015; Sirieix et al., 2017), catering services (Wu et al., 2021), coffee shops (Suksant & Jamieson, 2018), and cruises (Li & Wang, 2020; United Nations Secretary-General's Advisory Board on Zero Waste, 2024). Dhir et al. (2020) stated that literature examining food waste in the hospitality sector has covered quantification, waste composition, handling, doggy bags, consumer attitudes, demographic factors, governmental regulations, interventions, nudges, composting, and landfills. While there has been some effort in studying these sub-domains, most findings had limited generalizability, narrow focus, scale, and geographical scope.

Freestanding buffet restaurant chains, which are a common type of buffet restaurant in Thailand, are not widely studied due to several reasons. First, these restaurants often operate independently of larger commercial establishments, making them less accessible for data collection and research collaboration. Second, they operate with unique business models, which may not align with global research trends focused on hotel chains, malls, or other integrated hospitality services (Wu et al., 2023). Finally, their focus on standalone operations

may limit scalability and generalisability of findings, may made them less attractive for researchers aiming for broader industry insights. Aamir et al. (2018) found that many kitchens in Pakistan were unwilling to allow researcher to observe the practices.

Filimonau et al. (2019) noted that related research has not adequately addressed the managerial aspects of food waste mitigation, while Papargyropoulou et al. (2019) argued that the literature is disproportionately skewed toward developed nations. These limitations highlight the need for further exploration into freestanding buffet restaurant chains, particularly in the context of Thailand.

Wu et al. (2023) observed that previous researchers have mainly focused on food waste in households and hospitality businesses, and many studies have measured food waste in restaurants or catering services and concentrated on how to reduce food waste in hotels, à la carte restaurants, catering services, coffee shops, dining halls, and cruises. However, there has been little effort to study food waste reduction in buffet restaurants, despite the recognition of buffets as the biggest source of food waste due to large portions, menu choices, unpredictable demand, and customer and employee behaviors. Dhir et al. (2020) stated that literature examining food waste in the hospitality sector has covered quantification, waste composition, handling, doggy bags, consumer attitudes, demographic factors, governmental regulations, interventions, nudges, composting, and landfills. While there has been some effort in studying these sub-domains, most findings had limited generalizability, narrow focus, scale, and geographical scope. Filimonau et al. (2019) noted that related research did not cover the managerial aspect of food waste mitigation, and the large and complex structure of the food service sector impeded reliable estimation of food waste, and Papargyropoulou et al. (2019) argued that the literature was skewed toward developed nations.

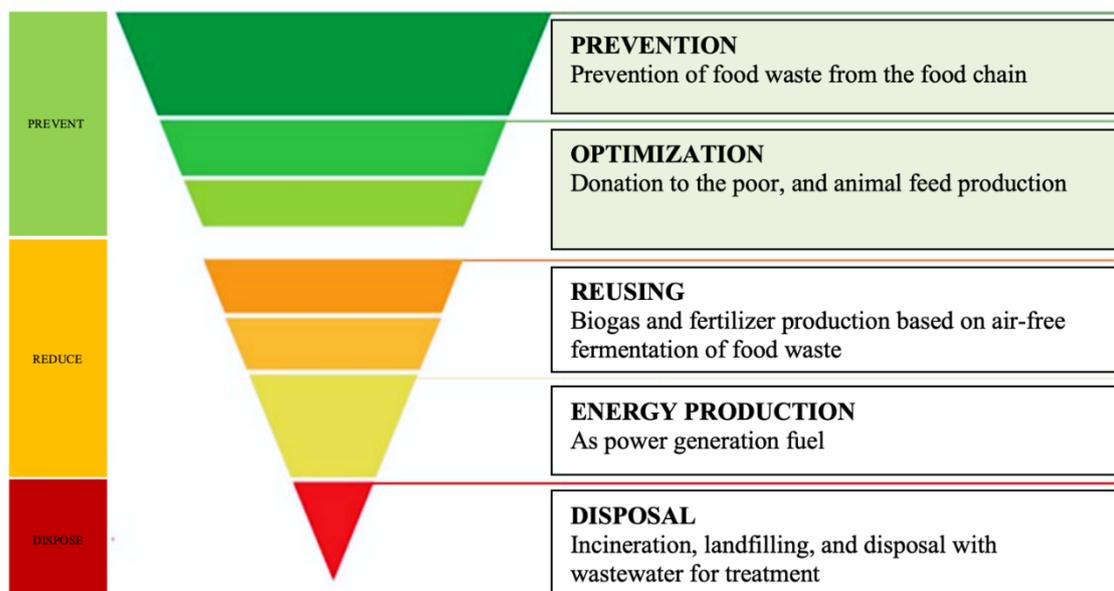
Regarding the definition of food waste itself, the Food and Agriculture Organization of the United Nations (FAO) defined food waste as the loss of food along the food supply chain, from harvesting to consumption. Intharatrakul and Phensupha (2020) stated that food loss covers raw ingredients before reaching consumers, while food waste refers to discarded food or raw materials after reaching consumers, such as a poor harvest resulting in aesthetically imperfect produce. National Geographic (2024) defined food waste as discarded food at the end of the food chain by retailers and consumers. Examples include unfinished meals, expired canned food, decorative fruits and vegetables, and spoiled food due to poor management by restaurants and convenience stores. Cicatiello et al. (2016) also defined food waste as food scraps, dried foods, food skins, expired canned food, and spoiled food due to poor management.

Food waste and food surplus, their existence leads to environmental issues. BIO Intelligence Services (2010) stated that one kilogram of food waste is equal to two kilograms of carbon dioxide emissions, affecting 2.9 tons of natural resources, and could contribute to the extinction of species and loss of biodiversity (Juvan et al., 2017). Srijuntrapun (2016) added that, aside from carbon dioxide, other greenhouse gases such as methane and nitrous oxide are also emitted. In certain food production processes, there is substantial water consumption, chemical use, and groundwater consumption, all of which contribute to inefficient resource consumption and result in waste.

If food waste is disposed of through open dumping, such dumps can become a source of germs and wastewater, which can contaminate nearby water sources.

As the food waste problem presents a significant challenge, the FAO and UNEP have called for increased attention towards food waste reduction and sustainable development,

especially Goal 12.3, which urges countries to halve food waste at all stages of the supply chain—from agricultural production and distribution to consumption—by 2030. The UN Environmental Programme (UNEP) introduced the food waste index, which measures food waste per person per day (in kilograms) as an indicator for the SDGs. UNEP also established five steps for food and drink waste prevention and reduction, as shown in Figure 1.



**Figure 1: The Five Steps of Food Supply Chain Management for Waste Reduction**

Source: FAO & UNEP. (n.d.). Referred in TDRI (2024). Report on food waste management in Thailand, Thailand Development Research Institute.

Regarding food waste reduction practices in restaurants, Read and Muth (2021) examined four approaches to food waste reduction in American restaurants: consumer education campaigns (CEC), spoilage prevention packaging (SPP), standardized date labeling (SDL), and waste tracking and analytics (WTA). They found that all four methods had similar cost-effectiveness. Silvennoinen et al. (2015) studied Finnish food services and found that improved management, guidance, and planning based on past experiences were potential solutions to the food waste problem. Reynolds et al. (2019) agreed, stating that measures such as changing plate sizes, introducing nutritional guidelines in schools, and conducting information campaigns significantly reduced food waste, particularly with plate size changes, which could reduce waste by up to 57%.

In Thailand, studies on food waste mitigation, such as the one conducted by the Thailand Development Research Institute (2019), proposed guidelines for surplus food management in the Thai context through government mandates and private sector campaigns. The TDRI suggested that members of hotel or retailer associations could form a “food conservation network,” similar to one established in the United States, to develop a management system for surplus food. Thurasakul and Rugmai (2022) studied the food waste management of restaurants in Ko Tao, Surat Thani Province, and found that many restaurants implemented measures such as the “first-in, first-out” principle regarding ingredients and reusing food scraps in new dishes. However, Itthiophakorn (2021) stated that buffet restaurants faced significant challenges due to customer expectations of value for money, which often led

to overproduction. Charlebois et al. (2015) found that reluctance to change suppliers is a significant factor in food waste reduction as a new supplier's reliability cannot be predicted, which might lead to a higher costs, outside pressures, such as seasonality which often require a business to change menus, thereby introducing new items that are often not coded into the computer system.

Given these unique challenges, management theories such as behavioral theories could be applied to reduce food waste on behalf of customers, while waste reduction by buffet restaurants could follow lean management principles to save costs. Behavioral theory, which was derived from classical conditioning developed by B.F. Skinner in the 1950s, posits that behavior can be modified through associations with certain stimuli, such as rewards or punishments.

Another applicable theory is Lean Management, which focuses on the reduction of unnecessary costs. Initially mentioned by Krafcik (1988) and later popularized by Toyota Motor Company, lean management emphasizes five principles: specifying value, identifying the value stream, creating flow, establishing pull, and pursuing perfection (Womack & Jones, 1997). Regarding the application of lean in restaurants, Gładysz et al. (2020) analyzed the applicability of lean management to reduce food waste in Poland and found that Lean was highly useful for such cases, however, the study also found that only seven papers directly tackle lean management in food services.

## Research Methodology

This study uses a qualitative research approach, using content analysis, case studies, documentary research, and in-depth interviews of the key informants. This study focuses on freestanding buffet restaurants, which operate independently of larger commercial establishments such as malls or hotels, as they present unique challenges in food waste management. Unlike chain restaurants within integrated hospitality settings, freestanding buffet restaurants often have limited access to centralised resources, standardised practices, and data-sharing networks. Their freestanding operations, combined with their reliance on overproduction and diverse menu offerings, make them a distinct and underexplored context for studying food waste issues. These factors highlight the need to understand their specific waste management practices and challenges. Qualitative methods were chosen for this study because they allow for a deeper understanding of the perceptions, behaviors, and operational challenges faced by restaurant managers and staff in managing food waste. Unlike quantitative approaches, which focus on numerical data, qualitative methods are more suited for exploring complex, context-specific issues, such as the interplay between cultural norms and operational practices in food waste management. This approach ensures rich, detailed insights that are crucial for addressing the unique challenges faced by freestanding buffet restaurant chains.

A restaurant chain was selected for this study as a unit of analysis due to the owner's commitment in becoming more sustainable and generosity to allow the researchers to use it as a case. Data collection showed that one customer would take 1.2 kilograms of food per person, and 1% of the amount would go to waste or 12 grams. The average food waste from each Buffet restaurant branch is 100 kilograms per branch per day, with the average monthly waste being 180,000 kilograms (as of April 2024). Buffet restaurant has 60 branches and thus has 2,160,000 kilograms or 2,160 tons of food lost and wasted (Buffet Restaurant, 2024). Therefore, the case is very suitable for examination of the current situation, major problems, and obstacles in waste management in Buffet restaurant, and proposing a guideline for surplus food management to reduce waste.

The studied restaurant chain is a famous buffet-style restaurant chain with over 60 branches across Thailand. The chain must manage over 2,160,000 kilograms (2,160 tons) of food waste. However, the chain's business model includes considering the benefits of all stakeholders in the supply chain, not just business profits. This approach also takes into account sociocultural and environmental aspects, optimizing food allocation, and complying with the United Nations' Sustainable Development Goals (SDGs). Particularly, Goal 12, which covers responsible consumption and production, and Target 12.3, which aims to halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains by 2030.

Other works that used interviews in a similar vein to this study included Filimonau et al. (2020) which employed a semi-structured interview approach due to its flexibility, covering the managerial knowledge about food waste and the need for mitigation, main drivers of food wastage, and current and future mitigation approaches with the 22 key informants being top managers in full-service restaurants in Shanghai. The sample size was determined by the saturation effect: interviews would end if no new theme could be extracted (normally it would take 10-30 interviews according to Marshall et al. (2013)). The interviewed lasted around 40 minutes on average and transcribed verbatim. Another work was Li and Wang (2020), which used observation, casual conversation, and in-depth semi-structured interviews but with convenience sampling, with 73 passengers and three Chinese tour leaders were interviewed. The interview lasted from 16 to 66 minutes, and transcribed verbatim in Mandarin, and later translated into English. Convenience sampling to get the key informants with 45 French and 38 Czech persons being contacted, and the data collection would be stopped upon saturation in a similar manner to Filimonau et al. (2020). Each interview session lasted between 45 and 60 minutes, and it was recorded and transcribed.

The authors set up the research method according to literature review so that for in-depth interview, each interview session would last 45 minutes, and the key informants are six managers and employees of a buffet restaurant involved with the food waste management process, selected by purposive sampling, carefully selected to provide diverse perspectives on food waste management in the buffet industry. These participants included two senior managers responsible for overseeing operational strategies, three kitchen staff with direct involvement in food preparation and waste handling, and one front-of-house supervisor with insight into customer behavior. The participants had an average of eight years of work experience in the industry, ensuring that their qualitative opinions were relevant and well-informed for explaining the nuances of food waste management. The sampling process started from the author approaching the owner of the restaurant chain, who provided a list of candidates for the in-depth interview. Table 1 shows the inclusion and exclusion criteria of the managers and employees.

According to Table 1, the inclusion criteria for the managers are: holding a top management position in the buffet restaurant chain, being a policy maker for food waste management in the buffet restaurant chain and willing and having time for the interview. The exclusion criteria are not being available for the interview and not attending the interview session. On the other hand, the inclusion criteria for the employees are: Being an employee of the buffet restaurant chain involved in operations, being responsible for food waste management in the buffet restaurant chain, and willing and having time for the interview. The exclusion criteria for the employees are not being available for the interview.

**Table 1 Inclusion and Exclusion Criteria of the Key Informants:**

<b>Participants</b>	<b>Inclusion Criteria</b>	<b>Exclusion Criteria</b>
Managers	<ol style="list-style-type: none"> <li>1. Holding a top management position in the buffet restaurant chain.</li> <li>2. Being a policy maker for food waste management in the buffet restaurant chain.</li> <li>3. Willing and having time for the interview.</li> </ol>	<ol style="list-style-type: none"> <li>1. Not being available for the interview.</li> <li>2. Not attending the interview session.</li> </ol>
Employees	<ol style="list-style-type: none"> <li>1. Being an employee of the buffet restaurant chain involved in operations.</li> <li>2. Being responsible for food waste management in the buffet restaurant chain.</li> <li>3. Willing and having time for the interview.</li> </ol>	<ol style="list-style-type: none"> <li>1. Not being available for the interview.</li> </ol>

Regarding research tools, this study uses a qualitative approach using semi-structured, in-depth interviews. The interview form consisted of 18 semi-open / semi-close-ended questions to allow the respondent to provide comments or answers beyond the author's estimation, covering five aspects:

- 1) Principles and concepts about surplus food management to reduce waste.
- 2) Process and type of surplus food management to reduce waste.
- 3) Problems and obstacles in surplus food management to reduce waste.
- 4) Management guideline for surplus food management to reduce waste.
- 5) Additional suggestions.

After the interview form was designed based on the literature review, the author requested the advisor to verify the form, and then the content was further improved to suit the research purposes and then used on the key informants.

Regarding data quality assurance, the authors used triangulation to verify the answers obtained from the in-depth interview of the key informants.

Data analysis was done as follows:

- 1) The authors verified the integrity of the data.
- 2) The authors analyzed and separated each issue according to the framework. The recorded interview was transcribed word by word and then repeatedly read to analyze the data. Typological analysis was used to categorize the data according to the major themes of the interview.
- 3) The result was then presented using a descriptive method according to the research objectives.

## **Research Findings**

According to an in-depth interview on surplus food management aimed at reducing waste in a prominent buffet restaurant chain, with six key informants (managers and employees of the restaurant chain) between January and April 2024. Key informant #1 is the owner of the buffet restaurant chain with 6 years of experience. Key informant #2 is the chief operating officer of the buffet restaurant chain with 5 years of experience. Key informants #3, #4, #5 and #6 are area managers (in charge of 10 branches) of the buffet restaurant chain with 4 years of

experience. The situation and process of surplus food and waste management in this restaurant chain can be elucidated as follows:

The restaurant chain at the time of interview had 60 branches, opened from 11AM to 5AM. Food waste in each branch of the buffet restaurant chain was 100 kilograms per branch per day, or 3,000 kilograms per month, and as of April 2024, the chain currently had 60 branches, and thus the daily food waste was 6,000 kilograms (six tons) a day, or 180 tons a month, or 2,160 tons a year. However, the key informants stated that the restaurant chain has been improving the food waste management.

*“One of the important goals of the restaurant is we want to help reduce food waste and loss in the business, so that we can help with the environmental problems and global warming. We are trying to manage the food waste through various activities” (Key informant #1)*

*“There is more food diversity, but optimization is so poor that we have a lot of food waste. We want our customers to get the most for their money, so we have various social and environmental activities such as the Zero Food Waste concept” (Key informant #2)*

*“The restaurant’s activities will concur with the SDGs, showing social and environmental responsibilities, and our attempt to succeed at them.” (Key informant #5).*

The key informants stated that the general food management in the studied buffet restaurant chain followed the prevention and optimization parts of the UN’s food waste hierarchy:

Regarding prevention, the restaurant has implemented various methods, such as fining the customers who overorder their food and lecturing programs about leftover food to create customer awareness about food waste reduction. Aside from the customer-generated waste, the kitchen waste was prevented through planning for the estimation and control of kitchen scraps, along with accurate calculation of supply needs.

Regarding optimization, the buffet restaurant chain processed edible surplus food, or trimmed-out parts into new dishes. For example, pork scraps from slicing are sent back to the central kitchen to be used in other dishes such as pork in seaweed wrap and bamboo pork. Trimmed vegetables that were edible but not sufficiently good-looking for serving was used in the soup to increase flavor. Servings were also reduced in size, for example, sweet corns that had usually been served in two per tray were reduced to one per tray. Lastly, the buffet restaurant chain used some of the surplus food in the boxed meal project with the goal to reduce food waste and help the environment.

*“We focus on encouragement rather than punishment. We make content on our Facebook page, and we make posters. We launch the Zero Food Waste project in which the customers can collect points if they can finish up their meals, and exchange for prizes” (Key informant #1)*

*“There are media and lecturing about food waste, along with articles we put on the Facebook page, because we want everyone to reduce food waste and become more conscious about the food waste problem” (Key informant #2)*

*“We have posters in the restaurant and launch the Zero Food Waste project in which the customers can collect points if they can finish up their meals, and exchange for prizes” (Key informant #3)*

*“We lecture them first, telling them about the problem, and encouraging them to cooperate. We do have punitive measures too. If the customers leave too much leftover, we fine them.” (Key informant #5)*

*“We tried adjusting the serving portion to prevent food waste, such as the corn. We used to have two pieces per serving, and we found that there were too many scraps. After we reduced that to one piece per serving, it helped with the food waste problem, and the customers can simply order more if they want.” (Key informant #6)*

Still, the problems in both prevention and optimization parts were as follows:

Regarding prevention, the problems and obstacles in surplus food management to reduce waste include overestimation and subsequent overordering by employees, as well as a lack of understanding among both kitchen and forward staff.

Regarding optimization, the problems and obstacles in surplus food management to reduce waste include employee awareness and adherence to waste management practices. Issues such as non-compliant trimming result in more discarded scraps. Additionally, employees are sometimes required to perform tasks beyond their normal duties, such as weighing discarded food, which can lead to negligence and improper waste separation, causing significant inefficiencies.

This multifaceted approach serves as a valuable model for other businesses seeking to reduce food waste and optimize resource use.

## **Discussion**

The studied restaurant chain had an annual food waste of 2,160 tons, which was considerable as the equivalent amount of rice could be used to feed 21.6 million people in a day (at 100 grams per man per meal). 2,160 tons could be translated into either enough meat for 8.64 million meals for a family of four, 10.8 million apples, 4.32 million corn cobs, or 5.4 million food cans.

An in-depth interview on surplus food management aimed at reducing waste in a prominent buffet restaurant chain revealed that the processes and strategies employed align closely with the UNFAO's concepts of prevention and optimization. This study offers a more profound comprehension of food waste management in a Thai buffet restaurant chain by examining the perceptions and actions of managers and employees involved in surplus food handling. Thus, it could somewhat fit into the theory of lean management, as the lean management emphasizes five principles: specifying value, identifying the value stream, creating flow, establishing pull, and pursuing perfection. In this case, the value was the reduced cost of food waste, the value stream was the food preparation process, the pull was the optimization process, and pursuing perfection was constant data collection to identify the high- and low-demand hours and appropriate raw ingredient preparation. The restaurant chain applied the behavioral theory by fining the customers who overorder their food and rewarding them by giving points which can be exchanged for prizes.

The reviews also showed that food waste is not merely a material issue but a reflection of cultural, social, and organizational dynamics, all of which could not be overlooked. As seen in the study that some employees viewed the task of weighing discarded food or trimming standards as another, secondary burden to their core responsibilities, this could be interpreted that those employees also struggled under their current workload and constraints, and thus food

waste management practices should go beyond mere technical fixes and logistical strategies into these sociocultural and organizational dynamics.

When compared to Filimonau et al. (2020), this work found that efforts to please the customers also drove food wastage on the supply side, but “cooking necessities” in Filimonau’s work had an ambiguous meaning despite receiving the highest number of mentions among the supply-side factors, although it could possibly mean excessive trimming to improve the looks of the food.

The situation and process of surplus food and waste management in this restaurant chain can be elucidated through several key aspects.

Prevention of surplus food management to reduce waste emphasizes addressing overestimation and overordering of raw ingredients. This approach aligns with the FAO and UNEP recommendations on preventing and reducing food and drink waste in businesses and households, as referenced by the Thai Development and Research Institute (TDRI) (2024). It suggests that preventing leftover or surplus food or preventing loss by calculating supply appropriately for industrial and household needs, can minimize the discarded amount. Private organizations might implement an ordering system that fits the demand to reduce waste, coupled with rigorous training for employees to improve trimming efficiency and reduce waste. Training employees to participate in waste reduction and prevention, as well as raising customer awareness about the environmental impact of food waste, is crucial. This concurs with Intharatrakul and Phensupha (2020), who found that food waste management is challenging due to the service industry's need to meet consumer demands for food quality. Ruang-iem et al. (2019) also highlighted the importance of building consumer awareness about minimizing food discarding and promoting an "Eat-it-All" attitude through special activities.

Optimization of surplus food management involves designing menus to optimize the use of raw ingredients, focusing on cost-effective and diverse utilization. For example, vegetables and fruits with minor bruises or holes that do not affect quality but only appearance could be used for soups or salads instead of being discarded. Similarly, meat scraps could be repurposed into other dishes. Effective waste management includes separating food waste for sale or donation to farmers or other individuals. Used cooking oil can also be separated and sold to potential buyers. All partners involved in handling such scraps are required to have certificates to ensure they do not simply discard the materials. The management of kitchen waste involves dealing with excess yet edible food resulting from the trimming of meat, vegetables, and other ingredients. These trimmed parts, while high-quality and edible, do not meet the restaurant's aesthetic standards. The current surplus food management procedure involves repurposing this surplus food into dishes that do not necessitate a pristine appearance, thereby ensuring that edible food is not wasted. To address the customer food overordering problem, the restaurant has instituted measures such as penalizing customers for excessive leftovers. This approach encourages patrons to order more responsibly, thus reducing the quantity of food waste generated. Moreover, the restaurant engages in extensive media campaigns to address the issue of food waste. These campaigns include both offline media, such as posters displayed within the restaurant, and online media platforms, aimed at raising awareness among customers about the food waste problem and promoting more responsible consumption habits. In addition, servings were reduced in size which was proved to be effective according to Chang et al. (2022), Cicatiello et al. (2016), and Li and Wang (2020).

For future sustainable consumption, it is recommended to apply technologies for statistical data collection and database building to identify root causes and develop new

solutions. This approach aligns with Thepsorn (2022) concept of recording food loss or overpreparation and finding solutions for such losses, such as implementing an efficient production system.

The restaurant chain's commitment to Corporate Social Responsibility (CSR) is evident through its comprehensive strategies to manage surplus food and reduce waste. By reducing food waste, the company helps to decrease the environmental burden associated with food production and disposal, supporting national sustainability targets and environmental conservation efforts. This study showed that the studied restaurant chain was highly conscious about its own public image. These comprehensive strategies and challenges highlight the restaurant chain's commitment to sustainable practices in food management.

This multifaceted approach serves as a valuable model for other businesses seeking to reduce food waste and optimize resource use. The benefits extend beyond the company, aiding national efforts to improve environmental sustainability and resource efficiency, thereby contributing to the overall well-being of the country. This concurs with the United Nations Sustainable Development Goals (SDGs), especially the 12.3, which urges countries to halve food waste at all stages of the supply chain—from agricultural production and distribution to consumption—by 2030. Furthermore, the approach used by the buffet restaurant chain can be applied and refined in other restaurants to further reduce food waste.

## **Suggestion**

In this study, the author used the qualitative approach with a focus on in-depth interviews and observation of the key informants who were managers of buffet restaurants without covering the consumers. Future studies should include a quantitative approach, studying the consumers of the restaurant, and examining their satisfaction with the waste management guideline being employed by the studied chain restaurants, and then describe the result to be more comprehensive.

Future studies should include other issues aside from the authors' focus on surplus food management to reduce waste in the buffet restaurant chain. However, other issues such as the kitchen process, cooking knowledge, or spatial context, could bring different perspectives for the more effective guidelines for surplus food management to reduce waste.

This study limited the scope to 60 Bangkok-based freestanding branches (as of April 2024) with some in other provinces such as Chon Buri, Suphan Buri, Nakhon Ratchasima, and Chiang Mai. There is buffet restaurant in shopping malls and petrol stations aside from freestanding restaurants, thus food waste management tends to be different depending on the policy of the premise owners, which presents a significant limitation. Thus, future studies should examine waste management of other branches and compare them to tailor the surplus food management guideline to the locale.

## **Conclusion**

Reducing food waste in buffet restaurants has broader social impacts that extend beyond the hospitality sector. This study highlights the potential for educating consumers about sustainable consumption practices, fostering greater awareness of the environmental and social consequences of food waste. By addressing these issues, the findings contribute to reduction of the carbon footprint associated with food production and disposal, aligning with the United Nations Sustainable Development Goals, particularly SDG 12: Responsible Consumption and Production. Furthermore, the study offers actionable insights for developing community-level

interventions, such as partnerships between restaurants and local organisations to redistribute surplus food, which can simultaneously tackle food insecurity and waste. These broader impacts underline the study's social relevance and its potential to drive real-world change.

Regarding the current surplus food management to reduce waste in the buffet restaurant chain, efforts include preventing losses by encouraging customers to reduce waste under the concept of “Full of No Food Waste” for the benefit of society and the environment. Additionally, optimisation is achieved through re-cooking edible surplus food for sale as boxed meals. Problems and obstacles in surplus food management include overestimation and overordering by employees, a lack of understanding on their part, and insufficient employee consciousness towards waste management, particularly in optimisation.

The prevention guidelines in place focus on improving estimation processes, reducing overordering, increasing employee training, and enhancing the frequency of lectures to encourage active participation in waste reduction and prevention. Customer consciousness is also targeted to raise awareness about the environmental impacts of food waste. The optimisation guidelines include designing menus to maximise the use of raw ingredients, with attention to cost-effective and diverse utilisation. For future sustainable consumption, applying technologies for statistical data collection and database building could be instrumental in identifying root causes and developing innovative solutions.

## References

- Aamir, M., Ahmad, H., Javaid, Q., & Hasan, S. M. (2018). Waste Not, Want Not: A case study on food waste in restaurants of Lahore, Pakistan. *Journal of Food Products Marketing*, 24(5), 591–610.
- Banjongsiri, K. (2018). *Guidelines for food waste management*. *Sau Journal of Science & Technology*, 4(1), 43–53. <https://ph01.tci-thaijo.org/index.php/saujournalst/article/view/171869>
- Bio Intelligence Service. (2010). *Preparatory study on food waste across EU 27*. [http://ec.europa.eu/environment/eussd/pdf/bio\\_foodwaste\\_report.pdf](http://ec.europa.eu/environment/eussd/pdf/bio_foodwaste_report.pdf)
- Buffet Restaurant. (2024). *Buffet restaurant facebook page*. <https://www.facebook.com/sukitee.noithailand>.
- Chaiyasain, C. (2021). Food waste management in a hotel kitchen for effective handling of the raw materials and being more environmentally friendly. *Hatyai Academic Journal*, 19(2), 371-387.
- Chang, Y. Y. C., Lin, J. H., & Hsiao, C. H. (2022). Examining effective means to reduce food waste behaviour in buffet restaurants. *International Journal of Gastronomy and Food Science*, 29, 100554.
- Charlebois, S., Creedy, A., & von Massow, M. (2015). “Back of house” – focused study on food waste in fine dining: The case of Delish restaurants. *International Journal of Culture, Tourism and Hospitality Research*, 9(3), 278–291. <https://doi.org/10.1108/ijcthr-12-2014-0100>
- Cicatiello, C., Franco, S., Pancino, B., & Blasi, E. (2016). The value of food waste: An exploratory study on retailing. *Journal of Retailing and Consumer Services*, 30, 96-104.
- Cohen, E., & Avieli, N. (2004). Food in tourism: Attraction and impediment. *Annals of Tourism Research*, 31(4), 755–778. <https://doi.org/10.1016/j.annals.2004.02.003>

- Dhir, A., Talwar, S., Kaur, P., & Malibari, A. (2020). Food waste in hospitality and food services: A systematic literature review and framework development approach. *Journal of Cleaner Production*, 270, 122861.
- FAO. (2011). *Global food losses and food waste: Extent, causes and prevention*. Rome. <https://www.fao.org/4/mb060e/mb060e00.htm>
- FAO. (2023). *The state of food and agriculture 2023. Revealing the true cost of food to transform agrifood systems*. Rome. <https://doi.org/10.4060/cc7724en>
- Filimonau, V., & Gherbin, A. (2017). An exploratory study of food waste management practices in the UK grocery retail sector. *Journal of Cleaner Production*, 167, 1184-1194.
- Filimonau, V., Krivcova, M., & Pettit, F. (2019). An exploratory study of managerial approaches to food waste mitigation in coffee shops. *International Journal of Hospitality Management*, 76, 48-57.
- Filimonau, V., Zhang, H., & Wang, L. E. (2020). Food waste management in Shanghai full-service restaurants: A senior managers' perspective. *Journal of Cleaner Production*, 258, 120975.
- Gładysz, B., Buczacki, A., & Haskins, C. (2020). Lean management approach to reduce waste in Horeca food services. *Resources*, 9(12), 144. <https://doi.org/10.3390/resources9120144>
- Information Technology & Communication Centre. (2023). *Community waste disposal area report of 2022*. <https://www.pcd.go.th/publication/29509>. (In Thai)
- Intharatrakul, K., & Phensupha N. (2020). Food loss and food waste in Thailand and solution. *Naresuan Agriculture Journal*, 17(2), 1-15.
- Itthiophakorn, D. (2021). Tourist's perception of buffet's food waste in hotels in Bangkok. *Dusit Thani College Journal*, 15, 83-99.
- Jitpleecheep, P. (2021, February 15). Buffet tactic boosting sales. *Bangkok Post*. <https://www.bangkokpost.com/business/general/2068243/buffet-tactic-boosting-sales#:~:text=%22Buffets%20have%20become%20popular%20with%20Thais%20over,sales%20by%2015%2D20%20this%20year.%22%20If%20buffets>
- Juvan, E., Omerzel, D. G., & Maravić, M. U. (2017, May). Tourist behaviour: An overview of models to date. In *Management International Conference* (pp. 24-27). Italy: Monastier di Treviso.
- Juvan, E., Grün, B., & Dolnicar, S. (2017). Biting off more than they can chew: Food waste at hotel breakfast buffets. *Journal of Travel Research*, 57(2), 232-242. <https://doi.org/10.1177/0047287516688321>
- Kattiyapornpong, U., Ditta-Apichai, M., & Chuntamara, C. (2023). Sustainable food waste management practices: Perspectives from five-star hotels in Thailand. *Sustainability*, 15(13), 10213.
- Kla-aim, C., & Nelson, J. E. (2019). *Influence of buffet restaurant characteristics on customer attraction, and retention in the emergence of healthy trend within Bangkok and provincial area* [Doctoral dissertation]. Thammasat University.
- Krafcik, J. F. (1988). Triumph of the lean production system. *Sloan Management Review*, 30(1), 41-52.
- Kundamal, R. (2022). *The unsustainability of buffet food waste*. Insights. <https://insights.grcglobalgroup.com/the-unsustainability-of-buffet-food-waste/>
- Li, N., & Wang, J. (2020). Food waste of Chinese cruise passengers. *Journal of Sustainable Tourism*, 28(11), 1825-1840.
- Makmek, K. (2023). *Potential Thai "Food Waste Crisis": Buffet as a culprit, caution against oversupply and overpurchase*. WorkPoint Today. <https://workpointtoday.com/thailand-food-waste/>

- Makro HoReCa Academy (2020). *Food waste and buffet restaurant*. <https://makrohoreca.academy.com/th/articles/food-waste-with-buffet-restaurants-03>
- Marshall, B., Cardon, P., Poddar, A., & Fontenot, R. (2013). Does sample size matter in qualitative research?: A review of qualitative interviews in IS research. *Journal of Computer Information Systems*, 54(1), 11-22.
- National Geographic. (2024). *Food waste*. <https://education.nationalgeographic.org/resource/food-waste/>
- Papargyropoulou, E., Lozano, R., Steinberger, J. K., Wright, N., & bin Ujang, Z. (2014). The food waste hierarchy as a framework for the management of food surplus and food waste. *Journal of Cleaner Production*, 76, 106-115.
- Papargyropoulou, E., Steinberger, J. K., Wright, N., Lozano, R., Padfield, R., & Ujang, Z. (2019). Patterns and causes of food waste in the hospitality and food service sector: Food waste prevention insights from Malaysia. *Sustainability*, 11(21), 6016.
- Read, Q. D., & Muth, M. K. (2021). Cost-effectiveness of four food waste interventions: Is food waste reduction a “win-win?”. *Resources, Conservation and Recycling*, 168, 105448.
- Reynolds, C., Goucher, L., Quested, T., Bromley, S., Gillick, S., Wells, V. K., ... & Jackson, P. (2019). Consumption-stage food waste reduction interventions—What works and how to design better interventions. *Food Policy*, 83, 7-27.
- Ruang-iem, G., Thongnoppakun, O., & Kampangseree, A. (2019). The food waste management guidelines for sustainability from special events in hospitality industry. *Dusit Thani College Journal*, 13(3), 546–557. <https://so01.tci-thaijo.org/index.php/journaldtc/article/view/241137>
- Sakaguchi, L., Pak, N., & Potts, M. D. (2018). Tackling the issue of food waste in restaurants: Options for measurement method, reduction and behavioral change. *Journal of Cleaner Production*, 180, 430-436.
- Setiawan, B., & Puspitasari, R. (2023). Consumer intentions to reduce food waste in all-you-can-eat restaurants based on personal norm activation. *Heliyon*, 9(2).
- Silvennoinen, K., Heikkilä, L., Katajajuuri, J. M., & Reinikainen, A. (2015). Food waste volume and origin: Case studies in the Finnish food service sector. *Waste Management*, 46, 140-145.
- Sirieix, L., Lála, J., & Kocmanová, K. (2017). Understanding the antecedents of consumers' attitudes towards doggy bags in restaurants: Concern about food waste, culture, norms and emotions. *Journal of Retailing and Consumer Services*, 34, 153-158.
- Srijuntrapun, P. (2016). Integrated food waste reduction in households. *Silpakorn University e-Journal (Thai)*, 36(3), 19-36.
- Suksant, M. S., & Jamieson, I. A. (2018). *Investigation of the effectiveness of different methods to increase the use of reusable cups for purchased beverages at a university campus in Thailand* [Master of Science Design Business and Technology Management Thesis]. Thammasat University.
- Thepsorn, R. (2022). *Worrisome! Thai food waste spiking from overbuying and Overselling*, TU Science Faculty Proposes Four Guidelines. <https://mgronline.com/science/detail/966000062262>.
- Thurasakul, M., & Rugmai, S. (2022). Food waste management of restaurant business in Koh Tao Surat Thani. *Dusit Thani College Journal*, 16(1), 50-63.
- Thailand Development Research Institute. (2019). *Final report on the study of Thailand-appropriate surplus food management to reduce waste*. Bangkok: ThaiHealth Promotion Foundation (TPF).

- Turasakun, M., & Rugmai, S. (2022). Food Waste Management of Restaurant Business in Koh Tao Surat Thani. *Dusit Thani College Journal*, 16(1), 50–63. <https://so01.tci-thaijo.org/index.php/journaldtc/article/view/259767>
- UNEP. (2021). *UNEP Food Waste Index Report 2021*. <https://www.unep.org/resources/report/unep-food-waste-index-report-2021>
- Womack, J. P., & Jones, D. T. (1997). Lean thinking—banish waste and create wealth in your corporation. *Journal of the Operational Research Society*, 48(11), 1148-1148.
- Wu, C. E., & Teng, C. C. (2022). Reducing food waste in buffet restaurants: A corporate management approach. *Foods (Basel, Switzerland)*, 12(1), 162. <https://doi.org/10.3390/foods12010162>
- Wu, Y., Kurisu, K., Phuphisith, S., & Fukushi, K. (2023). Household food-waste prevention behaviors in Beijing, Shanghai, and Wuhan in China compared with those in Tokyo and Bangkok. *Resources, Conservation and Recycling*, 192, 106901.
- Wu, Z., Mohammed, A., & Harris, I. (2021). Food waste management in the catering industry: Enablers and interrelationships. *Industrial Marketing Management*, 94, 1-18.

# Appendix

## Interview Form

### Study of Surplus Food Management to Reduce Food Waste: A Case Study of The Buffet Restaurant Chain in Thailand

**Explanation:** This interview form is made for the Master of Arts, (Contemporary Development and Development Practice) Puey Ungphakorn School of Development Studies, Thammasat University, with the goal to examine the surplus food management to reduce food waste in buffet restaurant chain.

Therefore, the author would like to ask the respondent to provide accurate information as much as possible. Your data shall be kept confidential and used only for educational purposes. I would like to thank you highly in advance for your time in answering this interview.

Details of the Interview:

1. This study aims to examine the surplus food management to reduce food waste in buffet restaurant chain based on the framework developed by the FAO and UNEP (UNEP, 2014) that focused on prevention and optimization of food allocation.
2. This interview form is separated into five parts as follows:
  - a. Principles and concepts on surplus food management to reduce food waste.
  - b. Current process and pattern of surplus food management to reduce food waste.
  - c. Problems and obstacles in waste management.
  - d. Future guideline for surplus food management to reduce food waste in buffet restaurant chain.
  - e. Comments and additional suggestions.

General information of the key informants

Position/Department \_\_\_\_\_ Branch \_\_\_\_\_

1. Principles and concepts on surplus food management to reduce food waste.
  - 1.1. Does buffet restaurant have any waste management principle or goal? How?

---



---



---

- 1.2. Current process and pattern of surplus food management to reduce food waste. Give examples of various projects contributing to buffet restaurant's waste management
  - Process and pattern of building management
    - 1.2.1. Process and pattern of general food management in the shop, regarding prevention and optimization

*(Does buffet restaurant prevent waste formation? Please explain the optimization process such as procurement and storage planning. In addition, please explain the general details about the prevention and optimization that can give a rough picture, not too detailed)*

---

---

---

1.2.2. Buffet restaurant's major waste management projects.  
*(name and purpose of the current waste management projects/operation time and other general details of said projects)*

---

---

---

1.3. What the pattern and step for the projects are like. *(please explain the steps of the project)*

---

---

---

1.4. Project stakeholders

How do the employees or staff participate in the management, and whether the third party and state agencies participate in the process and how?

---

---

---

1.5. Project Result

1.5.1. Does the project reduce waste and how?

*(For example, the pre-project waste amount was \_\_\_and the post-project waste amount was\_\_\_)*

Or explain whether the project can reduce waste and how.

---

---

---

1.5.2. Are you satisfied with the project after a while? How?

---

---

---

1.5.3. Beneficiaries from this project.

*(Such as how buffet restaurant chain, employees, and consumers benefit from the project)*

---

---

---

1.5.4. Will Buffet restaurant continue this project? How?

---

---

---

2. Problems, obstacles and guideline for surplus food management to reduce waste

2.1. What are the problems and obstacles in the waste food management project?

---

---

---

2.2. According to the problems in 3.1, are there any solutions? How?

---

---

---

3. Future guideline for surplus food management to reduce food waste in buffet restaurant chain

---

---

---

4. Comments and additional suggestions

---

---

---