Reducing food waste at trade fairs in Spain: The impact of interventions implemented by Gastrofira

Food waste reduction interventions significantly decrease food waste across four trade fairs in Spain

Overview

The need

Gastrofira is increasingly aware of the environmental and social impact of the food system. As such, they are committed to offering more sustainable catering services for their clients.

The solution

Gastrofira analysed two different types of food service, at two trade fairs in Spain (one international, one national). The analysis involved: 1) establishing baseline food waste levels, 2) identifying potential interventions to reduce food waste, 3) implementing the interventions, and finally 4) measuring the impact of the interventions.

The benefit

Although it's difficult to ascertain the true impact of each intervention, there were significant reductions in food waste at the trade fairs following implementation. Furthermore, this project has started a process of food waste monitoring and prevention that could be replicated by other catering companies in the future.

Gastrofira is the catering service of the Fira de Barcelona, one of the major trade fair institutions in Europe. They provide catering services for corporate events in both small- and large-scale venues, and offer a wide range of menus, including: coffee breaks, fingers menus, gala dinners and cocktails.

Background

The importance of tourism for the Spanish economy, and the nature of big events (trade fairs) – namely an inclination for a certain degree of opulence and the prevalence of a "use and throw away" culture – are of high concern in the fight against food waste in Spain.

Gastrofira, are aware of the potential environmental impacts associated with the different catering services they offer, and are commited to finding more sustainable alternatives for their clients who are willing to accept them. This action aligns with the "Action Plan Gastrofira", implemented to enhance Gastrofira's environmental performance: *Plan de Sostenibilidad de Gastrofira "¿Serlo o parecerlo?"(Sustainability plan of Gastrofira, to be or to appear to be)*. It was in this context that Gastrofira was interested, firstly, in becoming a member of the REFRESH Spanish Pilot Working Platform and, secondly, in deciding to participate with a pilot project.

Prior to REFRESH, Gastrofira had already been involved in the fight against food waste; helping to evaluate the environmental impact of previous fairs and working

collaboratively with a local NGO (Nutrition without borders) to redistribute surplus food to those in need. Being part of REFRESH has served to reinforce their effort to tackle the issue of food waste.

What was the solution?

The REFRESH Spanish Platform had established the hospitality sector as a priority sector for food waste reduction in Spain. Therefore, following meetings between Gastrofira and CREDA (Centre De Recerca En Economia I Desenvolupament Agroalimentari) a two-year project to tackle food waste in this sector was defined. The objective of the project was to evaluate the food waste situation in two types of food services offered by Gastrofira, and to establish potential solutions to prevent and reduce food waste.

The services (Table 1) were offered at two different fairs in 2017 to:

1. Establish baseline food waste levels
2. Determine causes of food waste
3. Propose appropriate interventions which may lead to food waste reductions

The services were then offered at the same fairs the following year, where the interventions were now implemented. Measurements could then provide an indication of the impact of adopting these interventions.

Table 1 - The two types of service offered and evaluated

	Service A	Service B
Two types of service	3 dining-rooms ~ 2000 diners per day International fair Finger menu	1 dining-rooms ~ 200 diners per day National fair Buffet menu
2 years	Baseline 2017 Intervention 2018	Baseline 2017 Intervention 2018

The manager of Gastrofira was engaged and commited thoughout the project and provided all the internal resources and personnel necessary to facilitate both the baseline quantifications and the implementation of interventions.

Implementation

Following project design, two fairs were selected, in which the two different food services could be provided and analysed. Using various approaches, members of CREDA then quantified the amount of food waste produced at each of these different stages (Figure 1). Measurements represented food waste over the entire length of the fair and the same approaches were adopted in 2017 and 2018, to make sure results were consistent and comparable.
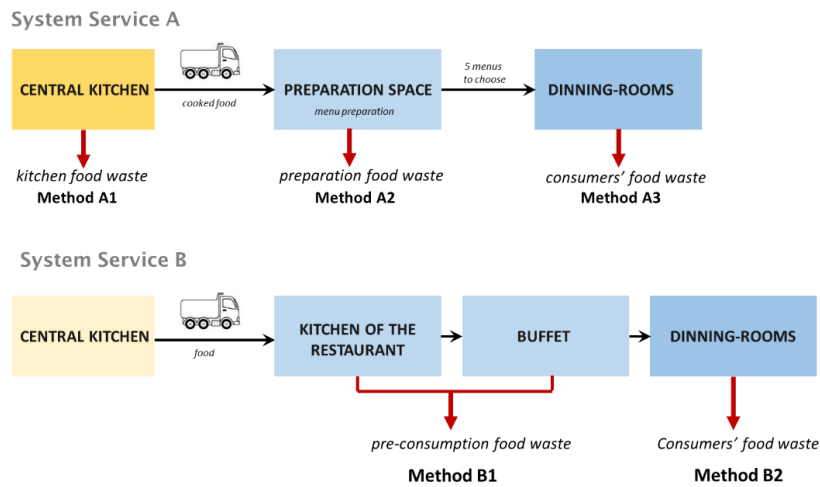
System Service A

CENTRAL KITCHEN → *cooked food* → PREPARATION SPACE *menu preparation* → *5 menus to choose* → DINNING-ROOMS

kitchen food waste
Method A1

preparation food waste
Method A2

consumers' food waste
Method A3

System Service B

CENTRAL KITCHEN → *food* → KITCHEN OF THE RESTAURANT → BUFFET → DINNING-ROOMS

pre-consumption food waste
Method B1

Consumers' food waste
Method B2

Figure 1 - A diagram of the two different food offers and expected areas of food waste along the chain

Food waste monitoring methods (Figure 1):

- **Method A1:** Participant observation and direct weighing with scales. 2 people, visiting the central kitchen twice per day during 11 consecutive days (preparation of food and during the fair). At the end of the day trash bins were weighed to quantify kitchen food waste. Other secondary data was used, such as food purchasing or production. During 2018 kitchen waste was excluded from the scope.
- **Method A2:** Participant observation and estimation based on data provided by Gastrofira. Uses the number of menus prepared and the weight of each menu based on observation and chef's knowledge.
- **Method A3:** Food waste from consumers was collected in trash bins together with other materials (napkins, paper and plastic dishes). At the end of the service, all trash bags were weighed and 20% of the bags were opened. From these opened bags, food waste was sorted from the other materials. Food waste per day was estimated based on the bags that were sampled.
- **Method B1:** Participant observation and estimations based on direct weight and information from chefs. All the food prepared and exposed in the buffet line was estimated.
- **Method B2:** Consumers' leftovers were collected by waitresses and sorted into trash bins. At the end of the service the research team weighed all the trash bins which contained only food waste.

Following measurements made in 2017, Gastrofira worked with CREDA to establish which interventions (both pre-consumption and consumer level) were likely to be most impactful in reducing food waste. The interventions were then implemented at both fairs in 2018. Food waste measurements were then taken once again at each of the listed stages.

Outcomes

Service A

In 2017, 7,332 diners attended the international fair. For each person that attended the event there was an estimated 407.6 grams (Table 2) of food waste (305 grams/per capita from preparation and 102.6 grams/per capita from consumers plates). Observations on expected causes of food waste included:

- Central kitchen food waste
    - Mainly leftovers from preparation
    - Mostly inedible food (lemon peels, etc.)
    - However, most of the food was either semi-prepared or pre-prepared food, therefore there wasn't much preparation food waste

- Preparation space food waste (a separate space where meals were prepared, outside of the kitchen)
    - High amounts of food waste due to high security margins, and imbalances in the number of expected clients and the number of actual clients
    - Avoidable food waste
    - Limited food waste due to preparation
    - Very short expiration dates of surplus food and cold chain guarantee

- Dining room food waste
    - Leftovers from clients
    - Avoidable food waste
    - No fixed pattern observed in clients (some of them left desserts whilst others left a little amount of food across multiple dishes)
    - 5 fixed menus with no variation possible (4 days of fair)

The interventions highlighted to tackle these issues included:

- 5% reduction of the security margin from pre-booked diners
- Reduction from 5 dishes per menu to 4 dishes per menu maintaining the weight of the menu
- Digitalisation of the food order system for the kitchen

Figure 2 – Images of dishes offered in Service A, the left image represents five dishes from the Japanese menu in 2017, whilst the right image represents four dishes from the Japanese menu in 2018.

In 2018, following the interventions, there was a clear impact on levels of food waste at the international fair. There was almost a 50% reduction of preparation space food waste per capita and 14% reduction in the consumers' food waste per capita (Table 2). However, the reduction in preparation food waste cannot be fully explained by reductions in security margins, as there was likely a combination of influential factors. For example, in 2018 the booking clients pre-booked 8% less dinners.

In addition to the designed reduction in number of dishes per menu (from 5 to 4) other unknown factors may have influenced consumers' food waste from the dining room. Nevertheless, it seems there was still substantial reductions in consumer food waste per capita, from 102 grams per capita in 2017, to 88 grams in 2018 (Table 2).

Table 2 – Food waste figures for the international fair (Service A), separated into preparation space food waste and dining-room food waste

PREPARATION SPACE					
	2017	**2018**		**2018-2017**	
Total diners	7,332	7,793		461	6%
	(grams)	**(grams)**		**(grams)**	**% reduction/over 2017**
Food waste preparation space per capita	305	136.8		-168.3	-55%
DINING-ROOM SPACE					
	2017	**2018**		**2018-2017**	
	(grams)	**(grams)**		**(grams)**	**% reduction /over 2017**
Food waste dining-room per capita	102.6	88.6		-14	-14%

Service B

In 2017, the estimated food waste per capita of clients attending the national fair was 438 grams (Table 3). It was anticipated the causes of this food waste were:

- Pre-consumption food waste
    - Overproduction due to imbalance of expected clients and actual clients
    - Expiration date of certain food products
    - On the last day of the fair there was more food waste

- Consumers food waste
    - Little food waste observed per capita. The buffet system could have had an influence. First course (salads, cold meat, etc.) exposed in small dishes and clients took the main course after eating the starters. Main course served by Gastrofira's waitresses.
    - Garnish food waste

The interventions highlighted to tackle these issues included:

- Re-adjusting the cooking to the actual number of clients each day, to avoid preparing too much food
- Adjusting food quantities to meet the expected number of clients
- Using different food waste reduction messages on the tables at the buffet line (Figure 3)
- Providing leaflets at the buffet line (Figure 4) to:
    - Inform about food waste prevention actions from Gastrofira
    - Increase food waste awareness

Figure 3 - Food waste reduction messages used on the buffet line - the left reads "Choose with moderation" and the right reads "Share with your colleague if you don't want so much

Figure 4 - The food waste reduction leaflet provided at the buffet line for Service B

In 2018, following the interventions, the national fair exhibited a 22% reduction of food waste per capita (Table 3). This reduction was anticipated to be due to pre-consumption interventions, as the consumer food waste actually increased from 61 grams/capita in 2017 to 75 grams/capita in 2018. It was therefore expected that the leaflets supplied had little impact on food waste levels. However, as previously highlighted the food waste was mainly from garnish, so it would be interesting to test the same strategy on other types of service (e.g. Service A).

Table 3 – Food waste figures for the national fair (Service B), separated into pre-consumer and consumer food waste

DINING-ROOM				
Food intake	335,100	359000	23,900	7%
Total number of clients	585	567	-18	-3%
Consumer food waste	**35,400**	**43000**	**7,600**	21%
Consumer food waste per capita	**61**	**75.8**	**15**	25%
Pre-consumer food waste per capita	**378**	**267.9**	**-110**	-29%
Total food waste	**256,400**	**194,900**	**-61,500**	-24%
Total food waste per capita	**438**	**344**	**-95**	-22%

Thoughts for the future

Gastrofira are committed to continue food waste reduction. They will work on:

- Improving the design of the gastronomic offer to minimize food surplus. The improvements must be attractive to consumers and must satisfy all kind of clients (vegans, vegetarians, kosher, halal, gluten free, lactose free, etc.).
- Working with direct clients (the company not the end consumer) on pre-orders, based on historic data of final clients attending pre-ordered lunches.
- Working to avoid absenteeism of attendees booked at restaurants, to avoid food surplus from cooked menus.
- Exploring new redistribution channels for surplus food. The first option is for workers' lunches, the second is to work with Nutrition without Borders NGO. There are also other options being explored.
- Detecting the recipes that are most frequently rejected by diners and that are often wasted, to change the offer or the recipe.

In conclusion, the Gastrofira pilot project has complied with their objectives. Food waste from a large trade fair event has been quantified, demonstrating that no matter the size of an event, a protocol for quantifying food waste and identifying improvements can be created. Moreover, the project provides useful insights for other catering services attempting to quantify food waste in their own operations.

The project showed that small changes can lead to significant reductions in food waste. However, not all prevention strategies appeared successful. It is also important to recognise that this project only tested two different food service offers and further testing (in different contexts) is required to assess potential food waste reductions associated with the interventions.