



University
of Stavanger

ROBERTO JACCHERI HØYDALSVIK
SUPERVISOR: KAI VICTOR MYRNES HANSEN

Food waste management in restaurants in Barcelona Spain: analysis of improvement implementations

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Forord:

Høsten 2023 var jeg på Erasmus-utveksling ved Ramon Llull Universitetet i Barcelona. Byen er kjent for sin fantastiske matscene og er derfor et ideelt sted å være for å lære om forskjellige kjøkken og restaurantdrift. Jeg vanket i et miljø som var opptatt av mat og matkultur og det ble naturlig å besøke mange spisesteder. Samtaler med ulike restaurant- og hotellpersonale avslørte at mange var ikke godt informert om håndtering av rester og matsvinn. Dette overrasket meg og vekket min nysgjerrighet.

Effektiv avfallshåndtering handler ikke bare om å være miljøvennlig; det forteller deg også hvor god en restaurant er til å holde kostnadene nede og å ha orden på logistikken. Jeg bestemte meg for å se nærmere på dette. Hvorfor kastet disse spisestedene så mye mat? Var det på grunn av måten de lagde maten på eller hadde det noe å gjøre med kundene?

Denne studien er mer enn bare en akademisk øvelse for meg. Det handler om å finne ut hvordan Barcelonas restauranter kan servere deilige måltider uten å etterlate et så stort fotavtrykk på planeten. Jeg håper arbeidet mitt vil hjelpe disse restaurantene til å bli enda bedre og gjøre byens matscene bærekraftig i lang tid fremover.

Jeg vil gjerne takke professor Kai Victor Myrnes Hansen og universitet UiS (Universitetet i Stavanger) for å hjelpe meg med å velge min bachelorgrad fritt og støtte til prosjektet mitt. Jeg vil takke mitt universitet i Barcelona, Ramon Llull IQS, for å lære meg omfattende teori om turisme og hvordan de opererer i Barcelona. Jeg takker alle restaurantene som bidro til dette prosjektet.

Til slutt vil jeg takke mine venner og familie for å støtte meg gjennom denne Erasmus- og bacheloropplevelsen. Med en spesiell takk til min mor.

Preface

My time studying in Barcelona was an eye-opener. Known for its amazing food scene, the city was an ideal place to learn about different cuisines and restaurant operations. But as I ventured from one eatery to another, I noticed something was missing. Conversations with various restaurant and hotel staff revealed a surprising gap in their operations—many were not well-informed about managing leftovers and food waste.

This sparked my interest. Managing waste effectively is not just about being environmentally friendly; it also tells you how well a restaurant is doing at keeping costs down and running smoothly. I decided to take a closer look at why waste was a problem. Why were these eateries throwing away so much? Was it because of how they made their food or something to do with the customers?

This study is more than just an academic exercise for me. It's about finding out how Barcelona's famous restaurants can serve up delicious meals without leaving such a big footprint on the planet. I'm hoping my work will help these restaurants become even better and make the city's food scene sustainable for a long time to come.

I Would like to thank my professor Kai Victor Myrnes Hansen and my university UiS (University of Stavanger) for helping me choose my Bachelor freely and support for my project.

I would like to thank my university in Barcelona Ramon lull IQS for teaching me in depth theory on tourism and how they operate in Barcelona. I thank all the restaurants that contributed to this project.

Finally, I would like to thank my friends and family for supporting me through this Erasmus and Bachelor experience. With a special thanks to my mother.

1. Introduction

Food waste is a pressing issue with significant implications for the environment, economy, and society (Hennchen, 2019). Across the globe, millions of tons of food are wasted annually, contributing to environmental degradation, economic losses, and social inequality. In the context of the food service industry, managing food waste is particularly crucial due to its direct impact on operational costs, sustainability efforts, and customer satisfaction (Nimri et al., 2021) (Coşkun & Yetkin Özbük, 2020).

This paper studies food waste management within Barcelona's renowned restaurant scene, aiming to uncover the underlying factors contributing to waste generation and explore strategies for mitigation and reduction. The goal is to provide knowledge about restaurants in Barcelona for the benefit of other students and researchers who want to study further restaurant in Barcelona and for those who want to get inspiration and knowledge to apply in restaurants in other part of the world (Diaz-Ruiz et al., 2018).

The United Nations' Food and Agriculture Organization (FAO) has pointed out that throwing away food that could be eaten is a big issue all along the supply chain. Researchers like Coşkun and Yetkin Özbük in 2020 have also studied this.

Statistics show that the third-highest amount of food waste occurs at food services (Coşkun & Yetkin Özbük, 2020). The Courtauld Committee in England estimates that food services will generate approximately 10% of all food waste generated in the country by 2025 (FAO, 2022).

Food waste at consumption stage is addressed by (Coşkun & Yetkin Özbük, 2020). During the consumption stage, food waste may occur at home or out-of-home. Food waste in the market of out-of-home food consumption is the food served but not eaten at food service providers.

In my project, I want to learn about Barcelona's context. I will look at what is going on in the kitchen and dining room to find the main causes of waste (Coşkun & Yetkin Özbük, 2020).

This paper seeks to address this gap by conducting qualitative interviews to a selection of

restaurants in Barcelona, ranging from casual dining establishments to fine dining venues. Through these interviews, I aim to gain insights into the practices, challenges, and perceptions surrounding food waste management within the local restaurant industry. By engaging with restaurant owners, chefs, and staff, I aim to understand the dynamics of waste generation, identify barriers to effective waste reduction, and explore innovative solutions employed by forward-thinking establishments.

The rest of the paper is organized as follows. Section 2 introduces theories and key words essential to establish a clear understanding of our investigation. Section 3 presents the methodology. Section 4 presents the findings of our study. Section 5 summarize the findings, provides the limitations and indication for further work.

2. Theory



In this section I will introduce the main theories (Figure 1) and later discuss them with each other. The four theories are: 1) Training for Food Waste Reduction, 2) Food Waste Hierarchy and Supply Chain Management, 3) Classification of Food Waste Types and Technology-Driven Food Waste Reduction

Figure 1: The main theories.

2.1 Theory descriptions

1) Training for Food Waste Reduction

The role of training, as highlighted by (Sezerel & Filimonau, 2023) is crucial in enhancing the competencies of chefs and kitchen staff to manage and reduce food waste effectively. Training can transform the dynamics of food waste in professional kitchens by focusing on several key areas:

- **Enhancing Skills and Awareness:** Training programs can enhance chefs' understanding of how their practices contribute to food waste and equip them with skills for more efficient use of resources.
- **Creative and Resourceful Use of Ingredients:** Training can foster creativity in using leftovers and surplus ingredients, turning what might be considered waste into valuable components of new dishes.
- **Addressing Seasonal and Unqualified Staff:** In environments where unqualified or seasonal staff are common, short yet impactful training programs can be crucial in imparting basic yet essential food waste reduction skills.
- **Long-Term Behavioral Change:** Training is not just about imparting skills but also about fostering a sustainable mindset and attitude towards food waste, aligning professional practices with environmental sustainability goals.

2) Food Waste Hierarchy and Supply Chain Management

Developed by (Parfitt et al., 2010), this theory underscores the significance of understanding food waste at every stage of the global food value chain, from production to consumption. The theory is instrumental in identifying where in the chain food is lost or wasted and in formulating strategies for effective management and reduction.

- **Stages of Food Waste:** The theory categorizes food loss and waste into various stages, including agricultural production, post-harvest and processing stages, transport, storage, processing, distribution, retail, and final consumption.
- **Implications for Management:** By understanding the specific points where waste occurs, strategies can be targeted more effectively. For instance, addressing waste at the retail stage might require different approaches than at the consumption stage.
- **Sustainability Goals:** This theoretical framework aligns with the United Nations' target 12.3 of the Sustainable Development Goals, aiming to reduce food waste throughout the supply chain. It emphasizes the role of measurement and quantification in managing and reducing food waste.

3) Classification of Food Waste Types

(Parfitt et al., 2010) and (Sezerel & Filimonau, 2023) provide a framework for categorizing food waste, which is crucial for understanding the nature of food waste and developing appropriate management strategies. This theory divides food waste into categories based on its avoidability and edibility.

- **Types of Food Waste:** The classification includes avoidable, partially avoidable, and unavoidable waste. Avoidable waste refers to food that was originally edible but got wasted, partially avoidable includes items like potato peels which can be edible under certain circumstances, and unavoidable waste includes items like bones and coffee grounds.

- **Implications for Waste Reduction:** By categorizing waste, this framework helps in identifying areas where interventions can be most effective. For example, strategies to reduce avoidable waste might differ from those addressing unavoidable waste.
- **Informs Practical Solutions:** This theoretical approach is practical in nature, helping foodservice providers and policymakers to focus on specific types of waste for targeted interventions.

4) Technology-Driven Food Waste Reduction

The theory argues for the use of specialized technologies to track, monitor, and predict food product status and demand across the supply chain, which can lead to significant reductions in food waste. (Martin-Rios et al., 2020)

- **Inventory Management Tools:** Technologies that enable real-time inventory tracking and demand forecasting to prevent overstocking and overproduction.
- **Freshness Monitoring Systems:** Sensors and indicators that assess food freshness and ensure products are consumed before spoiling, reducing waste.
- **Food Redistribution Applications:** Apps that facilitate the redistribution of excess food to reduce waste, connecting retailers with food banks and consumers with discounted surplus meals.

2.2 Theory discussion

1. Training for Food Waste Reduction

The first theory emphasizes the importance of training chefs and kitchen staff. The benefits of such training are several ones. By enhancing skills and awareness, staff can minimize waste during food preparation and service. Creativity in using leftovers can turn potential waste into culinary innovations, which not only reduces waste but also contributes to the financial bottom line. However, the challenge lies in implementing these training programs, especially in environments with high staff turnover or where there are financial constraints. Moreover, it

requires a shift in mindset to view food waste as a critical issue deserving attention. (Sezerel & Filimonau, 2023)

2. Food Waste Hierarchy and Supply Chain Management

(Parfitt et al., 2010) theory places importance on understanding the stages of food waste. By identifying where in the food value chain waste occurs, it becomes possible to tailor specific strategies to those areas. This approach is data-driven and requires extensive tracking and monitoring of the food supply chain, which can be resource-intensive. The success of this theory relies on cooperation across various sectors of the food industry, from farmers to retailers, as well as support from policymakers. It's also worth noting that while reducing waste is essential, it must be balanced with the need to maintain food quality and safety.

3. Classification of Food Waste Types

The third theory provides a framework for categorizing food waste, which is critical for crafting targeted waste reduction strategies. By distinguishing between avoidable, partially avoidable, and unavoidable waste, more nuanced and effective interventions can be designed. For example, consumer education campaigns might focus on reducing avoidable waste, while innovations in packaging might be directed at reducing partially avoidable waste. The challenge here is in the measurement and categorization process itself, which can be subjective and may vary greatly across different cultural and regional contexts (Parfitt et al., 2010; Sezerel & Filimonau, 2023).

4. Technology-Driven Food Waste Reduction

The theory proposed by (Martin-Rios et al., 2020) advocates for the use of technology to reduce food waste. Technological solutions like inventory management tools and freshness monitoring systems can greatly reduce waste by optimizing supply chain efficiency and product quality. The adoption of food redistribution applications can also address the imbalance between surplus food and food scarcity issues. Nevertheless, the implementation of such technologies requires

initial investment and training, and there can be resistance to change from traditional practices (Martin-Rios et al., 2020).

Putting all together

When these theories are considered together, a multi-layered approach to food waste reduction emerges. Each theory complements the others, suggesting that a holistic strategy is required to make a significant impact. For instance, training staff on the use of new technology can be a synergy between the first and fourth theories. Similarly, understanding the food waste hierarchy can inform the development of training programs and technological innovations.

The practical application of these theories, however, faces several challenges. There is the issue of scalability—how can these strategies be applied globally, across different cultures and economic realities? Moreover, the need for coordination among all stakeholders cannot be overstated. It requires a concerted effort from governments, businesses, NGOs, and consumers. To overcome these challenges, policy and incentives can play a significant role. Governments can offer tax breaks or subsidies for businesses that invest in food waste reduction technologies. There could be a certification process for restaurants and food service providers that successfully implement food waste reduction programs. Consumer awareness campaigns can be launched to educate the public on the importance of reducing food waste, and how they can contribute to this effort at the individual level.

In conclusion, while the theories provide a robust framework for reducing food waste, their success hinges on the collaboration between various actors in the food supply chain, the availability of resources to implement these strategies, and the willingness of society to embrace changes in food consumption and handling practices. The goal is not only to reduce waste but also to foster an ecosystem of sustainability within the food industry, contributing to broader environmental and social goals.

2.3 Explanation of terms

The main terms used in this paper are:

Food Waste: the definition of food waste I choose to operate in my thesis is as follows: food waste is when the food of the restaurant is not consumed by humans. For example, according to my definition, composting of food waste is still food waste.

Food waste is defined in many sources in different ways: consumption waste from the guest and production waste from the kitchen. Some sources include in the concept of food waste also the waste at agricultural stage and post-harvest storage and material handling, processing, distribution (wholesale and retail). I will not consider these aspects of agricultural nor transportation (Coşkun & Yetkin Özbük, 2020). Likewise, some sources study food waste at home that I will not study in this thesis.

Greenwashing: Greenwashing is a deceptive practice where a company, organization, or individual portrays themselves as more environmentally friendly than they are. It involves misleading consumers or the public into believing that their products, services, or policies are environmentally responsible when, in fact, they may be harmful to the environment or have minimal positive impact. This can be achieved through misleading advertising, false claims of sustainability, or exaggerated statements about environmental efforts. Greenwashing undermines genuine environmental efforts and can mislead consumers into making choices that are not truly eco-friendly (Nimri et al., 2021).

Consumption Waste: Consumption waste refers to the waste generated by customers or consumers of goods and services, particularly in the context of restaurants. It encompasses food waste, packaging waste, and other materials discarded by patrons during the consumption process. Consumption waste includes uneaten food, leftover portions, disposable utensils, containers, napkins, and any other items that are disposed of after consumption. Effective management of consumption waste involves strategies to minimize waste generation, promote

responsible consumption habits, and implement recycling and waste diversion initiatives to reduce environmental impact. Parfitt, J., Barthel, M., & Macnaughton, S. (2010).

Production Waste: Production waste, in the context of restaurants, refers to the waste generated during the production and preparation of food and beverages, as well as the operation of the restaurant itself. This includes food trimmings, spoiled ingredients, excess portions, and packaging materials discarded during food preparation, as well as non-food waste such as paper, cardboard, and plastic generated from restaurant operations. Production waste also encompasses energy waste, water waste, and other resource inefficiencies associated with restaurant operations. Effective management of production waste involves implementing measures to optimize production processes, minimize waste generation, and maximize resource efficiency to reduce costs and environmental impact (Parfitt et al., 2010)

2.4 Research question:

The purpose of this research and its interview process is to answer the main research question:

Which interventions do restaurants implement to achieve lower food waste?

3. Method

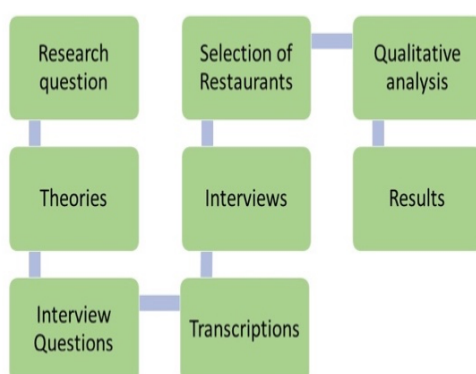


Figure 2 Steps in Method

Figure 2 depicts the main phases of this work. The most important step has been the definition of the research question. Second, I have identified some main theories. The primary method employed for this bachelor's thesis is qualitative interviews (Johannessen, 2010), which have been conducted in Spain. The use

of qualitative interviews enables an in-depth exploration of the perspectives, practices, and challenges related to food waste management in restaurant settings. The interview process has involved the development of an interview guide, which has served as a structured framework for the discussions with the responsible persons from the restaurants. This guide is designed to capture detailed responses on food waste generation and strategies for prevention and reduction. After the interviews, I have examined the transcripts to find recurrent themes, patterns, or important points that the interviewees made.

These interviews were given permission by SIKT.

Reference number: 667626

3.1 Gathering interview subjects

The interview process started by sending emails and walking around the city asking restaurants to take part of the research. This was a slow process and many restaurants showed non to very little interest. When the first 50 emails were sent out only 1 responded. Remaking the Email and changing the tone from “can you help me” to “I can help you save money and reduce food waste” had more success.

Table 1 Success rate of gathering interview objects.

Mails sent	91
Mails answered:	14
Interviews conducted	5
Success rate from “Mail sent” to “Interview conducted”	5,4 %

When running the last interview not so much new information was coming, therefore the interview phase could end.

3.2 Subjects Restaurants to be interviewed

Table 2 Restaurants interviewed.

Name of restaurant	Category
Restaurant 1	Casual Dining
Restaurant 2	Quick Service
Restaurant 3	Buffets
Restaurant 4	Casual Dining
Restaurant 5	Fine dining

The restaurants are anonymized. The restaurants did not give written approval to have their name in this paper. The restaurants will be divided into categories.

Table 2 is the list of restaurants and their categories. The categories are defined as follows:

Casual Dining: Casual dining restaurants are less formal than fine dining and provide a relaxed atmosphere. They serve moderately priced food in a comfortable setting and often have a more extensive menu compared to quick service restaurants.

Quick Service: Also known as fast-food restaurants, these places are designed for convenience and speed. They offer limited service and are often characterized by a counter service where you order and pay before eating.

Buffets: Buffet restaurants offer a variety of dishes displayed on tables where customers serve themselves. They can range from casual to formal and often charge a flat price for unlimited food.

All-You-Can-Eat: These establishments offer unlimited food for a fixed price. They are similar to buffets but may also include table service for certain items like drinks or specific dishes that are ordered and brought to the table.

Fine Dining: These establishments offer a formal dining experience with a sophisticated ambiance, high-quality service, and gourmet cuisine. They often have a dress code and may offer multi-course meals.

With these dividing we can compare the different categories to each other. I chose these five restaurants because they are all in different categories and different areas of Barcelona.

3.3 Description of restaurants

Restaurant 1 is a restaurant known for its innovative approach to healthy eating in Barcelona. With a focus on plant-based cuisine, it offers a diverse menu featuring fresh, seasonal ingredients. The restaurant emphasizes sustainability and wellness, catering to various dietary preferences including vegan, vegetarian, and gluten-free



Figure 3 Restaurant 1

options. With a welcoming atmosphere for diners seeking nourishing meals without sacrificing taste or creativity.

Interview profile: woman 40-year-old, General Manager

Restaurant 2 is a small “fast food” restaurant. It’s a family-owned restaurant with a strong local presence. It serves hotdogs and hamburgers mainly with cheap beer. And it’s a good representation of the “normal” Barcelona “fast food”.

Interview profile: Waiter 22-year-old boy, 3 years working with the restaurant.



Figure 4 Restaurant 2

Restaurant 3 is an all you can eat sushi chain in the Barcelona region with 4 locations. They are famous for their affordable price and the robot server. It’s a medium to low quality sushi restaurant but makes up for it on the quantity of food.

Interview conducted with; Assistant General manager, 25-year-old woman.



Figure 5 server robot from restaurant 3.

Restaurant 4 is a Hip/trendy bar from Barcelona. Its popular among students with wine interests. It’s a small restaurant with 20-30 seatings.

Interview conducted with front of house manager, 28-year-old Man.



Figure 6 Restaurant 4

Restaurant 5 is a High-class Italian tapas restaurant. It is the most expensive restaurant of the five with a Italian sharing menu. Every plate is made to share, and the portion size of the menu items depends on how many people are on the table.



Figure 7 Restaurant 5

Interview conducted with: HR department,
Online interview, Woman 27-year-old.

3.4 Interview Questions

Table 3 Interview-guide. 11 questions about food waste.

1. Food Waste questions	Do you conduct regular food waste audits to track and measure the amount of waste produced in your restaurant?
2. Staff Training	What type of training do staff receive to prevent food waste, and how often is this training updated or refreshed?
3. Sourcing Practices	How do you source your ingredients, and do you prioritize suppliers who use sustainable practices?
4. Portion Sizes	Have you implemented any strategies to optimize portion sizes to minimize waste, such as offering different portion options or customized orders?
5. Inventory Management	Can you describe your inventory management system? How do you ensure that food is used efficiently to prevent spoilage?
6. Consumer Awareness	Do you provide information to your customers about your food waste prevention efforts and how they can participate in reducing waste?
7. Food Donation	Do you have a partnership with local food banks or shelters where you can donate surplus food that is still safe to eat?
8. Waste Segregation	How do you segregate waste in your restaurant, and do you have a system for composting organic waste?
9. Sustainable Menu Design	How is your menu designed to reduce food waste, and do you use techniques such as cross-utilization of ingredients across multiple dishes?
10. Technology for Waste Reduction	Do you use any technology or apps to track food inventory, predict customer demand, or connect with food redistribution networks?
11. Furthermore	Anything you want to add or promote within this topic?

I have used these questions in a semi structured way. This means I tried as much as possible to follow the guide, but I also asked follow-up questions when I felt the need to explore more.

Research question:

The purpose of the interview process was to answer the main research question:

Which interventions do restaurants implement to achieve lower food waste?

The questions provided in the food waste interviews (table 3) are designed to assess a restaurant's policies and practices regarding food waste reduction and sustainability. They aim to understand various aspects of how a restaurant manages its resources, from procurement to disposal, and how it educates both staff and customers about these issues.

The first set of questions evaluates internal practices, including the frequency of food waste audits, staff training procedures, and sourcing practices for ingredients. These questions seek to find out whether the restaurant has systems in place to measure and reduce waste, educate its employees on sustainability, and choose suppliers that align with these values. The remaining questions probe into operational strategies such as portion control, inventory management, and waste segregation, all of which can significantly impact food waste. There's also an interest in external communication and community engagement, as seen in questions about consumer awareness and food donation partnerships. Lastly, the questions touch on the integration of technology in managing waste and the thoughtful design of a menu to ensure minimal waste through techniques like ingredient cross-utilization. All these inquiries point towards a comprehensive understanding of the restaurant's commitment to sustainability and waste reduction.

4. Results

The results are taken from the five interviews conducted in the restaurants. The results describe how the restaurants deal with food waste management and what the trends in waste management in Barcelona are. Each question asks about one specific implementation. The transcribed answers give an overview of how the five restaurants do the specific implementation. After the analysis the concrete implementations are explained.

4.1 Data analysis

As a first step for data analysis, the interviews have been transcribed. The transcripts consist of 5400 words of text, that can be accessed in the appendix.

Then, the transcripts from the interviews have been coded into an excel file (given in appendix).

From reading the transcripts, a set of implementations has been discovered.

Question 1: "Do you conduct regular food waste audits to track and measure the amount of waste produced in your restaurant?"

Four out of five restaurants did not track and measure the amount of waste.

Question 2 "What type of training do staff receive to prevent food waste, and how often is this training updated or refreshed?"

Three out of five have a comprehensive training program with forms and procedures to prevent food waste.

Four out of five have some sort of training program.

Question 3 "Do you provide information to your customers about your food waste prevention efforts and how they can participate in reducing waste?"

None of the restaurants provide information to their customers about their food waste prevention efforts.

Question 4 "How do you source your ingredients, and do you prioritize suppliers who use sustainable practices?"

Three out of five prioritized local suppliers.

Two out of five bought everything from 1 supplier.

Question 5 "Can you describe your inventory management system? How do you ensure that food is used efficiently to prevent spoilage?"

One out of five had digital inventory management system.

Question 6: "Do you have a partnership with local food banks or shelters where you can donate surplus food that is still safe to eat?"

Zero out of five restaurants donate food to food banks or sellers.

Question 7: "How do you segregate waste in your restaurant, and do you have a system for composting organic waste?"

Five out of five segregated their waste in the restaurant.

Zero out of five have organic waste System inhouse.

I report only about these seven questions as the answers to the remaining questions were less interesting for this paper.

4.2 Implementations made by the restaurants

Here the list of implementations made by the restaurants is given and categorized into: a) Consumer waste and b) Production waste.

1. The staff training is categorized as a production waste implementation.
2. Staff training: to prevent food waste is something 4/5 of the restaurant has implemented. Implemented forms and procedures on how the employees must handle waste. Both creative use of leftover
3. Food waste fine.: Food waste fine: "Restaurant 3" has implemented a waste fine for their customers when they leave food on the table. One euro per "sushi bite" left on the

plate. This makes the customer aware of over ordering. This is successful in preventing consumer waste.

4. Small orders from the supplier many times a week: Small consistent orders from the supplier keeps the food fresh and in rotation. Small order forces you to be careful with your inventory management. “Restaurant 5” Uses inventory management software to keep track on what they have in their inventory at all time. The constant rotation of food also gives the opportunity to keep your fridges tidy and not overloaded. This makes it easier to clean the fridges more often. This is a production waste implementation.
5. Local suppliers: Sourcing locally means products travel a shorter distance to get to the restaurant, which can reduce transportation costs and the carbon footprint associated with long-distance shipping.
6. Specialized inventory management: Specialized inventory management is the process of overseeing and controlling a company's inventory with strategies that are specifically designed for its unique products or industry requirements. It often involves using advanced techniques to maintain optimal stock levels and can include systems like just-in-time inventory. The aim is to improve the efficiency of inventory control to better align with the company's operational needs and financial goals.

5. Discussion and Conclusions

5.1 Comparing empirical results with theory

Starting with each theory, we discuss the results.

1) Theory - Classification of Food Waste Types

(Parfitt et al., 2010) and (Sezerel & Filimonau, 2023)

By categorizing waste, this framework helps in identifying areas where interventions can be most effective. For example, strategies to reduce avoidable waste might differ from those addressing unavoidable waste.

Our results say that:

- A) four out of five restaurants did not track and measure the amount of waste.
- B) Five out of five segregated their waste in the restaurant.

2) Theory - Training for food waste reduction

(Sezerel & Filimonau, 2023)

Training programs can enhance chefs' understanding of how their practices contribute to food waste and equip them with skills for more efficient use of resources.

Our results say that:

- A) Three out of five have a comprehensive training program with forms and procedures to prevent food waste.
- B) Four out five have some sort of training program.

3) Theory - Technology driven food waste reduction:

(Martin-Rios et al., 2020)

- Inventory Management Tools: Technologies that enable real-time inventory tracking and demand forecasting to prevent overstocking and overproduction.

One out of five had digital inventory management system.

Our results do not match with the fourth theory (Food Waste Hierarchy and Supply Chain Management).

5.2 Discussion

This section discusses the theories and results.

The Classification of Food Waste Types theory suggests that knowing what kind of waste is generated can help in crafting targeted strategies for its reduction. The theory posits that understanding the difference between avoidable and unavoidable waste is crucial for effective management. However, the finding that four out of five restaurants do not track or measure their waste means they are missing out on the insights that such data could provide. Without this knowledge, interventions cannot be fully effective because they're not informed by the specific types of waste each restaurant produces.

On the other hand, all restaurants segregate their waste, which is a positive step towards managing it more effectively. But without measuring, it is like knowing there is a problem without understanding its scale or the specific points where interventions could have the most impact.

The Training for Food Waste Reduction theory underscores the importance of equipping staff with the knowledge and skills necessary to minimize waste. While most restaurants have some form of training in place, the comprehensiveness and regularity of these programs vary. While three out of five have a more structured approach, there's potential for improvement in the remaining two. Continuous training is vital in maintaining awareness and improving practices over time.

Lastly, the Technology-Driven Food Waste Reduction approach is only utilized by one of the five restaurants through a digital inventory management system. This indicates a significant gap in the adoption of technology that could aid in forecasting demand, preventing

overproduction, and ultimately reducing waste. The lack of widespread use of such systems may be attributed to cost, complexity, or simply resistance to change from traditional practices. Additional discussion points are.

What is greenwashing and what is true?

When considering if the restaurants are telling the truth or «greenwashing» it is hard to come to any conclusion. The facts in the interview were not checked by the interviewer. But the perception was that the restaurants interviewed were interested and informed about food waste.

Lost in translation

Three out of five of the interviews was taken in Spanish then translated into English. Recognize that the Spanish level of the interviewer was not optimal, and some information may be lost in translation.

Not many implementation.

Relatively small amount of implementations found. To find more unique implementation another research is needed for a broader approach.

My questions the interview could have been better. In afterthought my questions could have been different concluding to different results. I could have focused more on just 1 theory and finding.

5.3 Conclusions

In conclusion, our investigation into food waste management practices across various restaurant categories in Barcelona illuminates the diverse approaches and challenges within the sector. Despite a growing awareness, the empirical evidence suggests that substantial gaps remain between knowledge and practice. Most establishments have not fully integrated systematic food waste tracking, pointing to a potential area for significant improvement. Training programs, while present, vary in depth and frequency, highlighting an opportunity for standardization and reinforcement of best practices.

While some innovative strategies have been implemented, such as consumer waste fines and specialized inventory management, these remain the exception rather than the norm. The utilization of local suppliers and digital inventory management systems by some of the restaurants demonstrates a willingness to invest in sustainable practices, yet the lack of widespread adoption underscores a hesitancy possibly rooted in economic considerations.

The study's findings stress an urgent need for a cohesive, sector-wide approach to food waste reduction. This could be facilitated by stronger regulatory frameworks, educational campaigns, and incentives that encourage restaurants to adopt and report on food waste mitigation strategies. Additionally, the creation of platforms for knowledge exchange could promote best practices and innovative solutions across the industry.

In summary, while progress is evident, there is a clear need for more robust, integrated, and technology-driven approaches to food waste management in Barcelona's restaurants. As this industry moves forward, it will be critical for all stakeholders to engage collaboratively in creating a more sustainable and less wasteful future.

This research demonstrates a personal commitment to sustainability and a professional approach to an industry-wide challenge. It serves as a cornerstone for further scholarly investigation and practical change within the restaurant sector, both in Barcelona and internationally.

5.4 Possible future work

Future research should aim to compare our work with studies in other countries such as Sweden (Engström & Carlsson-Kanyama, 2004) UK (Filimonau et al., 2020) and (Dora et al., 2020).

Moreover I should run several interviews in restaurants in Barcelona, extending beyond Barcelona, incorporating comparative studies with other cities, and possibly broadening the scope to include other links in the food supply chain. This could provide a richer understanding of the systemic changes required to reduce food waste on a global scale.

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6. Appendix

Interviews Transcripts and anonymized

Transcript Waste Management

Speaker 1 is the interviewer Roberto Høydalsvik
Speaker 2 is the interviewee.

Restaurant 1

Speaker1: Okay. So just I said this is just some general questions. In this sector and would be appreciated if you could answer. So the first question is do you conduct regular food waste audits to track and measure the amount of food waste production in your restaurants? So do you weigh your trash before throwing it away?

Speaker2: No, we are not wasting it.

Speaker1: Okay. So this is the next question is about staff training. And do you do some particular staff training to prevent food waste, and if so, how often do you train the personnel?

Speaker2: Yeah, we have a specific from, from learning about food waste for our personnel. And we do that when they start working. And then about sustainability, we use, we do regular teaching. So perhaps once, once per year, something like this. We we do special issues, and then we, we divide it by teaching crew and, and the ones that are more in customer. Part. Yes.

Speaker1: Because as I, as I learned, your business is multiple directions. You have like restaurants and events and some dietary products, some cleansing. Yeah, yeah, yeah.

Speaker2: No, no, but I mean, in, in, in the, in the.

Speaker1: Restaurants. Yes.

Speaker2: We divide the teaching the, the learnings from the one that that works inside the kitchen and the other ones that work outside in the salad. No, they have another another necessities.

Speaker1: Perfect. Thank you. And do you source your ingredients locally? And do you have suppliers in the Barcelona area or is it the how?

Speaker2: Yeah, we work a lot with that. And almost all our suppliers are local. Yeah, we work a lot with this. Perfect. And also we. Yeah, we purchase seasonal products each week for our menu. Yeah.

Speaker1: Super. I have a question about food donation. Do you have any partnership with food banks, shelters, any applications? People can receive and, and bring the food waste down.

Speaker2: We are not in any applications or we have worked with donation with local association in Alibaba. But as it's something very exceptional for us as we, we want what we try to do is to, to do a very accurate planification in order not to generate food waste in our production. So we, we produce a small batches. So we prefer to produce more times than to produce big amounts and then having to do it. So we are doing this, this this teaching and this way of, of working. Then we, we, we do not have many food waste. So when we have food waste that's something that has, well one has gone wrong and we cannot use it. So also normally all our staff is having the meals in, in our restaurants. So we are trying it. There is a lot of production that we can we know that it's not going to be sold. So we use it for staff.

Speaker1: Food and.

Speaker2: Okay. And all in order not to waste. So before we used to have contact with some association in a gravel for that, but we are not using this as we are not generating, generating, generating extra food.

Speaker1: Okay. So low production, fresh, always fresh.

Speaker2: Yeah. For us this is the clue for us from our point of view, the best way to reduce food waste in our restaurant is to do a good management. Yes. But back doors, I mean, you have to be very, very accurate in your purchasing to not to purchase too much. I agree to 2 or 3 purchases per week. Not a big one. That is going to get but in the fridge. And also we work a lot with cook small batches, not big production. So perhaps we are doing a daily menu from Monday to Friday. So we are producing Monday, Tuesday, Wednesday. We are producing

almost every day, every morning not to do big, big things that it's going to or has the waste to get in bad, bad condition or you are not sure which, which plate the the customer is going to ask for more. Yeah. So this is what we are trying to manage in order not to generate it because afterwards we do generate the, the food waste, it's very difficult to move it in. I mean, we are not a manufacturing center. We also have manufacturing center. And over there we have a long term ingredients very well packed with atmosphere protection that you can donate easily to an association if something has gone wrong or you have a mistake in one ingredient. Imagine you have to sell a product to a supermarket and you did a mistake in the labeling. So you cannot sell that. No, no, no, they have this good that is easy to to donate to move this food waste. But in restaurant you just have you, you cook in in batches not with the correct packaging with the correct protection. So it's, it's very dangerous also to donate this food. I mean, yes, because there is a lot of temperature variation and.

Speaker1: A lot of laws and regulations.

Speaker2: In, in microbial thing, you know, I mean factory, you know, the, the. The micro. Micro. So you work in a production.

Speaker1: In the environment is protected? Yes. Yes.

Speaker2: It's it's a product meant to be consumed in one today. So you have to work to do that, that. And for us it's very as we have team in the morning and in the evening, it's very to cook again a place in the evening, in the morning or during the service. Yes. Or to give a stop to that plate today we run over that, you know, but you have big, big things.

Speaker1: Very nice. I have a question about waste segregation. Do you how do you segregate your waste in the restaurant and have you a system for composing organic waste?

Speaker2: Yeah, we work a lot with that. I mean, we have separate with colors and we teach the, our employees and and we segregate all the waste. And each night the city council came to and pick each, each cube. It's different with the color. So we, we put it outside. So the.

Speaker1: Normal Barcelona.

Speaker2: So we don't do is to to measure it because it's very difficult to work and measure what you are throwing. Look, because almost all the food waste is when you are cooking about the pills and all that or, or almost all the food waste is plates from the customers that you are. Yeah. And throwing what, what they, they have on it. But that you cannot wait in the moment because you are busy and yeah.

Speaker1: Of course it's two different things. The production waste and the consumer waste. Because the consumer waste, you cannot if, if the client doesn't eat all the food, you cannot reuse the food by law, you have to throw it away. But more on more on the production side it can be very useful to weigh the, the garbage just because you can see how much money and you can see, okay, maybe we can use this in a different way or try to Yeah, sure. Okay. So I just have a the last question is about the menu and about the chefs. So I was wondering do you have a chef in each restaurant, or is there a head chef that makes all the menus for everything? The trained personnel in the restaurants, are they all educated chefs or mostly just cooks?

Speaker2: Well, we have a main chair that directs all the. Team. No, that's. And she is the the girls and she designs.

Speaker3: The dishes, and.

Speaker2: She likes very much to be in the kitchen. So she goes a lot to. To supervise and all and to teach all the rest. And in each restaurant also. Besides that there is a main chef and afterwards cooks. Okay. So we have both things now. And, and also we have a supervisor that is going to all the restaurants in, in our label. To to check that everything is going well and yeah super.

Speaker1: And the the menu you said was kind of shifting seasonal. You bring in seasonal products and try to work with your local vendors and stuff. Very nice. And yeah, we.

Speaker2: Change menu each week so you can. Each month we we print a program. Then you can see all the menus for a month. And each month we decide which is the seasonal ingredients or for that month. So we, we go deeper to that ingredient. So we change that. So then we used to explain a lot more about this ingredient. You can check on the internet. It's very nice. It's called LDA. There is a career. So we may we print a sheet with a lot of information about seasonal ingredients.

Speaker1: Super. So to wrap this up, I want to just ask you if there's anything you want to add or promote within this product. Do you feel you work a lot with food waste? Do you do you like personally? Do you like the topic or any thoughts you have?

Speaker2: Yeah. No. What I no, I think I mentioned all I really believe that in a restaurant food waste. It's a lot about money. Management. Yes. You know, good management because afterwards if, if if you. Okay, you can do a mistake in the kitchen and you cannot sell that. But this is really exceptional. It's more about your daily management because you try to to to do food waste. It's chef don't want to have a big cost of food waste because it's part of the management manual. So I don't know for us it this is this has to do a lot with, with this good clarification behind that prevents that. Then you you have you generate waste. Yeah.

Speaker1: Yeah. That's one of my theories I am.

Speaker2: Yeah I feel very I mean I have donated food in association, but do you feel a little bit risky about that. You know, because you don't know. How are they going to manage this food. No. I remember in the pandemia the restaurant used to donate a lot of food. I have donate a lot of food during pandemia, but you didn't know for sure. That arrives in association that families have to come to pick it. Perhaps they cannot maintain the, the cold temperature during all this processes. So it's kind of risky for a restaurant to do that. I believe that also.

Speaker1: Yeah, I agree. And the main research question I'm trying to answer is I think it's mostly education and, and chef and management, as you say. And of course, every restaurant will have food waste. It's not it's it's part of the game. But trying to minimize trying to for me.

Speaker2: For example, one big, big improve could be we make a trial with that with a machine that it was similar to cloth cloth washing machine, you know? Okay.

Speaker1: Yeah, yeah.

Speaker2: So this machine was to make compost in the restaurant. So you throw over there all the all the organic products and it recover it to water. So then you don't generate waste.

Speaker1: Okay. Interesting. Yeah.

Speaker2: And it's starting to be this kind of solutions for for waste. But for us, we we didn't implement that because the machine was very big and there was not enough space in each kitchen. And it smells quite a lot. And it was difficult to have it in the kitchen, but I'm sure that they are going to improve on that. I mean, for us, we have a big manufacturing center and over there we can have already machines that you throw in the organic and then it gives you it gives you soil for, for the farmers, see. So it recovers. So that can be a very good solution to also not, not generate so many food waste that are towards the. The the waste system of the government is not able to manage.

Speaker1: You're very you're very right because.

Speaker2: So that can be a lot an improvement. And it's starting to be these machines. I can give you information. And there is this kind of machines that perhaps they can help. City Council that each one invest with that not paying all the taxes to the government. And you manage your own waste of course, organic waste that that is really possible. And convert it to water or to soil that that technology already exists. We have tried it, but we have this problem with the smells and with the machine was very big, but it's starting to be solutions that perhaps we can't we have to go to this. So because, okay, we have to minimize food waste because it's a lot of energy. I mean, it takes a lot of energy to produce. Yes. Food. And this has to be to be consumed, not to waste. But we also have to do it not to generate so many rubbish that at least city council government in Spain are not able to manage on this issue. I know for sure, because I know people are working in the area and they say there is no capacity to manage all the rubbish.

Speaker1: So no, it's a it's very interesting because just defining food waste, as you said, it doesn't mean that everything has to be eaten as you said. Maybe converting it to soil, converting it to other other means is is not waste, you know? So yeah. Yeah.

Speaker2: Because look, the companies who we want to reduce our waste, I mean, companies, we are looking very much.

Speaker1: Of course, optimizing optimizing everything.

Speaker2: So I can assure you that if I am wasting a big batch, a big production is that I'm not sure that serving that will be good for health or for other. Or perhaps it has been a big, big mistake in some somewhere cooking that can happen. And I have to wait.

Speaker1: Yeah, that's that's life, you know. Yeah.

Speaker2: I will try not to not to have that that extra cost for sure. Yeah.

Speaker1: Yes. Okay. Thank you very much, Matt. You've been very nice and I hope you have a nice day. Speaker2: You too. You too. Okay. It's going well with your project. Speaker1: Thank you very much. Okay. Ciao, ciao. Oh.

Restaurant 2 Translated from Spanish to English

Speaker 1: "Very good. And if you don't know the answers, you say I don't know. So it's not important."

Speaker 2: "Yes, it's not important. These questions are about the cleaning disaster."

Speaker 1: "Do checks on the cleaning and monitor the measure, the weight of the cleaning, before... The cleaning? What? The food refrigerants. These ones that go in the... Everything to throw away. To throw away."

Speaker 2: "The measure? You don't do it? No, we don't. Ah, good. Do some training."

Speaker 1: "How to manage less cleaning. Yeah, yeah. That's right."

Speaker 2: "Okay. You do it here, from the boss? Yeah, the boss, the first day he's going to teach me. Here we put the plastic, here the organic, and so on."

Speaker 1: "Good, good. Do you have different places for cleaning? Do you have organic, plastic, paper?"

Speaker 2: "Yes. For everything, yes."

Speaker 1: "This is a bit of a tricky question, but about the menu. The menu is designed by portions, one by one, right?"

Speaker 2: "Yes. Is it something tapas? Well, we don't have tapas here, but for example, the measurements are made for one person."

Speaker 1: "Yeah, if the two people want to share it, it's theirs, but it's usually made for one. One person, yeah, yeah. Picole, not so much spiciness."

Speaker 2: "And we have the big one, but it's still for the person who eats a lot."

Speaker 1: "Okay. Oh, from the inventory, the supplier comes here, everything from the same supplier and then you put him in the cold."

Speaker 2: "A single cold here, or do you also have a cold... We have two. We have one here, on the counter, and in the back we have two rather large ones. Freezer and freezer? Freezer, freezer, we have two."

Speaker 1: "Okay, super. Is the inventory really fast in the car, or do you guys have a lot... Yeah, we have to reorder it, renew it. Yeah, renew it."

Speaker 2: "Usually every four days, or it depends on how the week goes, a week or four days, give or take. Perfect. Not this."

Speaker 1: "Do you have a partnership with food banks, where... No. This is a family business, so... Is the boss in charge? Is the boss in Roberto, or not?"

Speaker 2: "No, it's Roberto, but he's not. And Roberto is the boss? Okay."

Speaker 1: "Banca no. Do you have systems for organic composting? No, not that you put... Organic, but okay...? You don't do it at home. We do have a place to dump it, but we dump it the same day. But you dump the whole back here, right? It's not like someone comes and takes it. No, no, no. Okay, perfect."

Speaker 1: "Do you use technology or apps to monitor food expenses?"

Speaker 2: "No. Perfect. Is there anything else you'd like to add? Well, I'm very curious about the job."

Speaker 1: "What are you studying?"

Speaker 2: "I'm studying tourism. Tourism? And all that comes in, I've been asking about bars, so I think it's cool. And also that recycling, I mean this whole thing about throwing rubbish away, it's very important because the world is getting worse and worse."

Speaker 1: "So... The little things are important. Yes. Like the cuoco, how you cut the vegetables... It's the little things that make the difference, it's pretty much."

Speaker 2: "Thank you very much."

Speaker 1: "Thank you very much."

Restaurant 2 Translated from Spanish to English

Speaker 1: "Do you conduct regular food waste audits to track and measure the amount of waste produced in your restaurant?"

Speaker 2: "At Restaurant 2, we take our responsibility to minimize food waste seriously. But we don't measure the amount of food waste."

Speaker 1: "What type of training do staff receive to prevent food waste, and how often is this training updated or refreshed?"

Speaker 2: "Our staff at Restaurant 2 undergo training in waste reduction and sustainability. Upon joining our team, all staff members receive thorough instruction on best practices for minimizing food waste, including proper portioning, storage techniques, and creative utilization of ingredients. This allows our staff, including our responsible chef and waiter, to share ideas and innovations that further refine our approach to sustainability."

Speaker 1: "How do you source your ingredients, and do you prioritize suppliers who use sustainable practices?"

Speaker 2: "At Restaurant 2, we prioritize sourcing our ingredients from local suppliers. We place a strong emphasis on building long-term partnerships with suppliers. But we do buy some vegetables and produce from outside the Barcelona region."

Speaker 1: "Have you implemented any strategies to optimize portion sizes to minimize waste, such as offering different portion options or customized orders?"

Speaker 2: "We only serve small tapas portions. We are selling small burgers and different traditional tapas dishes. Almost all our dishes get eaten up. Noting that only our potato dishes tend to have consumer waste. We give out big portions in our patatas bravas and chips. This is something we are considering reducing."

Speaker 1: "Can you describe your inventory management system? How do you ensure that food is used efficiently to prevent spoilage?"

Speaker 2: "Our chef is responsible for the inventory management. We write the inventory that we receive in a form and the Chef labels the dates on the crates of food."

Speaker 1: "Do you provide information to your customers about your food waste prevention efforts and how they can participate in reducing waste?"

Speaker 2: "No, we don't."

Speaker 1: "Do you have a partnership with local food banks or shelters where you can donate surplus food that is still safe to eat?"

Speaker 2: "No, we don't."

Speaker 1: "How do you segregate waste in your restaurant, and do you have a system for composting organic waste?"

Speaker 2: "We have implemented a comprehensive waste segregation system that enables us to separate different types of waste streams effectively. Our staff are trained to sort waste into designated bins for recyclables, compostables, and general waste, following established guidelines and procedures. We have partnered with local composting facilities to ensure that

our organic waste is diverted from landfill and transformed into nutrient-rich compost for agricultural use."

Speaker 1: "How is your menu designed to reduce food waste, and do you use techniques such as cross-utilization of ingredients across multiple dishes?"

Speaker 2: "Our menu is designed to have small portions, encouraging our guests to order a little at a time."

Speaker 1: "Do you use any technology or apps to track food inventory, predict customer demand, or connect with food redistribution networks?"

Speaker 2: "We don't really have any technological implications."

Restaurant 3: Translated from Spanish to English

Restaurant 3:

Speaker 1: "Do you conduct regular food waste audits to track and measure the amount of waste produced in your restaurant?"

Speaker 2: "No."

Speaker 1: "What type of training do staff receive to prevent food waste, and how often is this training updated or refreshed?"

Speaker 2: "We don't have any training."

Speaker 1: "How do you source your ingredients, and do you prioritize suppliers who use sustainable practices?"

Speaker 2: "We buy everything from the same supplier. It is an Asian company that imports a lot of products."

Speaker 1: "Have you implemented any strategies to optimize portion sizes to minimize waste, such as offering different portion options or customized orders?"

Speaker 2: "Yes, we have an all-you-can-eat model. One of our key initiatives is to offer customers flexible portion options, allowing them to choose the amount of food they want to consume. Additionally, we encourage customers to order only what they can finish and charge a nominal fee for leftover food to discourage overordering and reduce food waste. Furthermore, our staff are trained to monitor portion sizes closely and guide customers in making choices."

Speaker 1: "Can you describe your inventory management system? How do you ensure that food is used efficiently to prevent spoilage?"

Speaker 2: "We have stock rotation procedures to ensure that older ingredients are used before fresher ones, further minimizing the risk of spoilage. Through planning and monitoring, we maximize the lifespan of our ingredients and minimize unnecessary waste in our restaurant."

Speaker 1: "Do you provide information to your customers about your food waste prevention efforts and how they can participate in reducing waste?"

Speaker 2: "We only say that they have to pay for the food they are not eating. This seems to be enough as we have very low customer food waste."

Speaker 1: "Do you have a partnership with local food banks or shelters where you can donate surplus food that is still safe to eat?"

Speaker 2: "No, we don't have any partnership. We encourage our employees to take home the excess food that we cannot use the next day."

Speaker 1: "How do you segregate waste in your restaurant, and do you have a system for composting organic waste?"

Speaker 2: "We follow the Barcelona waste regulations. I am not sure exactly how."

Speaker 1: "Do you have different garbage bins in the kitchen?"

Speaker 2: "No, we throw away everything in the same bin."

Speaker 1: "How is your menu designed to reduce food waste, and do you use techniques such as cross-utilization of ingredients across multiple dishes?"

Speaker 2: "We have a big menu with many options. Our menu is completely digital and on the top, it informs the customer about our fees for food waste."

Speaker 1: "Do you use any technology or apps to track food inventory, predict customer demand, or connect with food redistribution networks?"

Speaker 2: "Yes, we have a server robot in our restaurant and QR codes for menus."

Restaurant 5

Speaker 1: "Do you conduct regular food waste audits to track and measure the amount of waste produced in your restaurant?"

Speaker 2: "Yes, at «restaurant 5», we conduct regular food waste audits to track and measure the amount of waste generated in our restaurant. These audits are integral to our waste reduction efforts as they allow us to identify areas for improvement and implement targeted strategies to minimize waste."

Speaker 1: "What type of training do staff receive to prevent food waste, and how often is this training updated or refreshed?"

Speaker 2: "Our staff undergo comprehensive training to raise awareness about the importance of food waste reduction and equip them with the skills and knowledge to minimize waste in our restaurant. This training covers various aspects of waste prevention, including proper portioning, storage practices, and creative use of ingredients. We also provide ongoing refresher training sessions to ensure that our staff remain informed and engaged in our waste reduction efforts."

Speaker 1: "How do you source your ingredients, and do you prioritize suppliers who use sustainable practices?"

Speaker 2: "We are committed to sourcing high-quality ingredients from reputable suppliers who share our commitment to sustainability and ethical practices. We prioritize suppliers who adhere to sustainable farming practices and prioritize organic and locally sourced ingredients whenever possible. By sourcing responsibly and ethically, we ensure that our ingredients are not only delicious but also environmentally sustainable."

Speaker 1: "Have you implemented any strategies to optimize portion sizes to minimize waste, such as offering different portion options or customized orders?"

Speaker 2: "Yes, we offer a variety of portion options, including small plates, sharing platters, and customizable orders, allowing our customers to choose the portion size that best suits their appetite. Our staff are trained to assist customers in making informed choices about portion sizes and offer guidance on ordering to minimize waste. By offering flexible portion options, we strive to reduce waste while ensuring a satisfying dining experience for our guests."

Speaker 1: "Can you describe your inventory management system? How do you ensure that food is used efficiently to prevent spoilage?"

Speaker 2: "Our inventory management system is designed to optimize efficiency and minimize waste in our restaurant. We maintain detailed records of all incoming ingredients and track their usage throughout our operations to ensure that we utilize them efficiently and prevent spoilage. Our chefs prioritize the use of perishable ingredients and incorporate them into our menu offerings in creative ways to minimize waste. Additionally, we implement rigorous stock rotation procedures to ensure that older ingredients are used before fresher ones, further minimizing the risk of spoilage."

Speaker 1: "Do you provide information to your customers about your food waste prevention efforts and how they can participate in reducing waste?"

Speaker 2: "No, we don't."

Speaker 1: "Do you have a partnership with local food banks or shelters where you can donate surplus food that is still safe to eat?"

Speaker 2: "No, we don't."

Speaker 1: "How do you segregate waste in your restaurant, and do you have a system for composting organic waste?"

Speaker 2: "We have implemented a comprehensive waste segregation system to effectively manage our waste streams and minimize our environmental footprint. Our staff are trained to separate waste into distinct categories, including recyclables, organic waste, and non-recyclable materials, using designated bins and containers throughout our premises. Organic waste, such as food scraps and vegetable peelings, is collected separately and composted onsite using a dedicated composting system. By segregating and composting organic waste, we not only

reduce our environmental impact but also create nutrient-rich compost that can be used to fertilize our onsite herb and vegetable garden."

Speaker 1: "How is your menu designed to reduce food waste, and do you use techniques such as cross-utilization of ingredients across multiple dishes?"

Speaker 2: "Our menu is carefully crafted to minimize food waste and maximize the utilization of ingredients across multiple dishes. We prioritize efficiency and creativity in our menu design, incorporating versatile ingredients that can be used in a variety of dishes to minimize waste. Our chefs are trained to creatively repurpose leftover ingredients and trimmings into new and innovative menu offerings, ensuring that every part of the ingredient is utilized to its fullest potential. Additionally, we actively promote dishes that feature seasonal and locally sourced ingredients, allowing us to support local farmers and reduce our carbon footprint."

Speaker 1: "Do you use any technology or apps to track food inventory, predict customer demand, or connect with food redistribution networks?"

Speaker 2: "Yes, we leverage technology to optimize our operations and reduce food waste. We utilize specialized inventory management software to track food inventory in real-time, allowing us to monitor stock levels, identify trends, and forecast demand more accurately. This data-driven approach enables us to minimize overstocking and waste while ensuring that we have sufficient inventory to meet customer demand. Additionally, we use customer analytics tools to analyze ordering patterns and preferences, allowing us to tailor our menu offerings and portion sizes accordingly. Furthermore, we are exploring partnerships with food redistribution networks and apps to divert surplus food to those in need and minimize waste in our community."

Excel File

Table 4 Excel – questions 1-3. R stands for Restaurant

R.	"Do you conduct regular food waste audits to track and measure the amount of waste produced in your restaurant?"	"What type of training do staff receive to prevent food waste, and how often is this training updated or refreshed?" ²	"How do you source your ingredients, and do you prioritize suppliers who use sustainable practices?"
1	"So we don't do it to measure it because it's very difficult to work and measure what you are throwing." No	"Yeah, we have a specific from, from learning about food waste for our personnel. And we do that when they start working. And then about sustainability, we use, we do regular teaching. So perhaps once, once per year, something like this. We we do special issues, and then we, we divide it by teaching crew and, and the ones that are more in customer. Part. Yes." (1 chef and 1 waiter responsible for teaching)	Yeah, we work a lot with that. And almost all our suppliers are local. . Yeah, we purchase seasonal products each week for our menu. Yeah.
2	No	the first day he's going to teach me. Here we put the plastic, here the organic, and so on.	supplier comes here, everything from the same supplier and then we put it in the cold.
3	No	No.	We buy everything from the same supplier. It is an asian company that imports alot of products
4	we dont measure the amount of food No	Our staff does training when joining our team, all staff members receive practices for minimizing food waste. Proper portioning, storage and where to throw away the garbage. And we have meetings allowing our staff and our responsible chef and waiter, to share ideas.	we prioritize sourcing our ingredients from local suppliers. We place a strong emphasis on building long-term partnerships with suppliers. But we do buy some vegetable and produce from outside the Barcelona region.
5	"Yes, we weigh all the waste from the plates and production with a scale in the kitchen"	Our staff receives training about the importance of food waste reduction. This training covers aspects of waste prevention, , how to store the food good in the fridge, and different kitchen skills.	ingredients from suppliers who share our commitment to sustainability. We prioritize suppliers who practices sustainable farming practices and prioritize organic and locally sourced ingredients whenever possible. (Yes, we buy flower and olive oil from Italy.)

Table 5 Excel questions 4-6.

R.	"Have you implemented any strategies to optimize portion sizes to minimize waste, such as offering different portion options or customized orders?"	"Can you describe your inventory management system? How do you ensure that food is used efficiently to prevent spoilage?"	"Do you provide information to your customers about your food waste prevention efforts and how they can participate in reducing waste?"
1	No, we give out a fair portion for the price	Yes, , the best way to reduce food waste in our restaurant is to do a good management. Yes. But back doors, I mean, you have to be very, very accurate in your purchasing to not to purchase too much. I agree to 2 or 3 purchases per week. Not a big one. That is going to get but in the fridge	No, we dont share anything to our guest. We want them to feel domfertable and not but giult on their meal.
2	One person, yeah, yeah. Picole, The portions are not that big. And we have the big one, but it's still for the person who eats a lot.	Yeah, we have to reorder it, renew it. Usually every four days, or it depends on how the week goes, a week or four days, give or take	No
3	Yes,, we have all you can eat model. We offer customers flexible portion, allowing them to choose the amount of food they want to consume. Additionally, we encourage customers to order only what they can finish and charge a fee for leftover food to discourage overordering and reduce food waste.	We have a "stock rotation procedure" to ensure that older ingredients are used before fresher ones. planning and monitoring, we try to maximize the lifespan of our ingredients and minimize waste in our restaurant.	We only say that they must pay for the food they are not eating.
4	we only serve small tapas portions. We are selling small burgers and different traditional tapas dishes. Almost all our dishes get eaten up. But recently I have noticed that our potato tends to have a lot of waste. We give out big portions in our patatas bravas and chips. This is something I am considering reducing.	Our chef is responsible for the inventory management. We write the inventory that we receive in a form and the Chef labels the dates on the creates of food.	No. We dont
5	Our menu is a Italian tapas. The customer orders the dishes and we put accordingly the amount on the sharing plate for how many people are on the table.	Our inventory management is all digital in our restaurant. We maintain records of all incoming ingredients and track their usage throughout our operations	no

Table 6 Excel questions 7-9.

	"Do you have a partnership with local food banks or shelters where you can donate surplus food that is still safe to eat?"	"How do you segregate waste in your restaurant, and do you have a system for composting organic waste?"	"How is your menu designed to reduce food waste, and do you use techniques such as cross-utilization of ingredients across multiple dishes?"
1	: We are not in any applications but we have worked with donation with local associations.	Yeah, we work a lot with that. I mean, we have separate with colors and we teach the, our employees and and we segregate all the waste. And each night the city council came to and pick each, each cube. It's different with the color. We had a maching that did our composting in house, but it made to much noise and stong smell.	Change menu each week so you can. Each month we print a program. Then you can see all the menus for a month. And each month we decide which is the seasonal ingredients or for that month.
2	No	Yes. For everything, yes.	, the measurements are made for one person.)Yeah, if the two people want to share it, it's theirs, but it's usually made for one.
3	No We engourage our employees to take home the exces food that we cannot use the next day.	We follow the Barclona waste regulations.I am not sure exactly how."No we trow away everything in the same bin (in the kicthen). "	We have a big menu with many options. Our menu is completly digital and on the top it informs the customer about our fees for food waste.
4	No we dont	designated bins for recyclables, compostables, and general waste, following guidelines and procedures	Our menu is design at having small portions. Encoureging our guests to order alittle at a time.
5	No	separate waste into categories, recyclables, organic waste, and non-recyclable materials. (We don't have a system in house to composting)	As I said our menu is per person.

Table 7 Excel questions 10-11.

R.	"Do you use any technology or apps to track food inventory, predict customer demand, or connect with food redistribution networks?"	Anything you want to add or promote within this topic?
1	<p>So this machine was to make compost in the restaurant. So you throw over there all the all the organic products and it recover it to water. So then you don't generate waste.</p>	<p>So that can be a lot an improvement. And it's starting to be these machines. I can give you information. And there is this kind of machines that perhaps they can help. City Council that each one invest with that not paying all the taxes to the government. And you manage your own waste of course, organic waste that that is really possible. And convert it to water or to soil that that technology already exists. We have tried it, but we have this problem with the smells and with the machine was very big, but it's starting to be solutions that perhaps we can't we have to go to this. So because, okay, we have to minimize food waste because it's a lot of energy. I mean, it takes a lot of energy to produce. Yes. Food. And this has to be to be consumed, not to waste. But we also have to do it not to generate so many rubbish that at least city council government in Spain are not able to manage on this issue. I know for sure, because I know people are working in the area and they say there is no capacity to manage all the rubbish.</p>
2	<p>no</p>	<p>Well, I'm very curious about the job. What are you studying? I'm studying tourism. Tourism? And all that comes in, I've been asking about bars, so I think it's cool. And also that recycling, I mean this whole thing about throwing rubbish away, it's very important because the world is getting worse and worse.</p>
3	<p>Yes, we have a server robot in our resturant and QR codes for menues.</p>	<p>No, thank you</p>
4	<p>No</p>	
5	<p>specialized inventory management software, , identify trends, use customer analytics tools to analyze ordering patterns and preferences</p>	