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The Management of Meals in Food Service Establishments in the Context of Food Waste—Results of Focus Group Interviews with Employees and Owners

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Abstract: Food waste in the food service industry is global and affects the whole world. Despite the fact that food service establishments are significant food waste producers, they have received less academic attention than other food waste producers. The aim of this paper is to analyse the methods of management of meals in food service establishments in the context of food waste. The study was carried out using a qualitative research method in the form of a focus group interview between 24 January and 3 February 2020 in four locations. Three interviews were carried out with 23 owners and three interviews with 24 employees of six types of food service establishments, e.g., restaurants, bars, etc. In the respondents' opinion, the amount of food thrown away is not large and most often includes perishable foodstuffs and food discarded when preparing dishes. At the same time, the respondents admitted that many foodstuffs that were thrown away were fit for further use, for example, withered fruit and vegetables or products with no signs of spoilage but whose packages had been opened. To achieve a maximum reduction of wastage of dishes prepared in advance by food service outlets, greater emphasis must be placed on the cooperation between food service establishments and charitable institutions. According to the study, caterers are reluctant to officially engage in such cooperation because they have no knowledge of the current donation law, among others.

Keywords: food waste; food service establishments; focus group interview (FGI); plate leftovers; food donation; perishable foodstuffs

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1. Introduction

Despite the fact that food waste is an important global problem, there is no single, agreed definition of this term in the literature [1]. According to the definition proposed by the United Nations Food and Agriculture Organization (FAO), "food loss" is the reduction in the total weight of food intended for human consumption. [2]. Food loss starts in the early phases of the supply chain, whilst food waste occurs during distribution and consumption [3]. Food waste is divided into three categories: avoidable, potentially avoidable and unavoidable. Avoidable food waste involves food that could have been consumed before being thrown away, even though it may no longer be edible at the time of disposal. Avoidable food waste refers to food that can be eaten when food is prepared in one way in preference to another, such as potato peeling. Unavoidable food waste refers to parts of food that are not edible in normal circumstances, such as banana peels, eggshells and chicken bones [4]. Particular attention should be paid to avoidable food waste.

As demonstrated by Buzby et al. [5], 21% of food in restaurants remains unconsumed. According to the findings of Malefors et al. [6], around 20% of food served in the different segments of food service establishments (such as canteens, elderly care units, hospitals,

hotels, preschools, primary schools, restaurants, and upper secondary schools) became waste. As shown by a FUSIONS survey [7], the EU food service sector produces about 12% of the total amount of wasted food. In the United States, each year the food service sector generates nearly 16 million tonnes, which is about 25.4% of the food supply chain [8]. Wen et al. [9] indicated that up to 50% of the food wasted in China may come from food service establishments.

A failure to utilise the produced food for consumption purposes, in accordance with the primary assumption, results in an unjustified burden on the natural environment. It is related to the emission of GHGs or utilisation of natural resources such as water [10]. Carbon footprint calculations based on an assessment of the volume of food wasted in 2011 were estimated at 3.3 Gt CO_2 eq. [11]. Reducing food losses and wastage is widely recognized as a way to meet the challenges of global warming, the protection of natural resources and ecosystems and access to food for those in need [12].

Many researchers [13–16] noted that plate leftovers and food surplus account for a significant proportion of the food wastage in food service establishments. This is confirmed by the research conducted by WRAP (Waste and Resources Action Programme) [17] in 19 restaurants, which showed that plate waste and food surplus account for more than a half of wasted food. The studies conducted in four hotel restaurants by Tomaszewska et al. [18] also indicate that the largest amount, almost three-quarters, of food is wasted in places where meals are served, i.e., in buffet-style settings, or is left unconsumed on plates. Juvan et al. [19] also confirm that buffet-style settings generate a significant amount of waste.

Eriksson et al. [20] identified the hospitality sector (according to Malefors et al. [6], it encompasses establishments such as canteens, elderly care hospitals, hotels, schools, restaurants and universities) as a sector with great potential for food waste reduction. Strategies that can be used to reduce food waste include re-design of the kitchen process, education programmes and food redistribution [7,21–23]. As pointed out by Amicarelli et al. [24], formal agreements should be underwritten between hotels and foodbanks, with the aim of generating a food network holding together companies. As demonstrated by Aiello et al. [25], food recovery through the supply chain is still scarcely practiced, and the potential benefits achievable are frequently ignored. As pointed out by Bierwagen et al. [26], Food Rescue and Donation has the potential to establish a "win-win" arrangement between the spheres of waste management and demands of food security; however, it is still perceived as a less attractive alternative than forwarding the surplus food to waste treatment systems. Peira et al. [27] show that attitudes and behaviour toward unsold food depends on personal experience and role in the supply chain. Farmers usually donate their unsold food to families and pay attention to recycling activities. Groups of peddlers donate unsold goods to non-profit organizations. Hybrids try to reuse waste in the form of compost feed. Bonadonna et al. [28] observed a high level of interest in the ethical and charitable aspects of food waste and unsold food among farmers. Alfiero et al. [29] indicated that the traditional management of unsold food is an essential competitive element in this sector.

Donations of food from the catering sector are legally possible, but they are often difficult due to infrastructural limitations of food service establishments [30]. Donation logistics is a significant obstacle. Another critical issue is concerns about the potential liability for health safety risks associated with donated food, as highlighted by Sakaguchi et al. [31]. These risks might be mitigated by appropriate legislation. An example of such legislation is the Bill Emerson Good Samaritan Food Donation Act [32]. Some countries, including France and Italy, have introduced appropriate legal acts to encourage donations of unsold food in the trade and hospitality sectors [33,34]. Financial incentives for donors are important as well. In Poland, the Act on VAT [35] has been in force since 1 October 2013. The Act has abolished the obligation to pay VAT on food donations. One of the tools that might help businesses to reduce food wastage is the provision of support for the actions they undertake, for example, by developing procedures that will allow them to make rational use of food for socially useful purposes within the framework of the existing

legal rules concerning food health safety [36]. Meal management in food service businesses should match the waste hierarchy, which presents priorities for the most efficient use of resources from most to least favoured options [37]. The most preferred option is prevention; however, not all food waste can be avoided. Where prevention is not possible, the recycling of discarded food is the next preferred option [38].

Despite the fact that food service businesses are significant food waste producers, they have received less academic attention than other food waste producers, e.g., households [37]. The article refers to the management of meals in the context of food waste in food service establishments. It should be emphasized that this aspect has not been sufficiently examined and described so far in the food service sector.

The aim of this paper is to analyse: (1) the methods of management of meals in food service establishments: preparation of dishes in advance and menu planning; (2) the methods of management of unsold meals; (3) management of plate leftovers; and (4) waste management. The research was conducted among employees and owners of food services establishments.

2. Materials and Methods

Each methodology seems to have its own strengths and weaknesses and the problem is how, where and when to measure the phenomenon [39]. Chaboud [40] pointed out that the quantity or rate of FLW (Food Loss and Waste) alone may not be sufficient to justify the research interest and guide policy intervention. The study was carried out using a qualitative research method in the form of focus group interviews (FGI). The focus group interview is one of the essential methods of qualitative research, consisting in a detailed, insightful conversation with respondents who can also exchange information and discuss a given topic. With its group discussion efficacy, the focus group interview can provide interaction-based insights that may not surface in experiments [41]. The purpose of the study based on a focus group interview is to obtain precise information and expand knowledge on the relevant topic. During the interview, exploratory questions are asked to explain/understand the phenomena involved in the issue under analysis.

The subsequent stages of the FGI research carried out in the study are presented in Figure 1.

2.1. Sampling

When selecting the research sample, we were guided by the principle that in qualitative studies, it is common that data are based on 1 to 30 informants [42] and the sample size was determined on the basis of informational needs [43]. A purposive sample of employees and owners who currently work in food service establishments for at least a year in the three locations categories was recruited. Focus group participants represented the following location categories:

- Small towns with a population of up to 50 thousand;
- Towns and cities with a population of 50 thousand to 200 thousand inhabitants;
- Cities with a population of more than 200 thousand.

An open invitation to participate in the research was sent to thematic groups on social media and also published in the local press covering a city with a diverse number of inhabitants, i.e., Lodz (city with over 200,000 inhabitants), Piotrkow Trybunalski (city with 50,000 to 200,000 inhabitants), Lowicz and Kutno (cities with less than 50,000 inhabitants). As a result, the number of respondents reached via the invitation cannot be determined. People who expressed their willingness to participate in the study contacted the persons carrying out the study by e-mail or phone. Contact details were given in the invitation to the study. During the initial interview, all who participated in another qualitative research carried out with the FGI method the previous year were eliminated. Qualified participants received information sheets about the study.

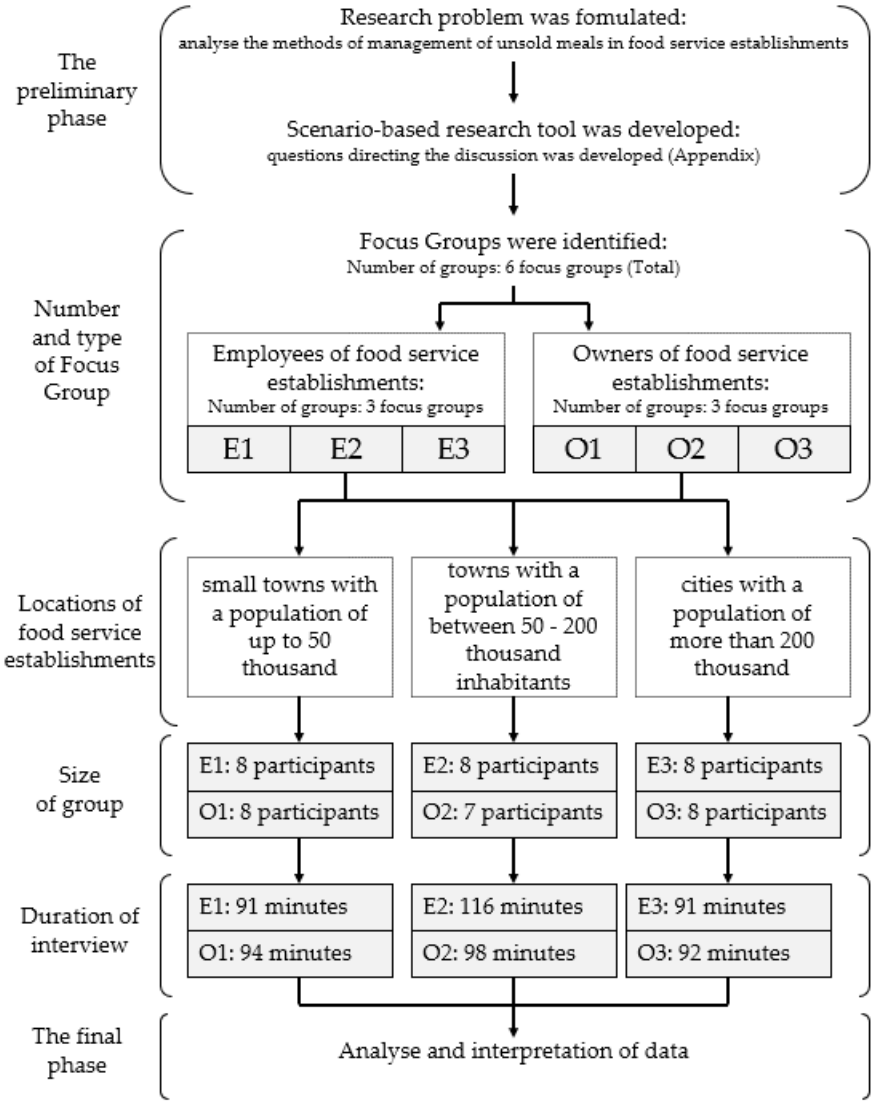

Figure 1. The subsequent stages of the FGI research carried out in the study.

2.2. Data Collection and Data Analysis

In the first stage of the study, a scenario-based research tool was developed (Appendix A). The interview scenario was created based on gaps/deficiencies identified by researchers in previously conducted quantitative research [18,44]. The study was conducted between 24 January and 3 February 2020 in 4 locations, i.e., in Lodz, Piotrkow Trybunalski, Lowicz and Kutno.

Three interviews with employees of food service establishments (E1, E2, E3) and three interviews with owners of food service establishments (O1, O2, O3) were carried out (Figure 1). Each interview was conducted in a stationary form, in a professional room adapted to research using the FGI method, i.e., equipped with an audio-video recording system. During each of the six interviews, an experienced moderator with appropriate qualifications and knowledge in FGIs was present and conducted interviews with a group of employees or owners of food service establishments (7–8 participants).

The interviews were recorded in audio formats. Next, the audio records were transcribed and submitted for analysis. The focus group interviews lasted from 90 to 120 min and were recorded using an audio format with the respondents' consent, which later enabled us to prepare a complete transcript of the interviews. Data collected through FGI have been thoroughly analysed through a qualitative content analysis, where data were

presented in words and themes. In addition, in a manifest analysis, authors described what the informants actually said, using the same words [45].

3. Results

A total of 47 of participants were recruited. The participants' characteristics are summarized in Table 1.

Table 1. The participants' characteristics (n = 47).

Characteristics	Group	Number of Employees *n* (%)	Number of Owners *n* (%)
Number of participants	Total	24	23
Gender	Female	15 (62.5)	13 (56.5)
	Male	9 (37.5)	10 (43.5)
Place of food service establishment	city < 50 k	8 (33.3)	8 (34.8)
	city 50–200 k	8 (33.3)	7 (30.4)
	city > 200 k	8 (33.3)	8 (34.8)
Category of food service establishment	Restaurant	14 (58.3)	6 (26.1)
	Bar, incl. Pizzeria, Dumplings	6 (25.0)	15 (65.2)
	Cafe	1 (4.2)	1 (4.3)
	Catering	1 (4.2)	-
	Pub	1 (4.2)	1 (4.3)
	Canteen	1 (4.2)	-
Position in food service establishment	Food supplier	2 (8.3)	-
	Cook	9 (37.5)	-
	Manager/assistant manager	9 (37.5)	-
	Waiter	4 (16.7)	-
	Owners	-	23 (100)

3.1. Preparation of Dishes in Advance

One of the critical issues that should be considered in the aspect of food waste in the food service sector is that many dishes are prepared in advance. This method of preparing food depends on the type of dishes served by a given food service outlet. As a rule, efforts are made to prepare as many dishes as possible on an ongoing basis, in response to specific customer orders. However, some dishes need to be prepared in advance to achieve the desired taste characteristics and properties (for example, various types of cakes, desserts, as well as roast meat and sauces).

> *Unfortunately, we prepare a lot of products in advance. Maybe not much in advance, but still some time earlier, right? For example, in the said apple pie or layer cakes, sponge cake must be combined with cream at some point so as to obtain the desired taste characteristics. Some of the desserts are frozen with chocolate mousses and whipped cream, which also requires freezing, so it's done in advance.*
>
> *[FGI_owners of food service establishments_1]*

The respondents also said that they prepared semi-finished products in advance, which they later used to prepare dishes.

> *There is always fresh broth in the kitchen, it is cooked every day and it must be so. When we cook onion soup or something similar, we have some broth ready (. . .).*
>
> *[FGI_owners of food service establishments_2]*

Owners of small food service outlets in small towns often admit that they prepare dishes in advance. They cook food earlier or leave unsold dishes for the next day, for example bigos (hunter's stew), stuffed cabbage, stews, soups or pasta dishes.

> *Well, some dishes need to be cooked earlier, such as traditional Polish cuisine dishes, hunter's stew or sour rye soup, which taste better after some time. Some types of dumplings also taste better when they are prepared the previous day.*
>
> *[FGI_owners of food service establishments_3]*

The above answers of owners of food service outlets are confirmed by their employees, who say that some dishes, e.g., soups, taste better after a certain time of storage than freshly prepared dishes. In addition, the employees emphasized that the preparation of dishes in advance had enabled them to organize the production process more efficiently.

> *It is not possible to prepare everything in one day, right? That is why some products are prepared earlier. (...) For example, meat can be roasted for about 6 h and then is vacuum-packed and labelled with dates.*
>
> *[FGI_employees_1]*

It is important to make sure that such a product is properly secured, packaged and labelled with a date to monitor its suitability for consumption. Products and dishes prepared in advance are stored in a precisely defined manner and in very specific conditions controlled by both the owners and chefs.

Where a dish, e.g., meat, is prepared earlier in larger food service establishments (restaurants, hotels) equipped with appropriate technical and technological facilities, it is vacuum-packed and possibly additionally heat-treated in an oven, which makes it fit for consumption for a much longer period.

> *Then, yes, we put stickers with dates on the packages. When everything is OK, that is when things are vacuum packed and there is no leakage there, (...) and no air gets inside, then all these processes are stopped. You can additionally steam it in the oven, i.e., pasteurize it. In this way, everything is fit for consumption even after a longer period.*
>
> *[FGI_employees_2]*

3.2. Flexible Menu That Takes into Account Inventory Levels

Menu planning combined with inventory management is an individual matter in each food service outlet. Food service outlets offering a permanent menu (e.g., restaurants) are less able to make the menu more flexible by food inventory tracking. However, also in this type of food service outlet, measures are taken to make better use of ingredients and supplies, e.g., specific menu items are recommended to guests by the restaurant staff. The staff also recommends specific dishes when advising customers on special event menus (e.g., banquets). On the other hand, in places serving breakfast, menus can include seasonal items or the special of the day, making it easier to combine menu planning with inventory management to ensure that products are used up before their "best by" date. Food service outlets that offer different dishes on the menu every day combine flexible menu planning with inventory management, also taking into account seasonal products.

> *We have such breakfast, once a week on Sunday we serve buffet-style breakfast between 11 and 15. Guests can help themselves. You pay and you can eat as much as you want. And this is completely tied to inventory management. That is, we do it to reduce the costs of the breakfast, but also to serve something new every week. We check what supplies we have, and exhaust them on a daily basis. In this way, we reduce costs and it also encourages us to be creative and continuously look for new recipes.*
>
> *[FGI_owners of food service establishments_4]*
>
> *When I order too many pickled cucumbers, we prepare cucumber soup. When I order too much sauerkraut, we cook cabbage soup. When I buy too much pasta or something, we cook penne pasta with chicken, spinach or salmon.*
>
> *[FGI_owners of food service establishments_5]*

Another increasingly popular trend in the food service industry is the maximum usage of raw materials. Owners declare that they are trying to use 100% of the product, even apple or pear peelings and their cores. However, there are still places where internal procedures do not permit the reuse of leftovers remaining after processing a given product or store food items not purchased by consumers on a given day or to offer them to the staff. In such situations, it is common practice to throw these products and dishes into garbage bins.

Sometimes we invent special promotions or a new dish, to encourage guests even more, but nothing can remain, yes, nothing can go to waste, because it would be a shame to lose money.

[FGI_employees_3]

What matters to us is the menu, because there is a menu card, but it is the task of our waiters to suggest what they recommend on a given day.

[FGI_employees_4]

Whenever it is possible to use products that we have in large quantities in our storage room, we make sure that wastage is reduced to a minimum, e.g., when we bake products in quantities larger than usual, our cake shop offers these products at a promotional price, for example when we have a lot of fruit in the storage room that might otherwise spoil quickly. The price is reduced, and products are sold as promotional items to prevent wastage.

[FGI_employees_5]

3.3. Unsold Food Management

Another issue associated with food management is what to do with food that has been prepared but has not been served to customers. Owners of food service outlets declare that such food can be consumed by employees and consider it to be a relatively widespread practice.

Yes, yes, but this is already a standard practice. It is better to give it to someone to eat than to throw it away. Another issue is that it is better to let them eat it than they sneak out and eat it behind the door in the toilet or somewhere. Here you are, let's eat it and that's it.

[FGI_owners of food service establishments_6]

It is worth noting, however, that employees of food service outlets less frequently mentioned such an option. Of course, some food service outlets adopt such a practice, but employees are not allowed to take such food home. In other outlets, employees may receive it as part of their lunch or may purchase a meal at a preferential price. Only employees of small, family-run food service outlets, more often from small towns, are allowed to take unused food home. However, this is not the case in larger food service businesses with more employees. It should be noted that the internal rules concerning meals for employees are established by the owner of a given food service outlet, who also decides whether or not employees may take home the food that remains at the end of the workday.

(...) when food remains (...) at the end of the day, (...) we simply take it home. We share it—the boss takes one half and I take the other half, (...)... Of course, everything is eaten up. My child can have it for dinner at home.

[FGI_employees_6]

The owners of food service establishments were also asked to specify what they did with the products that remained after the preparation of dishes or that were not intended for distribution to consumers (e.g., vegetables needed for preparing broth). Vegetable salads and pâtés are produced from vegetables. Respondents also said that vegetables were chopped/cut into smaller pieces and added to soups. On the other hand, meat can also be used to prepare pâté or used as food for livestock or domestic animals (such practices are more common in small towns). Boiled potatoes that have not been served to consumers are used to prepare potato dumplings or Silesian dumplings; rice or groats can be used to make stuffing for other dishes, e.g., stuffed cabbage. However, as a general rule, rice, groats and pasta are constantly cooked for dishes ordered by customers, so not much remains. Similar answers were given by the employees.

> *These foodstuffs are used. For example, if a specific type of meat remains, we have procedures that require us to prepare different spreads from it, such as sandwiches with chicken paste among others. We process all this so that it does not go to waste, yes.*
>
> *[FGI_employees_7]*

Stale bread can be used to make croutons, which are then served with soups or salads, or to make breadcrumbs or, when possible, it can be given to farmers in the country, who may feed it to poultry, for example. One can also soak stale rolls and add them to meatballs.

Withered fruit and vegetables are used to prepare compote, they are squeezed into juice or processed into smoothies or cocktails. As long as they are not spoilt and can be peeled, vegetables are used for cooking broth; otherwise, they are thrown away. One of the owners or employees of a food service outlet declared that even apple or pear peelings and cores were used for preparing compote (fruit stew).

Dishes from bain-marie counters usually end up in garbage bins or, less often, may be consumed by employees or, in the case of paid events, e.g., banquets, handed over to the customer that placed the order.

Dishes that have not been warmed up and/or have not been served to consumers and that can be used the next day, such as soup, are properly secured, labelled with the date and refrigerated. Some food service outlets store dishes that are fit for consumption until the following day and sell them at a reduced, attractive price. In the case of planned events (e.g., weddings, eighteenth birthday parties, banquets), all unconsumed menu items are given to the organizers.

> *Any remaining cakes, rolls or doughnuts are sold at 50% or even lower price the next day and customers can buy them if they want.*
>
> *[FGI_employees_8]*

Several respondents indicated that food was donated to those in need.

One of the food service establishments located in a large city declared that it donated unsold packaged bread to an organization providing support for those in need.

In the case of small towns, there is no cooperation between the food service sector and charitable organizations that would enable caterers to donate unserved food to people in need. It is often difficult or inconvenient to establish such cooperation, because it requires one to comply with complex formal requirements and involves excessive paperwork. Although it seems to be an ideal solution, it is difficult to implement because it causes too much work for caterers. Donation initiatives are also discouraged by media reports concerning caterers who became involved in charitable cooperation and now face difficulties because of non-fulfilment of all formal requirements. Such examples effectively discourage food service businesses from engaging in initiatives aimed at supporting those in need.

In addition, many owners and employees of food service establishments are convinced that they would have to pay tax on donations, which also makes them less willing to engage in charitable activities. Sometimes they prefer to throw food away instead of donating it to people in need because they do not want to deal with numerous formal issues or to incur additional costs. For this reason, some food service outlets leave food somewhere nearby so that people in need can use it. If they provide charitable assistance at all, they give free meals or drinks to specific persons; for example, volunteers who collect money for charitable causes.

> *Charitable campaigns, yes. Charity workers and volunteers come and ask if they can get a free meal. We say yes then, no problem. If we are (...) informed about it in advance, and it has been agreed, it is possible. However, when we are asked for donations, for example, for the homeless or something like that, things are more complicated.*
>
> *[FGI_employees_9]*

The owners of food service establishments pointed out, to a greater extent than their employees, that the food donated to people in need had been prepared but not served to customers. They most often talked about two forms of support: donating food to food banks

or donating food to homeless people who come just before the closing time. According to the respondents, food is more often given to the homeless than charity organizations.

Well, we give it to a food bank or when one of the homeless persons comes, but we don't throw it into the garbage bin.

[FGI_owners of food service establishments_7]

Well, in my place too, homeless people would sometimes come at the end of the shift and ask, "Is there anything left?". We would put it into a box then, they will eat it, we won't throw it away. Both sides are satisfied with this.

[FGI_owners of food service establishments_8]

Then we pack it into bags and hang them next to the garbage bin shed; a homeless person will eat it then. But it happens rarely.

[FGI_employees_10]

I usually have very little left. But when I do, I put it in a plastic bag and hang it next to the garbage bin shed.

[FGI_employees_11]

(...) let's take the example of my small café. There are cakes that I am 100% sure are good to eat, right? On the other hand, food in the refrigerated and confectionery counters becomes dry because air gets in from outside. There is nothing one can do about it. Well, it is a problem, because it is difficult to sell such a product then. I once thought that I might reduce the price. However, I gave it up, but when I see in the morning that those men are searching the garbage bins, I pack it in a paper bag and just give it to them, but I don't have any regulars who are used to coming here and waiting for food.

[FGI_owners of food service establishments_9]

To cope with the problem of food cooked in excessive amounts, many caterers sell at a promotional price the next day.

There has definitely been a reduction, because various promotional sales and discounts are offered on a regular basis, every day, so that as little returns as possible.

[FGI_employees_12]

However, some caterers are afraid that customers will stop buying fresh dishes and start ordering much cheaper dishes from the previous day.

I would not like food to remain in large quantities, because then people will get used to buying it the next day...(. . .) and will not buy it on the day it is cooked. And they will come the next day because they know I have cooked too much and will sell for half the price the next day.

[FGI_owners of food service establishments_10]

3.4. Management of Leftover Food/Parts of Dishes Left by Consumers

One important issue is the so-called plate leftovers, i.e., dishes or food items not consumed by customers.

Talking of food thrown away, let's face it, most of it is the food uneaten by customers.

[FGI_owners of food service establishments_11]

From the point of view of the caterers, the most desirable solution is to hand over the remaining portion to the customer, because then they do not need to think about what to do with it. However, this practice is not used by all caterers and not all types of food can be packed for take away. In addition, plate leftovers include uneaten portions and individual food items that usually cannot be eaten on their own or taken away, e.g., individual pieces of vegetables or pizza wedges or uneaten sauce. Moreover, customers are not always interested in taking uneaten food home, especially when they have to pay additionally for the takeaway container.

> *And you know, when an order is up to 10 zloty, then the customer also pays for the packaging. When a customer orders lunch for the whole family for 80 zloty and a piece of cutlet remains, which the customer wants to take home, then of course, we do not charge for the packaging.*
>
> *[FGI_employees_13]*

Representatives of food service outlets from a large city indicated that customers seldom take uneaten food items home. As a general rule, they are left on plates and end up in the bin as unfit for reuse. The owners of food service establishments have also observed that some customers bring their containers and ask for uneaten portions to be packed into them. The scale of the phenomenon is not large, but it happens more and more often now.

The owners of food service outlets where various types of parties are organized point out that this type of event generates the largest amount of plate leftovers because consumers pile too much onto their plates—more than they can eat. The same situation occurs during lunches and other receptions, where multiple dishes are served in the so-called Swedish buffet-style catering. Guests at such receptions often overindulge and do not care about the potential food waste because they do not pay for it. In this context, smaller plates combined with the education of guests can help reduce food waste [12].

During parties organized on various occasions, it was assumed that all dishes would be handed over to the organizers of those events.

One solution to this problem is to adjust dishes to the individual needs of consumers. In most cases, employees of food service establishments admit that they can adjust the ingredients or processing method of a given dish to the individual expectations of the customer—it is possible to modify the dish, e.g., one ingredient can be replaced with another, say rice/salad can be used instead of potatoes, etc. Meat can be sautéd instead of fried in breadcrumbs. It is also possible to modify the size of a portion, e.g., it can be doubled or halved.

3.5. Waste Management

Based on our own research, it was stated that, in large cities, waste usually ends up in garbage containers and, to a lesser extent, in bins for biodegradable waste. It is also fed to animals, but this waste management method is not as popular as in smaller towns. On the other hand, oils and frying fats are stored in special containers and collected by a specialized company in accordance with the applicable regulations. Other waste is collected by municipal waste collection companies.

According to the employees of food service outlets, the most frequently discarded foodstuffs include fruit and vegetables because they spoil easily and are used for decorating dishes. The main reason fruit and vegetables are thrown away is their hidden defects invisible upon delivery, such as cabbage rotten from the inside. The products that are most often thrown away depend on the cuisine that a given outlet specializes in and on the content of the offered menu. Most of them, however, are products with a short use-by date, opened and unused tins and jars (e.g., tuna or corn in a pizzeria), mushrooms, and unused sandwich pastes.

In contrast, when talking about items that are thrown away, the owners of food service outlets mostly mention peelings, skins and other parts of vegetables and fruit that cannot be used in the kitchen.

Employees report that the amount of discarded food is small. However, there are noticeable differences between food service outlets in small towns and large cities. The ones from smaller towns throw less food away. Employees of food service outlets from large cities much more often indicate that food is thrown away into garbage bins, emphasizing, however, that it is done in accordance with the applicable waste segregation rules. In small towns, waste is sometimes transferred as animal feed or composted. The transfer of leftovers is rarely regulated by an agreement and even when such an agreement exists, it is an oral one. Such a solution is convenient both for the caterer, who has no problems with waste disposal, and the recipient, who can feed it to animals at a low cost.

4. Discussion

In the opinion of both the employees and the owners of food service establishments, the amount of food thrown away is not significant and mostly includes perishable foodstuffs and food discarded when preparing dishes. As pointed out by researchers [46,47], food service providers tend to either underestimate the actual scale of FW. At the same time, the respondents admitted that many foodstuffs thrown away were fit for further use, for example, withered fruit and vegetables or products with no signs of spoilage but whose packages had been opened (avoidable food waste). Furthermore, Papargyropoulou et al. [48] point out that fruit and vegetables account for the largest percentage of avoidable food waste in hotel restaurants, followed by cereal products, fish and seafood, and meat. This is in line with the findings reported by Filimonau and Ermolaev [47], from which it follows that most FW in commercial food services is represented by such fractions as fruits and vegetables, meat, and bakery items. Meanwhile, as Bharucha [49] notes, even the leftovers can be used to prepare dishes. For example, about 30% of restaurants in Mumbai use peels discarded during food processing, such as lemon peels, to prepare marmalade and leftover skinned peanuts are powdered and used for garnishing or to add flavours to the preparations [49]. Another solution is to modify the operational processes. For example, to reduce the risk of discarding withered fruit and vegetables, caterers have to modify their storage and/or optimize their production process (order planning, menu cards) [50]. Some of the establishments under examination try to adapt the menu card to the inventory levels. Food service outlets offering a permanent menu are less able to make the menu more flexible.

Food service outlets in smaller towns throw away less food. A relationship between the food service establishment location and the amount of food thrown away was also identified in research conducted by Wang et al. [51] and Okumus et al. [52].

Differences have also been identified in food waste management methods. Establishments in smaller towns more often transfer it as animal feed or compost such food. This may be related to easier access to farms. By interviewing food service providers and farmers, Filimonau and Ermolaev [47] observed the willingness of selected stakeholders to uptake industrial symbiosis as a means of food waste recovery, but also as an opportunity to reinforce the social and network capital of food service operators and farmers. On the other hand, employees of food service outlets in larger towns most often throw waste into a garbage bin. This food waste management method should be considered the least appropriate as it has a negative impact on the environment. At the same time, it is the easiest method of disposing of waste from the managerial perspective [53]. The fewest objections one may have, applies to the handling of used oil and frying fats. In all food service outlets under analysis, these were collected by specialized companies in conformity with the applicable regulations.

As demonstrated by the study, cooperation with charities is still at a very low level. This can be attributed to the fact that caterers are afraid of legal consequences that they may face due to potential safety concerns associated with the food they transfer. They are also discouraged by the excessive paperwork. The respondents did not have knowledge about the current Polish legislation on food donations, which exempts donors from the obligation to pay VAT. Several respondents declared that they donated food informally, e.g., they left food next to waste bin sheds. This method of food disposal raises several concerns, both in terms of maintaining its health safety and ethical aspects. Food intended for consumption should be, above all, safe. Therefore, it is important to protect it against various types of contamination (chemical, microbiological, physical), including contamination by pests. In addition, it is necessary to maintain appropriate food storage conditions, especially the temperature. Failure to ensure the proper storage temperature for food is one of the most common causes of food poisoning or spoilage [54]. The conditions in places where waste is stored (e.g., so-called garbage bins) certainly do not satisfy the above-mentioned requirements.

During the completed research, an interesting observation was made that the owners of food service establishments had pointed out, more often than their employees, that they had only donated food to people in need which had been prepared but not served to customers. The discovered discrepancy may be attributable to the fact that the owners of food service outlets feel more guilty about wasting food than their employees. Unfortunately, concerns about formal issues associated with food donation to charitable organizations compel caterers to choose less problematic ways of disposing of unsold food items. As observed by Goh and Jie [55], more and more employees of the hospitality sector do not perceive food waste as unethical behaviour, which is a worrying trend. Training on these issues should be provided both for employees and owners. Moreover, they should also be educated about the legally permissible ways of redistributing food to non-profit organizations. Goh and Jie [55] concluded that many employees of the hotel sector felt guilty about wasting food and that this sense of guilt may their behaviour and reduce that undesirable phenomenon.

It should be emphasized that safe food should, first of all, be redistributed for consumption purposes [56]. Many authors indicate that surplus food from the catering sector may be transferred to people in need [49,57–59]. For example, in the United Arab Emirates, leftovers after events such as weddings may be donated to a charitable organization provided the quantity is sufficient for at least 50 people [60]. Another example comes from the United Arab Emirates, in an effort to combat food waste during Ramadan where the Red Crescent Society (RCS) operates the "Hefth Al Ne'ma" programme [61]. Amato and Musella [59] observed, on the one hand, the relatively high interest by business owners to donate to charitable organization but on the other hand, this method is still difficult to perform, probably because of a proper organization.

As reported by the researchers, the owners of food service establishments declared that unsold dishes could be eaten by employees and considered it a fairly common practice. It is worth noting, however, that employees of food service outlets rarely mentioned such a possibility. Bilska et al. [44] stated that this was not a common practice in Polish food service establishments (only one in ten, out of 130 establishments under examination, allowed employees to consume such dishes). In contrast, Tomaszewska et al. [18] concluded based on the research conducted in 4 hotels that dishes not consumed and left by the hotel guests were transferred from the breakfast buffet to the staff buffet. In Chinese restaurants, as found by Filimonau et al. [46], it is quite a common practice to prepare meals for employees from unused ingredients.

Another way to reduce food waste in the food service sector is to sell meals at a promotional price. In this regard, however, owners of food service establishments raised concerns about such a business model.

According to the respondents, the greatest amount of food is wasted during parties organized on various occasions, because their hosts order too many dishes. Another cause of food waste is self-service due to which guests leave large amounts of the so-called plate leftovers. Some serving strategies can reduce food waste, e.g., preportioning food items so that customers will not take too big slices [62], using smaller dinnerware and refilling the dishes more often. According to Thyberg and Tonjes [14] and Gunders [15], the two main factors affecting food waste in all-you-can-eat facilities are plate waste and food surplus. Food surplus is mainly caused by the difficulty in forecasting consumer demand [58]. Generally, plate leftovers in the foodservice sector may result, for example, from ordering too many dishes [48] or by customers dissatisfied with the quality or taste of dishes [63,64] or who receive portions not adjusted to their needs [65]. In the opinion of Berkowitz et al. [66], offering different portion sizes may be effective in some cases. Ravandia and Jovanovic [13] suggest reducing the size of plates, which could reduce food waste by up to 30%. Thaler and Sunstein [67] propose implementing the concept of a choice architecture that would change customer behaviour in a predictable way. Huang and Tseng [68] highlights that the relationship between consumers' attitudes and consumer plate waste is mediated by behavioural intention and food waste behaviour in restaurants.

According to the respondents, the most convenient solution is to offer customers the possibility to take home any food surpluses or plate leftovers. However, customers of restaurants are not always willing to take plate leftovers home, especially when they have to pay extra for the packaging. On the other hand, it has already become a standard to take away food that remains after a party by the ordering person. It should be noted that this is the only way to dispose of unconsumed food because, as a general rule, it cannot be served again [48,69,70]. Talwar et al. [71] suggest that food service outlets should encourage consumers to take away leftovers without feeling embarrassed about it.

Limitation and Future Research

The main limitation is that the survey was dominated by respondents employed in restaurants. We strongly suggest future studies to collect data from different types of food service establishments. According to the respondents, the amount of food thrown away is not significant. In our opinion, other study methods should be used, e.g., diaries, to specify the quantity of wasted food.

We observed that one of the main causes of food waste, according to respondents, is plate leftovers left behind by consumers. Future researchers should consider conducting consumer research to understand why leftovers are left and how they can be prevented. Moreover, such research will provide insight into the behaviour (worries) of consumers related to taking away leftovers.

5. Conclusions

As can be concluded from the interviews with both the employees and the owners of food service establishments, the amount of food thrown away in the catering sector is not large. Nevertheless, there are situations where waste does occur. The interviewees indicated that wasted food included, above all, perishable food and food discarded while preparing dishes, as well as potentially usable products, e.g., withered fruit and vegetables, so-called avoidable food waste. This proves that it is necessary to reorganize the relevant work procedures.

As declared by the participants in the qualitative research, plate leftovers account for a significant proportion of the food wastage in food service establishments.

In some food service establishments, measures are taken to reduce the amount of plate leftovers, e.g., by allowing the consumer to take the uneaten portion home or by enabling them to order food items in a more flexible way.

As has been shown, caterers have problems with adjusting the supply to the demand. Many dishes are prepared in advance. To achieve a maximum reduction of wastage of dishes prepared in advance, greater emphasis must be placed on the cooperation between food service establishments and charitable institutions. At present, such cooperation is hampered by the lack of knowledge about the current donation law, due to which restaurant owners are wrongly convinced that the donation procedure is complicated.

The results of our study may be used by government and non-government organisations to prepare for strategies on food waste reduction in the food establishment sector.

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Appendix A

1. Are the dishes prepared in advance?
    - If YES, for what reason?
    - What dishes (groups of dishes) are prepared in advance?
    - How long are they kept?
    - How are they prepared?
    - Are there developed procedures for handling previously prepared dishes? If YES, please describe them.
    - Are the dishes prepared in advance marked with the production date? If YES, in what way? If NOT, why?
    - Is food prepared in advance cooled down immediately after heat treatment?
2. How do you rate the degree of flexibility in the use of inventory resources to prepare your menu in relation to your inventory?
3. Now, I will present to you a few situations related to the use of food products and then ask you to refer to each of them and define how you handled the given situations:
    - What do you do with the products / raw materials used to prepare the dishes and not the ones dispensed to consumers (e.g., products needed to prepare the stock)?
    - What do you do with boiled potatoes, rice, pasta, and flour dishes that have not been served to consumers?
    - What do you do with stale bread?
    - What do you do with withered fruit and vegetables? To what extent are they used in the preparation of dishes?
    - What do you do with products that have been bain-marinated (kept warm) and not dispensed to consumers?
    - What do you do with dishes (salads / salads, hot and cold snacks, soups, sauces, meat, fish, vegetarian, flour dishes) that have not been heated and / or delivered to consumers?
4. What kind of food products are most often thrown away in your catering establishments?
    - What are the reasons for this?
    - How often do you throw away food?
    - Please estimate how much edible food (e.g., unsold products, out-of-date, etc.) is thrown away during the day/week?
5. How often do consumers leave uneaten dishes on their plates?
    - What is the most common among uneaten ingredients?
    - What do you think are the reasons for leaving uneaten dishes (so-called plate leftovers)?
    - How do you deal with these so-called plate leftovers?
6. Is it possible to order half a portion? If NOT, why?
7. Is it possible to modify the composition of the ordered food?
    - If so, to what extent—each element of the dishes or only individual elements?
    - If not, why not?
8. And can consumers take unfinished food home?
    - If NOT, why?
    - If YES, how often do you pack unfinished takeaways? Can customers pack unfinished dishes into their own containers?

- Are there any additional costs for customers, such as packaging?

9. Please briefly indicate what you do with food waste:
   - Inedible by-products such as peelings and eggshells?
   - Used oil / frying?
   - Unsold foods.
10. Do you cooperate with a charity organization? If NO, why? Do you see the possibility of such cooperation? If YES, with what organization? What dishes do you provide?

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