

HOSPITALITY FOOD WASTE MANAGEMENT: EVIDENCE FROM LUXURY HOTELS IN VIETNAM

Tran Nien Tuan*, Tran Ho Thuong Thuong, Tran Thi Khanh Ly

The University of Danang - University of Economics, Vietnam

*Corresponding author: trannientuan@due.edu.vn

(Received: February 26, 2024; Revised: May 28, 2024; Accepted: May 30, 2024)

Abstract - Despite its importance and urgency, the problem of hospitality food waste (FW) has not received much attention from academics. This paper has contributed to the field of FW by examining the FW practices employed by luxury hotels in Vietnam. 25 semi-structured interviews have been conducted with employees working in hotels in Danang and Quangnam. A qualitative thematic coding analysis was employed to identify themes. The results show that buffet leftovers were the most wasteful type, compared to preparation and plate waste. The study indicates that the prioritization of surplus food reuse and redistribution, particularly the sale of FW for animal feed, takes precedence over prevention practices. Customers were found to create more challenges than hotel employees regarding barriers to more effectively managing the FW issue. The study provides practical implications for policymakers to formulate and implement strategies aimed at enhancing the effectiveness and sustainability of FW management practices.

Key words - Barriers; Food Waste; Food Waste Management Practices; Hospitality Sector; Vietnam

1. Introduction

Food waste (FW) is a major global issue since it has an impact on financial, environmental, and social issues [1]. Although the adverse effects of FW have been recognized, the significant volumes of FW generated have been increasing over time [2]. Therefore, governments, academics, and practitioners have realized the urgency of addressing the issue of FW as part of the UN's 2030 Sustainable Development Goals (SDGs). The UN has included the reduction of FW in its SDGs, specifically through SDG target 12.3, which aims to cut global FW in half at the consumption stage and reduce its prevalence in food production and supply chains by 2030. Notably, the hospitality industry has been criticized for contributing significantly to overall FW [3]. In Europe, the hospitality industry accounts for 12% of the total FW generation, ranking third after households and food manufacturing and processing businesses [4]. In the absence of appropriate preventative and mitigation strategies, future hospitality organizations are anticipated to produce significant amounts of FW, impeding their efforts to achieve sustainability [5].

Despite its importance and urgency, the topic of FW in the hospitality sector has received little academic attention, particularly in terms of empirical evidence from underdeveloped countries [6]. This study discover significant research gaps that require immediate attention. Firstly, while the topic of FW is predominantly addressed in the household, agriculture, and grocery industries, the hospitality sector has been largely overlooked in the investigation [6]. Secondly, there is limited empirical

research including available numbers on FW in emerging and transitional countries [6]. This is a significant issue given the expanding local middle class, which raises the frequency of out-of-home food consumption and waste [7]. Finally, previous research has mostly sought to measure and characterize the FW streams in hospitality organizations [8], while the reasons for FW generation and mitigation strategies have received less attention [6]. Indeed, it is critical to discover successful FW management practices from a variety of hospitality sub-sectors and regions.

By understanding these literature gaps, the aim of this study is to gain a comprehensive understanding of the FW management practices employed by luxury hotels in a developing country. Particularly, the study will focus on four- and five-star hotels and resorts in Danang and Quangnam, Vietnam. To accomplish this aim, the study has outlined the following research objectives: (1) to discover the types and causes of FW in hotel restaurants; (2) to examine FW management approaches adopted in Vietnamese luxury hotels; (3) to identify the primary barriers that hinder FW management in luxury hotels in Vietnam. The findings also have practical implications for policymakers to design effective measures for future mitigation, ultimately helping to achieve the UN's SDG target 12.3.

2. Literature Review

2.1. Understanding Food Waste

FW has been a significant global issue and has been defined in diverse ways by scholars. Presently, a universally accepted definition does not exist [6]. Food loss and FW are two key terms frequently used in the literature [9]. Thyberg and Tonjes [2, p.112] refer to food loss as "... the decrease in edible food mass throughout the part of the supply chain that specifically leads to edible food for human consumption". For this study, FW is defined as "[...] food which was originally produced for human consumption but then was discarded or was not consumed by humans. Includes food that spoiled prior to disposal and food that was still edible when thrown away" [2, p.112].

The primary difference between the two terms lies in the fact that FW is characterized by both unintentional and deliberate occurrences, while food loss arises from mostly unintentional human actions [6]. Filimonau and De Coteau [6], who have a critical review on FW management within the hospitality industry, highlight that previous studies have tried to measure and describe the FW flows in the hospitality sector. However, there has been less focus on

understanding the reasons for hospitality FW generation, its impacts, and how managers can address it. More research is needed to identify the primary obstacles to effective waste reduction, develop intervention strategies to overcome these obstacles, and promote best practices for minimizing FW in the hospitality industry [6]. The causes and effects of FW, its management practices, and barriers are therefore reviewed in the following sections.

2.2. Classification and Causes of Hospitality Food Waste

Hospitality FW is classified into several categories (Figure 1). Previous research tends to classify FW based on where it happens in the restaurant business. Pirani and Arafat's [7] study developed a FW flow based on materials flow analysis, with three types corresponding to food service production and consumption processes: preparation FW, waste from serving dishes, and waste from guest plates.

Most recent research on the hospitality FW has used this three-type categorization [10, 11].

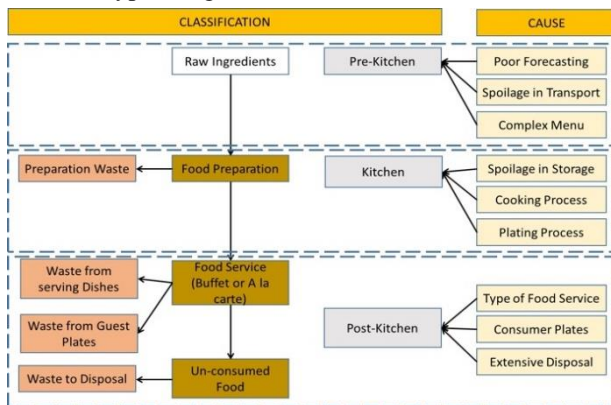


Figure 1. Classification and Causes of FW in the Hospitality Industry

Source: Adapted from [6] and [7]

The causes of FW can be attributed to several factors [12]. Firstly, poor forecasting in hospitality facilities leads to over-ordering of supplies and over-production of meals [10]. This is often due to the challenges of accurately predicting the number of diners due to seasonal and sales fluctuations [12]. Secondly, improper storage practices, such as infrequent stock rotation, lead to pest infestation and spoilage, making a substantial amount of fresh produce unsuitable for consumption [13].

Thirdly, the attitude and behavior of employees towards FW can have a significant impact on the quantity of FW generated [12]. For instance, errors made by staff during food preparation and processing, such as the discarding of trimmings fat and the removal of bones and skin from meat and poultry contribute significantly to the waste generated in restaurants [14].

Fourth, upscale dining establishments that serve high-quality food in smaller portions are often thought to reduce FW. However, the meticulous preparation of food from scratch to meet quality and aesthetic standards, combined with high prices, actually leads to a significant amount of FW in fine dining restaurants [6, 15]. Therefore, it's important to first explore organizational factors

contributing to FW in these establishments before examining customer-related reasons.

Fifth, recent studies have shown that irresponsible consumer behavior significantly contributes to FW in restaurants, particularly in terms of plate waste [13, 16]. Customers tend to prioritize personal satisfaction over environmental considerations when dining out, contributing to this issue [17].

Finally, in-house policies relating to the hotel's emphasis on client satisfaction and safety are factors in FW [2, 6]. Indeed, chefs prioritize meeting customer needs regardless of FW, given the high permissible food cost in fine-dining restaurants [18]. Food safety regulations also contribute to waste, as rejected foods do not meet set standards for consumption [15]. For example, HACCP-certified establishments must follow strict restrictions on food storage and disposal [7].

All factors contributing to hospitality FW generation are interrelated [19]. For instance, inaccurate demand forecasting is often due to staff skills [12], making it challenging to accurately assess and assign the causes of FW within a food service business [15].

2.3. Hospitality Food Waste Management Practices

In response to the increasing concern regarding FW, a significant body of literature has focused on identifying FW management strategies [3]. Papargyropoulou et al. [20] have devised an FW hierarchy as a framework to prioritize the options for managing FW throughout the food supply chain. In the relationship between the internal and external environment, Filimonau and De Coteau [6] propose a framework for the potential for FW production that could be divided into five classes: prevention, redistribution, recycling, recovery, and disposal. In the hospitality sector, managers should prioritize preventing FW generation rather than passively disposing of wasted food [10].

2.3.1. Food Waste Prevention

FW prevention is the most cost-effective way to save money and protect the environment [2, 21]. It avoids unnecessary food production and reduces the amount of FW sent to landfills, which helps prevent the production of methane and avoids environmental issues [21].

There are many preventative practices that hospitality firms should employ. A hospitality establishment may implement a cost control system to minimize potential losses from spoilage, theft, shrinkage, and waste [22]. Additionally, effective waste monitoring is an essential strategy that should be followed. By quantifying the amount of FW generated from different processes within the restaurant and identifying commonly wasted ingredients, managers and chefs can implement appropriate measures, such as menu redesign, to address this issue [10].

Furthermore, accurate demand forecasting and revenue management are important for preventing over-ordering of ingredients and over-preparation of meals, reducing food wastage [6, 23]. Also, Human resources management (HRM) is crucial for driving the implementation of FW mitigation approaches [24] and can help motivate employees and engage staff in sustainability efforts [25].

Ultimately, due to the limited awareness of the adverse environmental impacts of FW among many consumers [26], it is imperative for establishments to devise strategies aimed at enhancing consumer understanding of FW effects and encouraging guests to generate less FW themselves [7]. However, hoteliers are hesitant to adopt these 'nudging' techniques due to fear of negative customer feedback [27].

2.3.2. Food Redistribution

Once leftovers or food surpluses arise, hospitality organizations should repurpose and redistribute that food to minimize the amount of FW landfilled [5]. There are numerous practices available for hotels to achieve this.

First, providing takeaway boxes to customers when food remains untouched can effectively mitigate surplus, as the staff's ability to preserve such surplus is limited [28]. Second, any untouched leftover food should be reserved for subsequent meals by incorporating it into menu planning or offering a special menu featuring surplus ingredients [3]. Third, applying discounted prices to facilitate quick sales, along with the use of smartphone applications to redistribute discounted meals and food items, can be beneficial [6]. Fourth, surplus food can be utilized for staff meals or distributed among the staff, practices commonly observed in restaurants worldwide [17]. Finally, buffet leftovers safe for consumption can be donated to charities that cater to individuals in need [29].

However, it should be noted that these redistribution approaches may pose challenges. For instance, repurposing surplus ingredients necessitates substantial investment in menu design by hoteliers to ensure their incorporation into other dishes [13]. Additionally, the practice of using takeaway boxes in restaurants may be deemed inappropriate in certain countries, such as Italy and China [30]. Moreover, a limited presence of charities and non-governmental organizations due to weak civil society may hinder the collection of unsold food from restaurants for distribution to those in need [23].

2.3.3. Recycling, Recovery, and Disposal

If there is excess food or leftover food that cannot be repurposed or redistributed, post-generation waste management methods such as food recycling, recovery, and landfilling can be utilized.

Regarding food recycling, FW can be redirected to farms to be used as animal feed [13]. A study found that 60% of the 50 surveyed hotels in Vietnam sold FW to local collectors for use as animal feed. While FW is commonly utilized as pig feed, it is imperative to comply with food safety regulations to safeguard animals from diseases such as African swine fever and foot-and-mouth disease [32]. Furthermore, there is a suggestion for FW to be recycled into fertilizer through composting [33]. Notably, up to 67% of hospitality businesses in the UAE are involved in composting, making it a pivotal measure for mitigating FW [7].

The remaining FW can be recycled through anaerobic digestion [34]. However, space constraints, high initial

costs, and an underdeveloped market for by-products pose challenges in the hospitality industry [35]. Ultimately, landfill disposal is the least favorable approach to FW management. Therefore, proactive measures aimed at diverting FW from landfills should be prioritized [17].

2.4. Barriers to Food Waste Management Practices

Numerous obstacles to FW management can be classified as external and internal factors [10]. A deficiency in employee engagement is recognized as an internal barrier to the adoption of the FW management strategy [36]. Furthermore, the wider implementation of FW management practices in luxury hotels is limited by internal factors including corporate policies, initial implementation costs, and managerial attitudes [37]. For example, HACCP regulations, as previously discussed, prohibit managers from reusing and redistributing surplus food [12].

External factors, such as consumer behavior, present a challenge in addressing FW. A study by Sirieix et al. [28] revealed that social norms and status biases in France and the Czech Republic discourage customers from requesting takeaway boxes for leftovers. Additionally, many people are not fully aware of the extent of FW and its negative effects on society and the environment, leading to irresponsible behavior [38]. It is essential to change public perceptions and work towards long-term sustainability goals in the food industry [23]. Suppliers can also pose challenges in reducing FW, especially when they have more market power and can set limitations on food deliveries, such as amount and frequency [6]. Additionally, national laws and policies may impede efforts by hospitality firms to minimize FW. For instance, in some countries, food donors can be held responsible for any illnesses caused by donated food, which discourages food donations [2].

3. Methodology

The principal goal of this study is to gain a comprehensive understanding of the FW phenomenon; therefore, interpretivism is deemed more suitable for this purpose [39]. Employing a qualitative collective case study design, four- and five-star hotels and resorts in Danang and Quangnam, Vietnam, were selected. Data collection was conducted for two months from February to March 2024 using semi-structured interviews [40].

The research employed purposive sampling and applied two specific criteria to select the interviewees. Firstly, the selection focused on individuals employed in restaurants operating within four and five-star hotels and resorts. This was based on the understanding that larger establishments, with the financial capacity and administrative structure, are more inclined to adopt environmental management practices compared to smaller properties [41]. Secondly, the employees needed to work in specific positions: kitchen staff involved in food preparation, food and beverage staff engaged in customer service, food and beverage managers, and hotel managers. Snowball sampling was a useful approach

when there was difficulty identifying members of the population [39] and therefore was also used.

The data reached theoretical saturation and redundancy at 25 interviewees from 6 hotels in Quangnam and 16 hotels in Danang (Table 1). The majority of the interviews were conducted in Vietnamese, with a few in English. Both face-to-face and online interview formats were used in the study. The anonymous codes were applied to the individual participants. Interviews were coded following thematic analysis by [42]. All themes relevant to and linked to the types and practices of FW were considered as part of the further analysis. Finally, codes and themes were checked by the researcher, and a discussion was held to discuss findings, discussions, and conclusions.

Table 1. Overview of Interviewees

Interviewee no.	Type of Enterprise	Job Title	Work Experience
1	4-star hotel	Executive Chef	10 years
2	5-star hotel	Executive Chef	8 years
3	5-star hotel	Executive Chef	6 years
4	5-star hotel	Sous Chef	5 years
5	5-star hotel	Food & Beverage Manager	8 years
6	5-star hotel	Restaurant Manager	8 years
7	5-star hotel	Restaurant Manager	6 years
8	5-star hotel	Assistant Restaurant Manager	8 years
9	5-star hotel	F & B Supervisor	6 years
10	5-star hotel	F & B Supervisor	9 years
11	4-star hotel	F & B Captain	5 years
12	5-star hotel	Butler	8 years
13	5-star hotel	Server	6 years
14	5-star hotel	Server	7 years
15	5-star hotel	Cook Assistant	7 years
16	5-star Resort	Assistant F&B Training Manager	11 years
17	5-star Resort	F&B Supervisor	4 years
18	5-star Resort	Captain Restaurant	5 years
19	5-star hotel	F&B Supervisor	3 years
20	5-star Resort	F&B Guest Relation Coordinator	6 years
21	4-star hotel	F&B Captain	4 years
22	4-star hotel	F&B Supervisor	5 years
23	4-star hotel	Demi Chef	3 years
24	5-star Resort	Kitchen Operation Secretary	3 years
25	5-star Resort	Executive Sous Chef	12 years

4. Findings

4.1. Types and Causes of Hospitality Food Waste

The interviews have identified three main types of frequent FW produced at four- and five-star hotels and resorts (Figure 2). The reasons behind each are discussed further in the following.

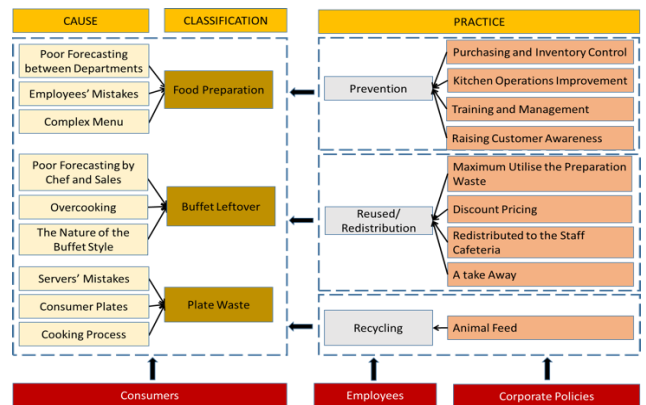


Figure 2. Classification, Causes, Practices, and Barriers to Hospitality FW

4.1.1. Preparation Waste

Preparation waste includes FW during the back-of-house stage. The generation of preparation waste in hotels can be attributed to the purchase of excessive food, often resulting from employee errors stemming from inexperience or careless behavior (Interviewees 4, 6, 7, 9, 12, 16) and errors in customer and reservation data (Interviewees 1, 2, 3, 13). Also, an amount of food is being wasted due to inadequate inventory management. More specifically, the absence of proper oversight and the presence of faulty electrical equipment have led to numerous instances of food items becoming expired and damaged (Interviewees 4, 6, 8, 9).

In the kitchen, poor food preparation skills, especially in cutting fruits and vegetables, lead to a significant amount of FW (Interviewees 7, 13, 14, 15). There have also been documented cases of culinary mishaps, such as burning, which have been attributed to staff incompetence or deviating from recipes. (Interviewee 2,5). In addition, If staff members are negligent and the finished meal contains hair, insects, or other contaminants, the entire dish will need to be discarded (Interviewees 2, 13, 14).

However, the findings show that the amount of FW during the preparation process was not large. This is because, due to strict standards and continuing supervision, it is rare for staff errors to result in FW. Even in cases of food surplus, chefs are flexible enough to utilize any mistakes for other dishes.

4.1.2. Buffet Leftovers

The largest amount of FW generated in hotel restaurants comes from buffet leftovers, which refers to the food left on the serving counter after the buffet has closed (Interviewees 2, 5, 6, 7, 11, 12, 13, 14, 16, 17). One reason for its creation is an inaccurate prediction of customer demand, leading to a mismatch between the actual number of visitors attending an event and the expected number of attendees (Interviewees 3, 4, 7, 11, 12, 13, 15, 17). For instance, one interviewee mentioned the discrepancy between the number of visitors expected at his hotel's breakfast buffet and the actual turnout:

"FW will be generated if the number of hotel check-ins differs from the breakfast buffet attendance" (Interviewee 11).

Similarly, dinner buffets in Vietnam are often served on

a walk-in basis due to the unfamiliarity of Vietnamese visitors with making reservations, posing a challenge for hoteliers in accurately forecasting guest numbers (Interviewee 13). This leads to significant leftover food on low-demand days (Interviewee 13).

Overcooking or over-preparation is the second reason that contributes to preparation waste. The main causes of overcooking include "the lack of expertise of the chef responsible for determining the amount of food to be cooked" (Interviewee 1) and inaccurate demand predictions (Interviewees 3, 4, 11, 13).

Another reason for FW generation at hotels is the buffet style of serving. The principle governing buffet display trays requires them to be kept full at all times when serving customers, even if it is close to closing time, resulting in significant FW (Interviewees 2, 5, 6, 11). Additionally, luxury hotels are expected to offer a wide selection of cuisine in their buffets to attract more visitors (Interviewees 6, 11, 12, 13). While some food items may consistently be in excess due to a lack of popularity among most hotel visitors, the chef is not authorized to remove them from the menu (Interviewee 11).

Respondents also pointed out that, to ensure food safety, company regulations for buffet products often require that any unconsumed food from one buffet period be discarded before the next one (Interviewees 2, 5, 11, 13, 14). However, "this practice seems to be more common in luxury hotels operated by multinational companies. In contrast, in hotels managed by Vietnamese organizations, managers are allowed to distribute the leftover food to staff or store it for later use" (Interviewee 5).

4.1.3. Plate Waste

The findings emphasize several causes of plate waste, which refers to food left on consumers' plates. The data shows that oversized portions that exceed customer demand contribute to plate waste. However, this is not considered a significant problem according to Interviewees 6, 8, 13, and 14.

Furthermore, mistakes made by hotel staff in cooking and serving meals often lead to plate waste. Errors in food preparation are most common among kitchen personnel (Interviewees 1, 4, 5, 7, 9, 11, 13). If a meal is of poor quality or flavor, it is often left uneaten (Interviewee 7). In such circumstances, high-end restaurants would provide a replacement to the customer:

"The kitchen has received three complaints from customers about the unpleasant smell of the chicken dishes." (Interviewee 7)

Furthermore, restaurant servers may occasionally make errors, such as taking the incorrect order or neglecting to inquire about food allergies, religious restrictions, or specific preferences. These oversights can result in unnecessary plate waste (Interviewees 6, 7, 10).

Excessive ordering or consumption of food results in plate waste (Interviewees 1, 5, 6, 7, 8, 9, 11, 12, 16). This behavior may stem from visitors' inclination to sample a diverse range of cuisines. When visitors are unaware of the serving sizes and culinary variety, they tend to overorder

(Interviewee 11). Additionally, it is common for patrons to take more food than they can consume at a buffet (Interviewees 2, 4, 6, 7, 11, 12, 13). Interviewees suggest that visitors may overestimate their hunger, lack familiarity with specific menu items, or find that the cuisine does not meet their expectations. For example, an extract is offered below:

"A foreign traveler ordered Hue beef noodle soup but couldn't eat it because it had shrimp paste in it, which they didn't like" (Interviewee 5).

4.2. Hospitality FW Management Practices

4.2.1. Purchasing and Inventory Control

Due to the potential generation of excess FW resulting from over-ordering, it is essential for the various departments within the hotel to exercise closer monitoring of their procurement quantities (Interviewees 1, 2, 3, 4, 9, 10, 25). Many acknowledged the implementation of diverse inventory management strategies, including the segregation of goods into different warehouses, adherence to the first in, first out approach, and regular monitoring of goods quantities and conditions (Interviewees 1, 2, 3, 4, 5, 7, 8, 13, 25).

4.2.2. Kitchen Operations Improvement

The primary approach to kitchen operations involves accurately forecasting the quantity of food to be prepared. The chef's decision on the food quantity is guided by various factors such as guest demographics, peak or off-peak periods, and weekdays versus weekends (Interviewees 1, 2, 4, 5, 6, 8, 11, 12, 13). Another method of minimizing FW entails replenishing buffet items multiple times instead of preparing all items at once (Interviewees 1, 3, 5, 6, 7, 8, 11, 13). One responder demonstrated this practice:

"When the buffet starts, the kitchen has to get all the counters ready. Around 8 or 9 p.m., the receptionist at the restaurant checks how many people are still eating and lets the kitchen know if they need to add more food" (Interviewee 5).

Moreover, multiple interviewees acknowledged opting for à la carte menu service instead of the buffet (Interviewees 5, 7). This approach holds the potential to mitigate wastage, particularly in circumstances where hotels experience low customer volumes, as seen during the coronavirus outbreak (Interviewee 8).

Finally, portion management is a highly effective method employed by numerous hotels to minimize leftover food from customers (Interviewees 4, 6, 7, 8, 13, 14). As stated by Interviewee 13, when the portion sizes are appropriate, *"very few customers leave food uneaten"*.

4.2.3. Training and Management

During the process of meal preparation, minimal food wastage is attributed to comprehensive training and rigorous oversight in the kitchen (Interviewees 3, 18). Furthermore, tasks are delegated to suitable individuals by management, waste cost status is conveyed, and the rationale behind waste reduction is elucidated to employees to foster optimal cooperation in minimizing FW (Interviewee 6).

The interviewees mentioned that a key managerial approach to reducing FW in hotels is to control kitchen costs (Interviewees 1, 4, 5, 7, 12, 13). If these costs go beyond the set standards, partly due to FW, it would directly affect the company's efficiency. In such cases, alternative management approaches are used, such as holding a meeting to identify the cause, issuing a verbal warning to the individual directly responsible, or reducing the bonus of kitchen or restaurant staff (Interviewee 7). Since this strategy directly impacts employee benefits, efforts are made to reduce the amount of leftovers (Interviewees 7, 12).

One approach that has been adopted is to measure the amount of wastage. Interviewee 13 asserts that utilizing an electronic scale to record the food lost during the day is the best way to reduce FW at his hotel. However, only two out of the 11 hotels mentioned using this method.

4.2.4. Raising Customer Awareness

One potential method for preventing FW is to display signage promoting waste reduction, aiming to increase customer awareness. However, only one of the hotels involved in the study adopted this approach, using photos on tables to encourage waste prevention (Interviewees 13, 17). The other participants indicated that, while prioritizing client satisfaction at their high-end establishments, they deemed these communication techniques to be inappropriate.

4.2.5. Reuse/Redistribution Practices

Hotels have implemented reuse/redistribution solutions to address FW after it is generated. First, the kitchen will make the best use of the preparation waste and the buffet leftovers. When food is approaching its expiration, several FW redistribution strategies are employed, including returning it to the supplier or transferring it to other hotel facilities, such as morning buffets (Interviewees 1, 2, 4, 17). Additionally, buffet leftovers are routinely preserved for future use. For instance, white rice is repurposed, and hams are sliced into salad pieces (Interviewees 2, 6, 8, 16). Second, discount pricing, or the sale of surplus food at a reduced cost, serves to augment hotel income while simultaneously mitigating FW. Third, excess food is routinely allocated to the staff cafeteria as part of an effort to minimize the volume of food prepared for employees and curtail the amount of food directed to landfills. However, there are days when the canteen kitchen has already prepared enough food for the staff, leading to surplus food that ends up going to waste because employees may not eat it all (Interviewee 12).

Interviewees 9 and 25 highlighted the concern of ensuring food safety for staff while implementing this approach. Consequently, some hospitality establishments decline to reuse and redistribute excess food in line with HACCP standards (Interviewees 2, 5). Finally, respondents noted that it is a common practice for hotels to package leftover food and offer it as takeaways, contributing to the reduction of waste generated by the hotel.

4.2.6. Sold for Animal Feed

According to 15 out of 25 respondents, surplus food that cannot be reused or redistributed is repurposed as

animal feed. The majority of the hotels and resorts where the interviewees are employed have adopted this practice, with only one exception. This approach not only allows for cost-free disposal of waste but also generates additional revenue through the sale of surplus food.

4.3. Barriers to Hospitality Food Waste Management

Corporate policy is the first obstacle in addressing FW within the hospitality industry. Compliance with food safety standards prevents certain hotels from repurposing leftover food for other meals or distributing it to staff or charity (Interviewee 8). Moreover, strict security restrictions prohibit the removal of food from the premises, hindering efforts to donate excess food. Consequently, surplus food is only utilized within the confines of the hotel. Additionally, prioritizing customer satisfaction makes it challenging to implement measures to minimize plate waste. For example, the inability to fulfill customer orders due to ingredient shortages could lead to customer discomfort (Interviewee 9).

Employees may present a challenge according to several interviewees (Interviewees 3, 5, 6, 7, 8, 11, 12, 13, 14). This challenge may arise from skills gaps and poor attitudes, such as the inexperience of a chef. However, certain interviewees (Interviewees 5, 7, 8, 11, 12) did not view employees as a significant barrier and believed that this issue could be effectively managed.

The customers' behaviors, particularly in the context of buffet service, present the ultimate obstacle. Specifically, 11 out of 25 interviewees reported that customers tend to leave a substantial amount of food uneaten on their plates. These leftovers due to customers' irresponsible behaviors can only be discarded.

5. Discussion

5.1. Types of Food Waste

A significant finding of this research is that buffet leftovers were identified as the most prevalent source of FW in fine-dining establishments, relative to preparation waste and plate waste. This aligns with the conclusions drawn by Katajajuuri et al. [43]. Unlike the present study, earlier research indicates that the primary contributor to FW in upscale restaurants is preparation waste [11]. This disparity can be attributed in part to the fine-dining establishments in Vietnamese luxury hotels implemented various FW prevention and reuse practices, helping to minimize FW generation in the preparation phase. This is consistent with the findings of Filimonau et al. [18], who stated that managers of high-end dining establishments in the UK and the Netherlands effectively reduce kitchen waste through the implementation of reuse procedures.

5.2. Causes of Food Waste and Barriers to Food Waste Management

The research has identified various underlying reasons for the generation of FW. Participants consistently emphasized that inaccurate demand forecasts, leading to overordering and overpreparation, are the primary causes of FW, particularly in the context of buffet leftovers. These findings are in line with similar studies, such as the work of

Filimonau et al. [30]. Furthermore, the interviewees indicated that in-house policies related to the hotel's priority of customer satisfaction and safety are drivers of FW. It then becomes difficult for managers and staff to engage in FW mitigation. The findings of this study show that Vietnamese hotels tend to favor extensive menu offerings, procure excessive commodities, prepare large quantities of food, and prohibit the kitchen from reusing cooked food or serving it to the staff. This confirms previous findings regarding the factors contributing to FW [30].

Critically, this study discovered that employees' attitudes and behaviors had a considerable impact on FW and obstacles to hospitality FW management. The findings align with prior study in the literature [6, 15, 44]. Specifically, the role of human error is identified to be caused not only by the lack of training, knowledge, and close supervision of managers [13] but also because fine-dining cooking is laborious and needs specialized skills [15]. Additionally, in line with Okumus' [13] study and Papagyropoulou *et al.* [10], the findings also made clear the problem of conflicting priorities resulting in poor coordination and communication between the various departments in hotels.

5.3. Food Waste Management Practices

5.3.1. Prevention Practices

There are several methods in terms of food provisioning and restaurant operations available to prevent FW, which includes implementing a cost control system, conducting a plate waste audit, managing inventory effectively, adjusting the menu, replacing buffet-style food with a la carte options, and controlling portion sizes. These practices align with recent empirical studies, for example [11] and [18].

Additionally, as previously emphasized, the Human Resource Management (HRM) function plays a pivotal role in steering the implementation of FW mitigation strategies in an organization. Most of the interviewees argue that the skill gap and poor attitudes of employees can be addressed by providing training and retraining, closely monitored by managers. All hotels in this study have implemented thorough training and diligent monitoring, focusing not only on the kitchen staff but also on the service team. This finding aligns with the research conducted by [45], and [46].

Another HRM practice in preventing FW is a reward/punishment system, which was adopted in all the hotels studied to encourage staff participation in FW reduction initiatives. This supports the findings of Bohdanowicz et al. [45]. Interestingly, this research found that the benefits of FW reduction and the results of implemented techniques were communicated to all employees through regular internal company reports or workplace meetings. In contrast to the current study, Charlebois et al. [15] found no daily waste reduction actions and utilized group communication instead. Indeed, effective communication on FW management in hotels has a positive impact [47] since it contributes to fostering employee commitment, cultivating loyalty, enhancing

responsibility, and boosting motivation to actively participate in FW management [48].

5.3.2. Reuse/Redistribution Practices

Even though prevention measures should be prioritized [10], our analysis reveals that restaurant managers and cooks tend to opt for reactive measures over proactive approaches in reducing FW. These measures include reallocating excess food to other kitchens, conserving surplus food for future use, implementing promotional initiatives such as 'the Special meal of the day,' selling excess food to both staff and customers, and offering take-away options for patrons. These findings are consistent with prior research [19] and highlight the prevalent approach within the industry.

Moreover, the current data suggests that excess food was repurposed in the staff cafeteria, a common strategy employed worldwide to minimize FW [17]. However, if employees are unable to consume all of the remaining food, it will go to waste because it is not made available for them to take home, as stated in [7]. This study found that Vietnamese luxury hotels implemented strict security policies prohibit taking anything outside of the hotel premises. As a result, a limited amount of FW was reduced by using reuse or redistribution strategies. This is an intriguing finding that differs significantly from previous research. Such stringent corporate policies have been established to prevent staff from taking surplus food home and to deter employee theft in hotel workplaces, as these issues could have adverse effects on the hotel's financial performance and reputation [49]. This finding aligns with the conclusions drawn by Harris [50], indicating that employees in hospitality roles often encounter ethical dilemmas and may be susceptible to engaging in theft due to the nature of their work. Furthermore, the redistribution of surplus food to the staff cafeteria raises valid concerns regarding health and safety compliance for the staff, as stipulated by food safety regulations such as HACCP. Consequently, there are concerns about the feasibility of distributing extra food to the staff.

Furthermore, this study discovered that no Vietnamese hotels gave extra food to those in need, despite the widespread use of this method to mitigate FW worldwide [51]. This confirms the study in full-service restaurants in Shanghai [30]. This is owing, in part, to the relative 'novelty' of food donation in developing nations [6] and the absence of charities and/or food banks in Vietnam. The last argument is consistent with Filimonau et al. [23], who reached similar conclusions in Bulgaria.

5.3.3. Recycling Practices

An interesting finding indicates that selling leftover food to feed animals is the most widely adopted strategy among Vietnamese hotels to address FW. This finding is consistent with prior research on hotel solid waste [52] and household waste in Vietnam [53]. Although this practice has been referenced in previous studies by Papagyropoulou et al. [11] and Gandhi and Singh [54], no empirical study in other sectors has demonstrated the widespread use of recycling FW as animal feed in the hotel

industry. This might be because this practice is criticized as posing a danger of infecting animals with illnesses and hence is prohibited throughout the EU [32].

The present study presents a different viewpoint from Thi, Kumar, and Lin [55], who found that animal feeding is rarely practiced in impoverished nations. However, in Vietnam, this practice is prevalent due to its cost-effectiveness and lower labor requirements compared to other methods, further compounded by the absence of local regulations. Nonetheless, it has been evidenced that the management of FW is not primarily driven by a concerted managerial effort to control waste, but rather by hotels' propensity to transfer the responsibility for handling surplus food to other stakeholders. Perhaps due to the ease of managing FW, most hotels are relatively unconcerned about discarding significant quantities of waste in bins, primarily considering the associated costs. In essence, the amount of discarded food is inconsequential as long as the customer has paid for it. Notwithstanding this, the implementation of this approach results in only a minimal amount of FW being sent to landfills, thereby minimizing costs and environmental impacts [6].

6. Conclusion and Recommendations

6.1. Theoretical Implications

This study has contributed to the existing knowledge of FW by identifying the factors that contribute to FW generation and examining the prevailing FW management strategies implemented by luxury hotels in Vietnam. Furthermore, it represents one of the pioneering initiatives within the hospitality industry to conduct an exploratory study into FW management within developing nations. Managing FW is an essential albeit challenging strategy, necessitating increased focus on the FW issue within the hospitality sector, particularly due to its significance in burgeoning economies.

The study has accomplished its first objective by identifying the types of FW and the underlying reasons for FW generation in hotel restaurants. According to the research findings, buffet leftovers were identified as the most significant source of FW in Vietnamese hotels. This finding contrasts with recent studies, which suggest that the majority of FW in upscale restaurants occurs during food preparation and on the customer's plate [3, 14]. Additionally, the study highlights the substantial impact of employee attitudes and behaviors on FW generation within hotel establishments. While customer-related factors also contribute to FW, particularly during buffet events, the study indicates that portion size does not significantly drive FW occurrences.

This study has gained its second objective by investigating FW management approaches adopted in Vietnamese luxury hotels (Figure 2). In terms of prevention practices, luxury hotels in Vietnam have incorporated a cost control system. Some hotels have also conducted plate waste audits, although these are not widely adopted due to their time- and labor-intensive nature. The study also outlines other prevention practices. However, Vietnamese hospitality businesses have yet to invest in

advanced software to accurately forecast demand, and only a few enterprises are implementing consumer engagement practices for FW mitigation. In addition to food provisioning and restaurant operations, the study identifies several HRM practices that enhance employee responsibility and motivation to participate in FW management.

Regarding reactive practices, the study reveals that the majority of Vietnamese restaurants prioritize the reuse and redistribution of surplus food. Common practices include selling FW for animal feed and transferring excess food to the staff cafeteria if it cannot be utilized in the kitchen. Despite animal health concerns, animal feeding helps Vietnamese hospitality businesses, as they would send just a small amount of FW to landfills. Additionally, the study indicates that food donation is not universally practiced in Vietnamese hotels due to its novelty in developing countries and the limited presence of charities or food banks in Vietnam.

The study achieved its third objective by identifying the main challenges to efficient FW management in luxury hotels in Vietnam. One key issue is that business policies prioritize customer safety and satisfaction. Also, employees are often seen as a barrier due to a skills gap and negative attitudes. However, interviewees did not consider this to be a severe issue. On the other hand, customers proved to be more challenging. For example, hotel staff may be highly sustainable in their operations, but if visitors behave in an environmentally irresponsible manner or do not show up, then there is not much that the hotels can do.

6.2. Practical Implications

The research suggested some practical implications. The study highlights that hospitality enterprises in Vietnam should invest in more accurate demand forecasting and HRM as primary initiatives of FW management. Second, to enable more effective future mitigation, hoteliers could use 'passive' nudging strategies such as posting table notices to encourage customers to produce less FW themselves [56]. More 'active' nudging of restaurant patrons should be introduced, such as offering rewards for clean plates [30]. Finally, given the absence of food donations, it is essential to establish a national food bank and collaborate with the World Bank's worldwide food bank to construct a food donation platform, as also recommended by Thi et al. [55].

6.3. Limitations and Future Research Directions

This study is subject to certain limitations. One such limitation is the restricted ability to generalize and theorize the findings from the case study research. The sampling procedure and participant recruitment for this study present additional constraints. The study relied on the experience of gatekeepers (i.e. chefs, F&B supervisors, and F&B servers) to identify suitable participants, potentially limiting participant variety and introducing under- or over-representation of specific groups. Additionally, language barriers may pose challenges, as the data was collected in Vietnamese and subsequently translated and analyzed in English.

The study highlighted several potential research opportunities. First, future studies on hospitality FW in Vietnam should concentrate on its many sub-sectors to investigate the scale of FW, identify the primary causes, and determine the FW management strategies used. Second, various FW management strategies have been implemented in the Vietnam hotel industry, but there is a paucity of research on their effectiveness. Future studies should include case studies that evaluate the effectiveness of these mitigation strategies. These case studies may successfully demonstrate the benefits of FW mitigation to industry practitioners, underlining the importance of its implementation to management. Third, given that this study demonstrated the prevalence of selling FW for animal feeding in Vietnamese hotels, future research should focus on the positive and negative effects of this practice. Fourth, given the personnel's health concerns, the possibility of moving extra food to the staff cafeteria should be investigated following food safety requirements such as HACCP. It would be valuable to initiate a longitudinal study, as it could offer a more comprehensive understanding of hospitality FW practices. Further research could test and verify if the model of FW practices associated with hospitality participation suggested here can be usefully applied in other types of businesses. Finally, in forthcoming studies, it is imperative to assess the validity of FW practices within the hospitality industry.

Acknowledgment: This research is a part of a University-level research project granted by the University of Danang - University of Economics with the grant number of T2024-04-49.

REFERENCES

- [1] E. Juvan, B. Grün, and S. Dolnicar, "Biting Off More Than They Can Chew: Food Waste at Hotel Breakfast Buffets", *Journal of Travel Research*, vol. 57, no. 2, pp. 232-242, 2018.
- [2] K. L. Thyberg and D. J. Tonjes, "Drivers of Food Waste and Their Implications for Sustainable Policy Development", *Resources, Conservation, and Recycling*, vol. 106, pp. 110-123, 2016.
- [3] S. I. Pirani, and H. A. Arafat, "Solid Waste Management in the Hospitality Industry: A Review", *Journal of Environmental Management*, vol. 146, pp. 320-336, 2014.
- [4] Å. Stenmarck et al., "FUSIONS: Estimates of European Food Waste Levels. IVL Swedish Environmental Research Institute", *Public Wageningen Food and Biobased Research-Report*, vol. 2102, pp. 39, 2016.
- [5] A. Betz, J. Buchli, C. Goebel, and C. Muller, "Food Waste in the Swiss Food Service Industry - Magnitude and Potential for Reduction", *Waste Management*, vol. 35, pp. 218-226, 2015.
- [6] V. Filimonau and D. A. de Coteau, "Food Waste Management in Hospitality Operations: A Critical Review", *Tourism Management*, vol. 71, pp. 234-245, 2019.
- [7] S. I. Pirani and H. A. Arafat, "Reduction of food waste generation in the hospitality industry", *Journal of Cleaner Production*, vol. 132, pp. 129-145, 2016.
- [8] K. L. Christ and R. Burritt, "Material Flow Cost Accounting for Food Waste in the Restaurant Industry", *British Food Journal*, vol. 119, no. 3, pp. 600-612, 2017.
- [9] J. Parfitt, M. Barthel, and S. Macnaughton, "Food Waste Within Food Supply Chains: Quantification and Potential for Change to 2050", *Philosophical Transactions Royal Society B: biological sciences*, vol. 365, pp. 3065-3081, 2010.
- [10] E. Papargyropoulou, N. Wright, R. Lozano, J. Steinberger, R. Padfield, and Z. Ujang, "Conceptual Framework for the Study of Food Waste Generation and Prevention in the Hospitality Sector", *Waste Management*, vol. 49, pp. 326-336, 2016.
- [11] E. Papargyropoulou, J. Steinberger, N. Wright, R. Lozano, R. Padfield, and Z. Ujang, "Patterns and Causes of Food Waste in the Hospitality and Food Service Sector: Food Waste Prevention Insights from Malaysia", *Sustainability*, vol. 11, pp. 6016, 2019.
- [12] L. Heikkilä, A. Reinikainen, J. Katajajuuri, K. Silvennoinen, and H. Hartikainen, "Elements Affecting Food Waste in the Food Service Sector", *Waste Management*, vol. 56, pp. 446-453, 2016.
- [13] B. Okumus, "How Do Hotels Manage Food Waste? Evidence from Hotels in Orlando, Florida", *Journal of Hospitality Marketing and Management*, vol. 29, no. 3, pp. 1-19, 2020.
- [14] L. Principato, C. Pratesi, and L. Secondi, "Towards Zero Waste: An Exploratory Study on Restaurant Managers", *International Journal of Hospitality Management*, vol. 74, pp. 130-137, 2018.
- [15] S. Charlebois, A. Creedy, and M. von Massow, "Back of House - Focused Study on Food Waste in Fine Dining: The Case of Delish Restaurants", *International Journal of Culture, Tourism and Hospitality Research*, vol. 9, no. 3, pp. 278-291, 2015.
- [16] D. M. A. Roodhuyzen, P. A. Luning, V. Fogliano, and L. P. A. Steenbekkers, "Putting Together the Puzzle of Consumer Food Waste: Towards an Integral Perspective", *Trends in Food Science and Technology*, vol. 68, pp. 37-50, 2017.
- [17] L. Sakaguchi, N. Pak, and M. Potts, "Tackling the Issue of Food Waste in Restaurants: Options for Measurement Method, Reduction and Behavioral Change", *Journal of Cleaner Production*, vol. 180, pp. 430-436, 2018.
- [18] V. Filimonau, E. Todorova, A. Mzembe, L. Sauer, and A. Yankholmes, "A Comparative Study of Food Waste Management in Full Service Restaurants of the United Kingdom and the Netherlands", *Journal of Cleaner Production*, vol. 258, pp. 120775, 2020.
- [19] V. Filimonau, M. Krivcova, and F. Pettit, "An Exploratory Study of Managerial Approaches to Food Waste Mitigation in Coffee Shops", *International Journal of Hospitality Management*, vol. 76, pp. 48-57, 2019.
- [20] E. Papargyropoulou, R. Lozano, J. K. Steinberger, N. Wright, and Z. B. Ujang, "The Food Waste Hierarchy as a Framework for the Management of Food Surplus and Food Waste", *Journal of Cleaner Production*, vol. 76, pp. 106-115, 2014.
- [21] A. B. S. Schott and A. Cánovas, "Current Practice, Challenges and Potential Methodological Improvements in Environmental Evaluations of Food Waste Prevention - A Discussion Paper", *Resources, Conservation and Recycling*, vol. 101, pp. 132-142, 2015.
- [22] B. Ozdemir and O. Caliskan, "A Review of Literature on Restaurant Menus: Specifying the Managerial Issues", *International Journal of Gastronomy and Food Science*, vol. 2, no. 1, pp. 3-13, 2014.
- [23] V. Filimonau, H. Fidan, I. Alexieva, S. Dragoev, and D. D. Marinova, "Restaurant Food Waste and The Determinants of its Effective Management in Bulgaria: An Exploratory Case Study of Restaurants in Plovdiv", *Tourism Management Perspectives*, vol. 32, pp. 100577, 2019.
- [24] M. Wagner, "Green Human Resource Benefits: Do They Matter as Determinants of Environmental Management System Implementation?", *Journal of Business Ethics*, vol. 114, pp. 443-456, 2013.
- [25] A. Datta, "Green Work-Life Balance: A New Concept in Green HRM", *International Journal of Multidisciplinary Approach*, vol. 2, no. 2, pp. 83-89, 2015.
- [26] B. McCarthy, and H. B. Liu, "Waste Not, Want Not: Exploring Green Consumers' Attitudes Towards Wasting Edible Food and Actions to Tackle Food Waste", *British Food Journal*, vol. 12, pp. 2519-2531, 2017.
- [27] S. Stöckli, E. Niklaus, and M. Dorn, "Call for Testing Interventions to Prevent Consumer Food Waste", *Resources, Conservation and Recycling*, vol. 136, pp. 445-462, 2018.
- [28] L. Sirieix, J. Lála, and K. Kocmanová, "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*, vol. 34, pp. 153-158, 2017.
- [29] M. Mourad, “Recycling, Recovering and Preventing “Food Waste”: Competing Solutions for Food Systems Sustainability in the United States and France”, *Journal of Cleaner Production*, vol. 126, pp. 461-477, 2016.
- [30] V. Filimonau, H. Zhang, and L. E. Wang, “Food Waste Management in Shanghai FullService Restaurants: A Senior Managers’ Perspective”, *Journal of Cleaner Production*, vol. 258, pp. 120975, 2020.
- [31] R. Salemdeeb, E. K. zu Ermgassen, M. H. Kim, A. Balmford, and A. Al-Tabbaa, “Environmental and Health Impacts of Using Food Waste as Animal Feed: A Comparative Analysis of Food Waste Management Options”, *Journal of Cleaner Production*, vol. 140, pp. 871- 880, 2017.
- [32] S. Kumar, “Resource Use and Waste Management in Vietnam Hotel Industry”, *Journal of Cleaner Production*, vol. 13, no. 2, pp. 109-116, 2005.
- [33] N. Singh, D. Cranage, and S. Lee, “Green Strategies for Hotels: Estimation of Recycling Benefits”, *International Journal of Hospitality Management*, vol. 43, pp. 13-22, 2014.
- [34] O. Kuczman, M.V.D. Gueri, S.N.M. De Souza, W.N. Schirmer, H.J. Alves, D. Secco, W.G. Buratto, C.B. Ribeiro, and F.B. Hernandez, “Food Waste Anaerobic Digestion of a Popular Restaurant in Southern Brazil”, *Journal of Cleaner Production*, vol. 196, pp. 382-389, 2018.
- [35] S.E. Mbuligwe, and G.R. Kassenga, “Feasibility and Strategies for Anaerobic Digestion of Solid Waste for Energy Production in Dar-Es-Salaam City, Tanzania”, *Resources, Conservation and Recycling*, vol. 42, no. 2, pp. 183-203, 2004.
- [36] K. S. Sealey, and J. Smith, “Recycling for Small Island Tourism Developments: Food Waste Composting at Sandals Emerald Bay, Exuma, Bahamas”, *Resources, Conservation and Recycling*, vol. 92, pp. 25-37, 2014.
- [37] L. D. Stalcup, C. S. Deale, and S. Y. Todd, “Human Resources Practices for Environmental Sustainability in Lodging Operations”, *Journal of Human Resources in Hospitality and Tourism*, vol. 13, no. 4, pp. 389-404, 2014.
- [38] S. V. Russell, C. W. Young, K. L. Unsworth, and C. Robinson, “Bringing Habits and Emotions into Food Waste Behaviour”, *Resources, Conservation and Recycling*, vol. 125, pp. 107- 114, 2017.
- [39] C. Robson, M. Kieran, *Real word Research*, 4th edition. John Wiley and Sons Ltd Copyright, 2016.
- [40] J. W. Creswell, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, 4th edition. Thousand Oaks, CA: SAGE Publications, 2014.
- [41] M. Mowforth, and I. Munt, *Tourism and Sustainability: Development, Globalisation and New Tourism in The Third World*. Routledge, 2015.
- [42] V. Braun, and V. Clarke, “Using Thematic Interview Analysis in Psychology”, *Qualitative Research in Psychology*, vol. 3, no. 2, pp. 77-101, 2006.
- [43] J. M. Katajajuuri, K. Silvennoinen, H. Hartikainen, L. Heikkilä, and A. Reinikainen, “Food Waste in the Finnish Food Chain”, *Journal of Cleaner Production*, vol. 73, pp. 322-329, 2014.
- [44] F. Tàtano, C. Caramiello, T. Paolini, and L. Tripolone, “Generation and Collection of Restaurant Waste: Characterization and Evaluation at A Case Study in Italy”, *Waste Management*, vol. 61, pp. 423-442, 2017.
- [45] P. Bohdanowicz, P. Zientara, and E. Novotna, “International Hotel Chains and Environmental Protection: An Analysis of Hilton’s We Care! Programme” (Europe, 2006- 2008), *Journal of Sustainable Tourism*, vol. 19, no. 7, pp. 797-816, 2011.
- [46] E. Goh, and F. Jie, “To Waste or Not to Waste: Exploring Motivational Factors of Generation Z Hospitality Employees towards Food Wastage in the Hospitality Industry”, *International Journal of Hospitality Management*, vol. 80, pp. 126-135, 2019.
- [47] A. Sourvinou, and V. Filimonau, “Planning for an Environmental Management Programme in a Luxury Hotel and its Perceived Impact on Staff: An Exploratory Case Study”, *Journal of Sustainable Tourism*, vol. 26, no. 4, pp. 649-667, 2018.
- [48] B. F. Daily, and S. Huang, “Achieving Sustainability Through Attention to Human Resource Factors in Environmental Management”, *International Journal of Operations and Production Management*, vol. 21, no. 12, pp. 1539-1552, 2001.
- [49] E. Goh, and S. Kong, “Theft in the Hotel Workplace: Exploring Frontline Employees’ Perceptions Towards Hotel Employee Theft”, *Tourism and Hospitality Research*, vol. 18, no. 4, pp. 442-455, 2018.
- [50] C. Harris, “Ripping off Tourists: An Empirical Evaluation of Tourists’ Perceptions and Service Worker (Mis)Behaviour”, *Annals of Tourism Research*, vol. 39, no. 2, pp. 1070-1093, 2012.
- [51] F. Girotto, L. Alibardi, and R. Cossu, “Food Waste Generation and Industrial Uses: A Review”, *Waste Management*, vol. 45, pp. 32-41, 2015.
- [52] P. H. Byer, C. P. Hoang, T. T. T. Nguyen, S. Chopra, V. Maclaren, and M. Haight, “Household, Hotel and Market Waste Audits for Composting in Vietnam and Laos”, *Waste Management and Research*, vol. 24, no. 5, pp. 465-472, 2006.
- [53] N. B. D. Thi, N. T. Tuan, and N. H. H. Thi, “Assessment of Food Waste Management in Ho Chi Minh City, Vietnam: Current Status and Perspective”, *International Journal of Environment and Waste Management*, vol. 22, no. 1-4, pp. 111-123, 2018.
- [54] B. Grandhi, and J. A. Singh, “What a Waste! A Study of Food Wastage Behavior in Singapore”, *Journal of Food Products Marketing*, vol. 22, no. 4, pp. 471-485, 2016.
- [55] N. B. D. Thi, G. Kumar, and C. Y. Lin, “An Overview of Food Waste Management in Developing Countries: Current Status and Future Perspective”, *Journal of Environmental Management*, vol. 157, pp. 220-229, 2015.
- [56] S. Kallbekken, and H. Sælen, “Nudging Hotel Guests to Reduce Food Waste as a WinWin Environmental Measure”, *Economic Letters*, vol. 119, pp. 325-327, 2013.