COLLARES

Strengthening Collaborative Food Waste Prevention in Colombia: Towards Responsible Production and Consumption

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Glossary

B2B	*Business to Business*
CE	*Circular Economy*
COLLARES	*'Strengthening collaborative food waste prevention in Colombia and Peru: Towards responsible production and consumption'*
DAC	*Development Assistance Committee*
EAFIT	*Escuela de Administración, Finanzas e Instituto Tecnológico (University)*
EU	*European Union*
FAO	*United Nations Food and Agriculture Organization*
LAC	*Latin America and the Caribbean*
HaFS	*Hospitality and Food Service*
MMU	*Manchester Metropolitan University*
NGO	*Non-Governmental Organization*
RO	*Research Objective*
RQ	*Research Question*
SMEs	*Small and Medium-Sized Enterprises*
TMA	*Target, Measure, Act*
UNSDG	*United Nations Sustainable Development Goal*
WRAP	*Waste and Resources Action Programme*

Terminology

Food Waste: Primarily, material wastage that occurs during or after the consumer interface, i.e. where the customer meets retailer and post-purchase stages (including meal preparation).

Food Loss: Primarily material wastage that occurs prior to the consumer interface, i.e. during production (at source) or along the supply chain.

Organic Waste: Food waste and surplus waste together.

Surplus Food: Food that is still fit for consumption, such as leftovers in the kitchen and excess ready-made meals.

Downstream: The demand side of food supply and meal preparation which represents the linkage between HaFS and their customers (i.e., retail and consumption).

Upstream: The supply side of the food preparation chain, beginning with production and related supply chain processes (i.e., including post-harvest handling, storage and transportation).

A. The Layout of this Report

This document starts off with an Executive Summary immediately below. The idea was to create an area for quick reading and referencing about the project's activities. This format also allows for an easy 'pull-out' Brief. Following on from there, the Report is laid out in narrative style and arranged into 8 Sections. The first Section introduces the project and lays out general aims.

Section 2 comments on the literature. It takes a brief look at the global problem of food waste and where this relates to adopting CE measures to help bring about change. Section 2 also presents a country–specific information about Colombia's national policy and measures in relation to the topic.

Section 3 then specifies aims and objectives, in relation to the central research question. We present the basis for our mixed research methodology, using the case study approach. We also report about challenges to project implementation during unprecedented COVID 19 lockdowns and related regulations in Colombia.

Section 4 starts the presentation of the results, beginning with the quantitative survey. There is an extensive range of tables which should allow the Reader to interact with the collated data. These matrices are accompanied by commentary. This Section also presents the perspectives of HaFS representatives about enabling change.

Section 5 discusses results from the expert interviews conducted with HaFS business representatives. This part of the Report includes individual quotations based on professional experience and personal thoughts and reflections about the topic. Section 5 also provides an overview of the COVID-19 pandemic challenges and opportunities- including from the perspectives of the interviewees.

Section 6 briefly comments on the online workshop with HaFS representatives, while Section 7 discusses the impact and potential legacy of the COLLARES project for the HaFS in Colombia. Finally, Section 8 lays out the conclusion and suggests 10 recommendations to improve HaFS food waste management in Medellín.

B. Executive Summary

i. Project Overview

Throwing away food which could be eaten or otherwise put to good use should no longer be tolerated. Simply deemed as 'food waste', this practice is meeting with increasing disfavour from governments, householders and businesses alike (World Food Security, 2014; WRAP, 2013). Advocates are increasing calling for a move towards a circular economy by designing out waste, wherever possible, at every stage of handling resources (European Commission, 2014a; LWARB, 2017; Vilariño et al., 2017; Food Citizenship, 2019; Camilleri, 2021). In this respect, Colombia has joined other regional LAC countries by aiming to halve per capita food waste by 2025 (FAO, 2016). Circular practice in food preparation entails basic moves such as combating kitchen waste. Therefore, when it comes to food businesses and the wider hospitality sector (HaFS), preventing wastage or loss would be also strategic. The central aim would be to capture residual food value and, to keep consumable foodstuff from being discarded (usually in forms of landfill).

It is towards this end that the project COLLARES aims to promote action against food waste in Colombia and Peru. COLLARES was implemented in 2021 by a cross-sector partnership of academic, business and other stakeholders. Data collection and business engagement was conducted primarily between February and July 2021 and was therefore impacted significantly by the COVID 19 pandemic. Despite this, COLLARES achieved engagement and exchange with over 160 HaFS businesses across the two DAC countries. COVID 19 effects on these businesses was generally sobering. At the same time, COVID 19 restrictions helped to trigger innovative responses including; improved management; new food handling techniques, and new distribution models.

This document reports only on the findings from Colombia, based on the city of Medellín. An accompanying report on the work in Peru can be found on the project website (www.collaresproject.org). In addition to a literature review, we generated primary data from three main stages of the project. These encompassed an online quantitative survey, a series of qualitative expert interviews and an online workshop for HaFS representatives in Medellín. The latter involved a mixed grouping of participants with contributions from HaFS business representatives, academics and, specialists in food waste reduction and the circular economy.

ii. An Overview of the Quantitative Survey Results

The results for Colombia show that full-service businesses (such as restaurants) generate greater levels of waste than fast food and other quick service outlets. The majority of HaFS respondents, however, do not measure food waste in any way. Despite this, measures were being taken by a significant number of staff teams where enterprises are now separating organic from non-organic waste. For example, 21% of businesses manually separate food from non-food waste (after initial disposal). Findings also show that two thirds of food businesses are using specified containers for this activity.

When asked to identify the three most common types of discarded food, businesses listed general plate waste, followed by fruits and vegetables, peels/shells and other inedible material. Apart from plate waste, the survey indicated that the next level of waste occurred during preparation. Wastage as a result of food deliveries and storage was registered as the least commonly cited area of food loss.

In terms of food waste redistribution, there is a clear skew towards HaFS in-house usage, with over half of the businesses allowing staff to consume food that is still edible but would have been dumped otherwise. One in five businesses sometimes use this food in other meal preparation. It was interesting that only 6% of HaFS donate such food to charity and, that almost a third of respondents acknowledged that surplus food was still going to the landfill. In contrast, composting and other recycling are only practiced by 8% and 25% of HaFS businesses respectively.

iii. An Overview of the Qualitative Results

a. Semi-Structured Interviews

The qualitative interviews focused on identifying the main challenges and solutions in preventing food waste among HaFS businesses in Medellín. According to the respondents, HaFS businesses are certainly tackling food waste on a local scale but with limited success. It appears that, on the whole, these activities are not being implemented as a whole organisation strategy (with detailed and comprehensive action plans) or with long-term plans for continuous improvement. Some of the key concerns mentioned by the interviewees included:

- Difficulties controlling the temperature of the kitchen to maintain optimal conditions for all food ingredients.
- Facilities and space needed to store food waste appropriately.
- Lack of clarity regarding roles and responsibilities of different stakeholders (including local governments and landlords (such as shopping centres & universities).
- Although food waste management regulations have been implemented, interviewees perceive a lack of enforcement from authorities.
- There is a general lack of awareness and knowledge among HaFS businesses and other stakeholders about food waste management.
- There are food safety concerns about diverting food as charitable donations.
- There is lack of control regarding the amount of food leftover by customers.
- There is sometimes a lack of control regarding the quality of produce provided by suppliers.
- The business costs of developing and implementing appropriate food waste management processes are high.

The interviewees also noted some strategic measures for improving food waste. These would be implemented before, during and after services as well as more general HaFS activities.

b. An Online Workshop

The workshop 'Estrategias y buenas prácticas en torno al desperdicio de alimentos en los restaurantes' (Strategies and good practice related to food waste in restaurants) was held during the latter stage of the project. It confirmed active interest about the topic on the part of local HaFS representatives. This is backed up by the active participation of individuals who also contributed to earlier research stages. The workshop facilitated B2B engagement and vibrant interaction between HaFS representatives and international specialists. In this respect, the workshop contributed to the COLLARES aim of strengthening collaboration as a basis for making changes.

iv. An Overview of Key Recommendations

Our research identifies two clear actions that HaFS businesses in Medellín should take. Firstly, HaFS in Medellín should work towards the development and implementation of environmental management systems which would help cope with unpredictable and challenging situations.Secondly, HaFS businesses should share and adopt good practice and innovative cases coming to improve their own practices.

This work, however, also shows a clear need for appropriate governmental policy, regulation and support to assist HaFS sector action against food waste in Medellín. This could include incentivisation of stakeholders, with the understanding that HaFS customers should be considered as strategic partners. Supporting basic infrastructural changes and re-modelling (commensurate with the business scale and thrust) are also important steps for change.

1. Introduction

1.1. COLLARES: Project Aim and Objectives

This document reports on the Colombian aspects of the dual-nation Project called; 'Strengthening collaborative food waste prevention in Colombia and Peru: towards responsible production and consumption' (COLLARES). The Project was funded by the UK Global Challenges Research Fund. It was led by Manchester Metropolitan University in the United Kingdom, working in partnership with the Universidad EAFIT (Medellín) in Colombia. The Peruvian partnership comprised of Universidad Nacional Jorge Basadre Grohmann (Tacna, Peru), Universidad Privada del Norte (Lima, Peru) and the social enterprise SINBA (Lima, Peru).

The primary aim was to support food waste prevention in Peru and Colombia, towards more resilient enterprise and sustainable food systems. As such, this multi-stakeholder initiative was aligned with the UN Sustainable Development Goal 12 "Responsible Consumption and Production" with special focus on Indicator 12.3 'Global Food Loss and Waste'. COLLARES also supports the FAO aim to halve per capita global food waste (at the retail and consumer levels) and, to reduce food losses along production and supply chains (including post-harvest losses), by 2030. Colombia is a signatory to this FAO commitment through the Department of Social Prosperity of the President of the Republic. Additionally, since 2015, Colombia has been part of a FAO multi-nation case study on food loss (FAO, 2019).

The empirical element of the COLLARES project ran from February until July 2021. The overarching rationale and methodological framework were adapted according to the differing contexts of the two participating countries. These included considerations around cultural relevance, local logistics, customised delivery and business priorities in the cities, regions and countries under investigation. In the case of Colombia, these impacting factors were identified and monitored by stakeholder dialogue, in particular with HaFS representatives and also government focal points from the metropolitan area. To that end, there was an early link up session with COLLARES project personnel and representatives from the regional government. Manchester Metropolitan University provided overall coordination, project management and expertise regarding business response to food waste and related methodological approaches. All research activities were conducted in Spanish.

1.2. The Colombian Study Approach

The geographical focus was the City of Medellín, the second largest in Colombia and located in the northern region of Antioquia. Medellín has a population of around 2.5 million people with significant socio-economic disparity across the metropolitan area. There are estimated to be around 700,000 HaFS businesses in Colombia as a whole (STATISTA, 2019).

Over 120 HaFS representatives (owners or employees) and other personnel took part in this study. These individuals were mostly from restaurants, cafés and quick service outlets. In keeping with the cross-sector relevance of the topic, non-HaFS stakeholders were also included, such as representatives from the city's Metropolitan Council, Area Metropolitana del Valle del Aburrá.

In terms of research strategy, a mixed methodological approach was adopted. In keeping with baseline research about a topic with elements pertaining to both measurement and behavioural change, we combined quantitative and qualitative research methods. This dual approach allowed us to examine the interrelationship of food waste awareness, with perceptions and business practices.

2. Policy and Practice Review: Understanding food waste and HaFS business responsibility

Most of the literature about this topic is policy related. These documents may be categorized into two broad areas. Firstly, there are a host of global reports from international donor agencies. Many of these are linked to conventions which have been shaped by the UNSDGs, the FAO and the EU. Secondly, there is documentation related to national policy and legislation in Colombia. The majority are responses to the international commitments noted above and sometimes explain the law. Broadly speaking, this information covers solid waste, food waste and sustainable development. In those instances, it can be noted that Colombia has a defined reporting role alongside the LAC family of nations.

However, it is fair to say that while there is some NGO-related information around this study's key concepts, there is a dearth of country-specific, academic writing about the topic.

2.1. Policy and Practice Review: Understanding food waste and HaFS business responsibility

Food waste has been aptly described as a massive systemic challenge (Spang et al., 2019) and it is also an endemic, global problem. In recent times, governments, international donors, NGOs (as well as academia) and enterprises are turning their attention to the challenge of targeted change. The Food and Agriculture Organisation of the United Nations (FAO) posits that at least one-third of all food produced for humans is not consumed (2011). As a global issue, an enormous range of economic as well as environmental and social costs have been documented (FAO, 2011, 2016; 2019; WRAP, 2014; Vilariño, et al., 2017).

Understanding business action to tackle food waste requires an important distinction to be made: namely the differentiation between the notions of 'food loss' and 'food waste' (Teigiserova et al., 2020; Fattibene & Bianchi, 2017). Food loss generally refers to wastage that occurs along the supply chain and prior to consumption. Therefore, food loss refers primarily to the decrease in quantity and quality at harvest, production and processing activities. It would also include slaughter and spoilage during distribution and storage, up to the retail and food service levels.

On the other hand, 'food waste' occurs mostly at the supply chain – consumer interface where customers interact with retailers and also, during post-purchase stages (including households). The latter includes instances where food, organic and/ residual materials are thrown away, or otherwise discarded, although consumable or fit for other use. This clarification is essential for understanding HaFS retail in Medellín; its restaurants, fast-food chains, catering and institutional meal services.

When it comes to the business sector, the need for an innovative action agenda has also been recognised (Martin-Rios et al., 2018; Pamfilie et al., 2018). In the case of food enterprises, the direction is also towards sustainable production and consumption through more circular practice (WRAP, 2013, 2017, 2018). A CE orientation may therefore be interpreted within the daily tasks of food handling and meal preparation of HaFS.

Thus, the basic 'waste to resource' principles of CE represent a different approach to running a food business. A CE response means preventing food waste in the first place. This can include food procurement, storage, disposal and general handling. For example, kitchen (e.g. food scraps) and other organic waste can be avoided, redirected or otherwise redistributed. Whereas Webster (2015) argues that this requires acknowledging the wealth of basic resource flows, Burrowes-Cromwell (2021) looks at how cross sector collaboration might help to fuel such CE change. She intimates that joined up working might curb the underlying (and vital) waste flow of information and human participation (Burrowes-Cromwell, 2021).

In short, HaFS change towards a CE can be led by the adoption of 'closed loop' business design principles which prevents or reduces waste but with attention to human participation. The latter point is especially significant because it resonates with the cooperative themes in the COLLARES design for supporting a holistic shift in HaFS and stakeholder behaviour Koc et al., (2008), Kraaijenhagen et al., (2016), Papargyropoulou et al., (2016) and Laughton (2017) all stress this imperative about collaboration for sustainable business. When applied to the HaFS sector, CE action would focus on the valorisation of 'leftover' organic materials.

There are three key trends that are pertinent to this research and to its rationale. Firstly, there is an ongoing move to highlight the business case against food waste (Lipinski et al., 2013). This agenda stresses the financial implications of inefficient food systems for the HaFS sector. In a nutshell, the emphasis is on raw financial value. Secondly, there is an emerging interest in working with HaFS to cut back on food that is routinely being thrown away or otherwise under-utilised (MMU, 2015; Pay, 2017; Ormazabal et al., 2018).

The third key trend is the acknowledgment of social factors. In her recent writing, Burrowes-Cromwell (2021) examines the philosophical underpinnings of achieving this shift towards change. She concludes that while food waste has obvious environmental implications, there is also a twin dynamic of monetary value and social values. Simply put any effort to combat food waste requires both people collaboration and joined up sector-wide efforts (Laaninen & Calasso, 2020). It is worth emphasising that this requirement transcends traditional supply chain thinking. It demands adopting a values-based perspective that is inclusive about honing financial value.

One important point about the social aspect is that in real terms, everyone qualifies as a food consumer. Moreover, when speaking of HaFS, customers are major players. They act as both generators of food waste and the arbitrators of food supply dynamics. This is because they give out indicators which drive decisions about menu design, meal preparation and, procurement which involves resource sourcing from other parts of the food sector. Any ‘signals’ from customers also convey changing attitudes and behaviour towards food resources to HaFS businesses (Filimonau et al., 2020; Matzembacher et al., 2020). Furthermore, inevitably, the discussion about food waste touches on nutrition (impacting HaFS preparation of healthy meal choices) and the upkeep of a sanitary business environment.

2.2 Food Waste Prevention in Colombia

As noted, the UNSDG framework identifies food waste is an area for global action. In recent years, Colombia has started to take more deliberate steps to address this issue (FAO, 2016). However, progress has been at best disparate and slow. This Section summarises the emerging policy and regulatory context for preventing food waste in Colombia.

Although the majority of Colombia's national regulations are about solid waste management, there has been some movement towards combatting food waste. This appears to stem from Colombia's involvement with FAO work in LAC countries on this issue (FAO 2016). Formal documented measures and later policy development can be traced chronologically from this point. For example, there was a Report published in 2016 by Colombia's National Planning Department (Departamento Planeación Nacional) which was followed up by other related policy measures. However, in view of an estimated third (27%) of the population living in poverty[1], that report drew the connection between food waste and economic deprivation. It argued that the annual estimate of 9.76 tonnes of wasted food could be a potential 'breadbasket' for feeding 8 million hungry or otherwise disadvantaged people.

Subsequently, Colombia's National Development Plan (2018-2022) targeted waste management as a key challenge[2]. In 2018, solid waste legislation provisions around food were introduced [3]. These actions were then followed up in 2019 with Law 1990[4]. This legislation pertained to food loss and food waste management of 'residues' in restaurants, alongside further solid waste provisions. It should be noted that this law has direct implications for the 10 municipalities within the Medellín metropolitan area and, for their environmental management function.

[1] http://www.dane.gov.co/files/investigaciones/condiciones_vida/pobreza/bol_pobreza_17.pdf
[2] https://colaboracion.dnp.gov.co/CDT/Prensa/PND-Resumen-2018-2022.pdf
[3]see decreto 2412 de 2018: https://www.funcionpublica.gov.co/eva/gestornormativo/norma.php?i=89969
[4] https://minas.medellin.unal.edu.co/noticias/3231-en-que-consiste-la-gastronomia-sostenible

Other environmental regulations exist at national and sub-national levels related to waste management within organizations. According to such stipulations, HaFS in Medellín should adhere to the following provisions:

1) Metropolitan Resolution 879 of 2007 which adopts "The Manual for the Integral Management of Waste in the Aburrá Valley" (in which Medellín is situated), as an instrument of self-management and self-regulation[1].

2) Resolution 316 of the 2018 legislation which sets out obligations related to the management of used cooking oils, including the need to:

- Register with the Environmental Authority.
-Train responsible personnel to mitigate against the risks that these wastes pose to the environment.
- Report annually to the Environmental Authority, including providing information about the total kilograms of waste generated and, a copy of the certificates issued.

Additionally, a 2021 framework of the waste utilization programs of the public cleaning service sets out a requirement for all municipalities and districts to use colour coded systems for solid waste including green containers for separating food waste[2].

As illustrated, therefore, there have been positive developments in terms of establishing a regulatory framework for food waste in recent years. However, non-regulatory action, including practical support for HaFS businesses to meet these regulations, remains underdeveloped.

3. Research Aim, Objectives & Methodology

3.1. Research Aim

The overarching aim of this work is to offer insight and direction for HaFS sector action against food waste in Medellín. This is consistent with the overall goal of COLLARES, which is to promote responsible food production and consumption in Colombia and Peru.

[1] http://alphasig.metropol.gov.co/normograma/compilacion/docs/R_AMVA_0879_2007.htm
[2]https://www.medellin.gov.co/irj/go/km/docs/pccdesign/medellin/Temas/MedioAmbiente/Publicaciones/Shared%20Content/Documentos/2021/Seguimiento_PGIRS_CAPITULO_0-2020.pdf

3.2 Research Objectives and Questions

COLLARES project activities were geared towards raising awareness about the value of identifying, measuring and reducing food waste. However, in order to effectively guide the research, there were three overarching objectives with a Medellín focus. These were to:

RO1: Investigate current food resource management challenges experienced by HaFS businesses in Peru and Colombia. We aimed to achieve this by referencing secondary sources on the topic and, primary research mixing quantitative surveying with qualitative interviewing.

RO 2: Facilitate stakeholder awareness about the importance of cutting back on food waste. We aimed to achieve this through a semi-structured interviewing and an online workshop.

RO 3: Boost food waste redistribution efforts in the respective cities. We aimed to achieve this through an online workshop.

The above objectives were further interpreted at the level of the quantitative survey and subsequent interviews. In this regard, the primary research questions guiding the Study were:

RQ 1: What are the main challenges and areas for improvement?

RQ 2: What is the existing infra-structure for food waste support, redistribution and the disposal of resource waste?

3.3 *Research Methodology*

As noted earlier, we employed combined methods featuring a literature review, surveying and interviewing (Goonan et al., 2014). However, this was within the wider confines of a single case study. As with Hosseininia & Ramezani (2016), these multiple methods allowed for both qualitative and quantitative assessment of a complex subject involving food business and food waste. This hybrid approach also helped to tease out some aspects of the behavioural issues surrounding HaFS business waste. Although we were interested in challenges surrounding HaFS food waste measurement and waste disposal, we did not subscribe to just a quantitative focus.

3.3.1 Quantitative Survey with HaFS Personnel in Medellín, Colombia

A HaFS business database was procured from the Medellín Chamber of Commerce ("Cámara de Comercio de Medellín para Antioquia"). The survey was administered between May -June 2021. The data was collected using the Google Forms platform and transferred for analyse to Microsoft Excel. The survey instrument was designed to be as simple and flexible as possible, whilst still meeting the study objectives. The aim was to encourage participation from a wide range of HaFS respondents, not just from individuals with an interest in food waste or the time to complete a survey.

Therefore, the survey tool was limited to 18 questions, 14 of which comprised multiple choice (see Appendix A for a copy of the questionnaire). These questions were based on the 2 overarching research questions detailed above. They were also informed by an initial literature review and engagement with HaFS personnel during the inception stages. Since COLLARES entailed a dual nation initiative, we adapted some questions (minimally) from the instrument which was used in the Peruvian study. In order to encourage survey uptake, all respondents were invited to take part in a prize draw to win one of 6 sets of vouchers. These vouchers were then redeemable at a large catering supplies retailer in Medellín.

From the original database of 3217 businesses, 2756 were identified as being unique entries operating as HaFS businesses. These enterprises were approached twice using the email address included in the database. A total of 103 businesses responded to the survey. It should be noted that 3 of these were excluded from analysis due to data quality concerns.

3.3.2 Qualitative Interviews with HaFS Personnel in in Medellín, Colombia

Qualitative interviewing allows exchange of ideas between participants. As a research approach, it gives us an opportunity to explore purpose and meaning at the base of attitudes, thoughts and actions (Creswell, 1994; Crotty, 2015; Olsen, 2012). A case study approach was adopted for this primary research venture based on individual businesses. The interview instrument for this project about HaFS food waste was designed to:

· Identify key challenges regarding food waste management for HaFS in Medellín.

· Identify key solutions, strategies and actions being developed and implemented by HaFS in Medellín, to reduce food waste.

The interviewing employed a semi-structured style. A total of 28 respondents representing 15 HaFS, from a range of businesses participated in semi-structured interviewing. This sample included established regional chains, independent food enterprises and public sector catering outlets. Subsequent thematic analysis was done using NVivo software.

3.3.3 Workshop with HaFS personnel and international specialists

The online Workshop provided an opportunity for gathering primary research data as well as support HaFS action (See Appendix B). The event, entitled: 'Estrategias y buenas prácticas en torno al desperdicio de alimentos en los restaurantes' (Strategies and good practice related to food waste in restaurants), was held during the latter stages of the project. It can be considered as a form of extended focus group. Although it was a virtual event, this workshop aligned with Kitzinger's stance (1994) about how small groups could foster interaction and exchange.

There were three areas of focus:

- Communicating the issue (food waste in general, specific issues for HAFS, business opportunities).
- Learning about ways HaFS businesses can tackle the issue (case studies, methodologies).
- Discussing and gaining commitment from the businesses to make changes.

The workshop was designed to run for 2 hours at a timeslot sympathetic to the busy mid-morning/ afternoon scheduling of HaFS personnel. Thirty (30) representatives including persons from the HaFS sector and other local and international stakeholders were invited to take part. The workshop was conducted in Spanish, with readily available English translation.

3.4 COVID 19 and other issues impacting research design and project implementation

The entire delivery for the COLLARES project took place during the first wave of the COVID 19 pandemic in Colombia. This was a time of massive financial blows for the HaFS sector not only in Colombia but across the globe. In many countries, COVID 19 response measures relegated HaFS businesses to 'non-essential' status by restricting their operation and disrupting supply chains. Loss of footfall and resulting business meant that many HaFS had to shut down. For example, Foroudi et al., (2020, p.1) report on the impact of COVID 19 and the daunting situation for the food and catering sector in the UK. While some businesses do not survive, others were forced to find new pathways for business continuation. Sometimes this entailed staff dismissals, re-engineering staff workloads and deliberate efforts to glean savings, wherever possible. Burrowes-Cromwell (2021) refers to these new 'circuitries of change' with their implications for more deliberate relational business practice on the part of HaFS.

Although we tried to ensure alignment between methodology and original project objectives, lockdowns and other COVID circumstances heavily impacted HaFS in Medellín. To accommodate this, we allowed for critical changes at each implementation stage of COLLARES. For example, we re-arranged online meetings as a result of the need to change the order of agreed tasks, These included original plans for an in-situ workshop andkitchen training activities. We also shifted to more online and/ telephone interviews with HaFS representatives and other stakeholders.

The interviews were also scheduled at agreed times which did not conflict with interviewee obligations to their businesses. All project meetings were conducted via Microsoft Teams.As COVID disruptions severely challenged HaFS business resilience, we included a special section in the interviews to assist reporting concerning the impact of what was going on. This was an attempt to deliberately separate any Covid-specific findings, from what would have been general findings. In short, creativity was vital for workable options that would not inhibit the project's progress. These amendments had the additional benefit of helping us to examine options on the ground that would also enable any business transition and eventually, HaFS recovery.

4.0 Findings from the Survey

This Section presents the data collated from 100 HaFS businesses located in Medellín, Colombia. Forty-nine surveys were completed by either owners or managers. The rest of the responses came mostly from HaFS administrators. In terms of geographical location, the survey informed that 83 businesses operated on a single site, with 12 having between 2 - 5 additional locations. Five respondents represented chains with more than 5 outlets. The data is presented below in an extensive series of tables, along with a narrative overview.

The respondents were provided with the following definitions of the principal types of food waste relevant to their operations:

a. Food Waste (Desperdicio de alimentos): Non-consumable food such as shells from eggs and other foods, bones, plate waste, spoiled food, expired food.

b. Surplus Food (Excedente de alimentos): Food that can be consumed such as leftover food in the kitchen, excess ready-made meals.

c. Organic Waste (Residuos orgánicos): Food waste and surplus waste together.

Table 1 compares the business size demographics of respondents with the database information provided by the city's Chamber of Commerce. Although the limited sample size and nature of the population database render the statistical analysis of survey representativeness problematic, a visual scan indicates that small businesses were the main source of over representation in the sample. This comes as no surprise since SMEs already dominate a significant part of the private sector across the globe and, their significance for the HaFS sub-sector in Latin America has also been noted (Motta, 2017).

Table 1 (a-b): Basic demographics of HaFS

a) Population

	Micro	Small	Medium	Large	Total
Population	2650 *(96%)*	90 *(3.3%)*	13 *(0.4%)*	3 *(0.1%)*	2756
Sample	85 *(85%)*	12 *(12%)*	1 *(1%)*	2 *(2%)*	100

Among the 100 respondent businesses, 43 classed themselves as providing traditional food A further 27 identified as fast-food outlets.

b) HaFS Business Types

Traditional Food	43	Homemade Food	4
Fast Food	27	Sea Food	3
International Food	6	Others	17

In order to aid data analysis, the respondent businesses were further grouped into the following broad categories:

Full-service (dine-in restaurants with waiting staff etc)	61
Quick-Service (fast food and takeaways etc)	34
Other (industrial catering, ice cream shops etc)	5

Survey participants were also asked to rank where most food waste occurs. This was using a scale of 1-7, with 1 being the most and 7 being the least. It should be noted that the Table below sets out the frequency of occurrence (in terms of responses). Each waste category was cited as either the most or the least source of waste, with the top two being shaded for quick reference and for emphasis.

Table 2: Breakdown of sources of waste

	Deliveries	Storage	Pre-production	Kitchen during Service	Kitchen end of Service	Plate Leftovers	Other
Most Common	10	7	20	12	11	28	10
Least Common	16	12	7	9	6	7	3

Plate leftovers were therefore ranked highest by 28% respondents. This was followed by kitchen pre-production (20%). In contrast, the frequency figures for least common sources are highest around 'Deliveries' and 'Storage'. In other words, wastage during food deliveries (16%) and storage (12%) were the least commonly cited areas of food waste.

Responses to the question; 'what is the reason for the waste in the area you ranked first?' can be clustered into the following four categories:

Table 4: Explaining generation of food waste

Preparing food (peeling, chopping, sorting)	48
Cooking food (kitchen meal making)	6
Customer leftovers	36
Other	16

Table 5: Describing the most common types of food thrown away

What are the three most common types of food that you throw away?

Plate Waste	Fruit & Vegetables	Inedible (peel etc)	Cooking Oil	Bread & Rice	Meat
65	59	50	19	13	8

Plate waste, fruit & vegetables and inedible parts such as peelings and shells were the most common types of food thrown away.

Participants were also asked 'Does the restaurant / dining room measure the amounts of organic waste in any way?'. Sixty per cent of businesses did not measure waste at the time of the survey. Of those that did, only 3 used a specialised software system, with the remainder relying on weighing and other forms of manual control.

Table 6: Tools for Measuring Waste

Yes…	we have a specialized software system	3
	through manual control	24
	we weigh the waste	19
No		60
Other		6

There was a specific question to determine any basic kitchen activity around this topic: 'Is organic waste currently separated into surplus and waste in the restaurant / dining room?'. Just over three quarters of respondents report separating food into surplus and waste.

Table 7: Separation of surplus & waste

Yes	we have coloured containers	66
	we have staff for sorting	21
No		24

Table 8, below, indicates what happens to surplus food once it is collected by businesses.

Table 8: What is done with surplus food?

Give what is left of prepared food to staff	54
Donate to charities	6
Use for other meals	20
Composting	8
Pay surplus food reuse service	6
Collected by recyclers	25
Thrown away (landfill)	27
Other	13

The responses show that just over three quarters of businesses separate food waste accrued in the restaurant or dining area and, more than fifty percent of HaFS give what is left of prepared food to staff. However, only a minority of these food businesses donate surplus to charities or send organic waste to composts (8). Likewise, only a few of HaFS contract a third party for surplus food reuse services (6). It is fair to assume that the latter represents additional budgetary costs which might be beyond the capacity or commitment of some food enterprises.

4.1. Measuring Waste Generation

The average daily amount of organic waste among the respondent businesses was 16.3KG, of which 6.7KG is surplus food. These figures can be broken down into customer flow rates, as proxies for size, as presented below.

Table 9: Average daily food waste by business size

Customer Flow (number of customers per day)	Average Daily Food Waste (kg)	Average Daily Surplus (kg)	Total Organic Waste (kg)	Average Food Waste Per Customer (g)
0-50	3.8	3.4	7.1	130
51-100	10.7	8.3	19.0	173
101+	21.1	13.0	34.1	84

The figures indicate that larger businesses tend to create greater levels of organic waste, both food waste and surplus. However, waste per customer appears to be lower for HaFS with high levels of footfall. Further cross tabulation of organic waste with business type and waste type shows very clear trends. As outlined in the table below, organic waste appears higher in businesses that measure waste than those that do not. The differences are especially pronounced for food waste rather than for surplus.

Table 10: Measurement of Waste according to HaFS Business Type

Measure Waste?	✓	×	✓	×	✓	×
Full Service	8.6	4.0	14.6	7.0	23.2	11.2
Quick Service	4.8	4.3	12.0	5.5	16.8	9.8
All Businesses	6.9	4.2	13.4	6.5	20.3	10.6

4.2. Understanding Waste Management

4.2.1 Waste Disposal

Table 11: General breakdown of HaFS choice for food waste disposal

Municipal public collection	75
Composting	19
Private waste company	12
Other	7

As Table 11 sets out, three quarters of HaFS using municipal waste collection facilities to dispose of food. Around a fifth divert at least some organic waste to composting. Among the businesses that do not compost organic waste, a lack of facilities was cited by nearly 2/3 of the respondents.

Table 12: General rationale for not using Composting

Lack of facilities	50 (64%)
Time	24 (31%)
Cost	17 (22%)
Other	6 (8%)

It is interesting to note a further breakdown in Table 13 below. This sub-grouping relates only to the 22 businesses that indicated they do not separate food waste from food surplus. The reasons stated can be clustered into three categories:

Table 13: Additional explanation for not separating organic material

Lack of containers	12
Lack of surplus	5
Lack of time, space, or training	4

As set out in Table 8, above, 82 two businesses indicated that they do not reuse surplus food. This includes cases where it is collected apart from food waste. The absence of facilities is again presented here as the dominant response. Most prominent among the 'other' reasons given are the absence of surplus itself or that surplus is doled out to staff or to local charities.

Table 14: Explanations for not reusing surplus food

Lack of facilities	37 (45%)
Time	20 (24%)
Cost	13 (16%)
Other	26 (32%)

4.3. Waste Prevention

One question pertained to specific actions taken to prevent food wastage, impacting meal preparation and catering resource. This was an important question for showing any kind of innovative practice or new strategies for beating business waste. It is particularly significant for helping to determine HaFS businesses readiness levels for adopting 'waste to resource' principles. The latter concept is central to CE practice and would entail deliberate design regarding general management or at least, a comprehensive work system for cutting out food waste. The Table below reports on the responses that were given.

Table 15: Actions taken to prevent food waste

	All Businesses (%)	Full Service *(n=60)*	Quick Service *(n=40)*
Cook to order	57	52	65
Re-use in dishes	10	10	10
Portion control	65	73	52
Short menu	39	37	42
Staff training	38	40	35
No action	5	0	12
Other	4	3	5

According to this breakdown, 'cooking to order' and 'portion control' were cited most frequently as steps to minimise organic waste. Staff training and menu design were also cited. A further cross tabulation with full service and quick service businesses indicated similar trends for both. However, this excluded the five businesses that reported that they did not undertake any actions. Notably, these were all quick service outlets.

Table 16: Engagement with Customers for Influencing Change

	All Businesses (%)	Full Service (%)	Quick Service (%)
Awareness campaigns	8	10	5
Informational messages	16	20	10
Offer smaller portion sizes	43	47	37
Offer to-go bags	69	68	70
Other	9	8	10

This data shows that across all business categories, the most common action taken to influence diner behaviour and to reduce food waste was offering 'to-go' bags or food packaging. This was followed by the option to receive smaller portion sizes, which was available in 43% of the participating establishments.

4.4. HaFS preferred areas for support and enabling change

When addressing the idea of change, the survey participants were asked about what types of support they would find helpful for efficiency management and, for reducing costs associated with organic waste. In this case, the specific question was: *'Which of the following options would you find useful?'* Short courses, instructional videos and virtual workshops were all identified by approximately half of respondents. It is worth noting that all businesses identified at least one type of support option. There are also clear implications for the HaFS themselves in terms of commitment to communicating these ideas to their own staff teams and also, making time and opportunity so that the desired changes can happen and also be sustained.

Table 17: Support for HaFS action against food waste

Short course	50
Virtual workshop	44
Instructional videos	47
Instructional infographics	30
Brochures with instructions	24
Other	3

4.5. The COVID 19 Pandemic

Participants in the survey were asked to provide information about how the ongoing pandemic had influenced their business practices and rates of food waste and surplus (up until the point of the survey in May / June 2021). Overall, both food waste and surplus waste decreased for the majority of businesses as a result of the pandemic. The question posed was: 'Has your business changed in any of the following ways during the pandemic?'. The following Table gives a breakdown of responses.

Table 18: Impact of COVID 19

Table 18: Impact of COVID 19

Reduced opening hours	50
Added a delivery service	60
Added takeaway	46
Reduced menu	36

The survey also showed that the initial stages of Covid appear to have had a significant impact on the respondents. In terms of food waste, around two thirds of businesses witnessed decreases in levels of food discarded. It can be assumed that this was consistent with an overall decrease in demand. The most common change made by businesses (of all categories) in response to Covid was to add a delivery service.

Table 19: Assignment of food waste and surplus during the pandemic

	Food Waste	Surplus Food
Increase	6	4
Decrease	63	68
Been more variable	2	1
Stayed more or less the same	22	20

Among full-service businesses, only 2 reported an increase in food waste up until the point of survey completion, with 15 reporting that food waste stayed more or less the same. In terms of surplus, only 1 full-service company reported an increase and, 13 reported around the same levels. Similarly, among quick-service businesses, only 4 reported an increase in food waste and 3, an increase in food surplus. Seven respondents reported that both kinds of waste stayed more or less the same during this period. However, around two thirds of businesses (across both categories) reported a decrease in both food waste and surplus food during this period of the pandemic.

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4.6. Summary of Survey Findings

In summing up, the following 8 headline observations can be made from the survey data presented earlier:

1. Full-service businesses generate greater levels of waste than fast food and other quick service outlets.
2. Plate leftovers from customers is the most common source of food waste for HaFS businesses in Medellín, Colombia. This is followed by waste from preparing food ingredients.
3. The types of food being discarded is broadly in line with its market monetary value. Vegetables and fruit representing the largest volume, with meat being the smallest.
4. Three quarters of businesses dispose of food waste through the municipal collection system but lack of facilities is most commonly cited as the reason businesses do not separate, reuse surplus food or compost organic waste.
5. Two thirds of businesses separate organic waste into surplus and general food waste.
6. Third party reuse services appear uncommon in Medellín, with only a small number of companies reporting their use.
7. The most common preventative action to minimise organic waste across the sample, is portion control. Cooking to order is cited most frequently and 'to-go' ('doggie) bags are the most common action to influence diner behaviour in relation to wasting food.
8. Short courses, instructional videos and virtual workshops were considered as the most favourable forms of support to HaFS businesses tackling food waste.

5. Findings from the Qualitative Interviews

A total of 28 respondents were interviewed in May 2021. These people represented 15 HaFS businesses that included well-known regional chains, independent businesses and public sector catering outlets. A semi-structured interview guide was administered. The interviews were conducted in Spanish, via the telephone, and recorded to aid analysis. The data was transcribed and subsequently uploaded to the NVivo software application. Thematic content analysis was conducted focusing on the main challenges and suggested strategies for improving HaFS food waste management. The final analysis is presented below, structured around the core themes.

5.1. Challenges for tackling Food Waste

The interviews highlighted ten issues associated with minimising HaFS food waste. These were first grouped as challenges perceived by HaFS representatives to be outside of their organisation's control. Secondly, there were challenges considered as within the reach of food business owners themselves and lastly, there were key actions regarded as only partly within HaFS business control.

5.1.1. Challenges perceived as within HaFS control

Strategy and direction

It is interesting that only one interviewee explicitly stated that they did not have a food waste management 'strategy'. They explained that this was mainly due to not having appropriate professional guidance. That individual specified:

"We don't have a strategy developed at the moment. The only thing is that we try to reuse and recycle in the best way possible, but we don't have a formal strategy. This is because we don't have an appropriate consultant for this. We don't have all the series of things that are required for this."

Although others did not cite a lack of strategy or direction as challenging, it is worth noting that overall, the respondents did not express the view that 'strategies' needed to be large-scale or formally implemented (in a conventional sense). So, for example, one person quipped:

". . .well, I think that a strategy, strategy per se... I think a lot is about the way the chef deals with waste management because if you are a conscientious person, well you will know that if there is food that is left over from preparation you need to find ways to reuse these. For instance, we try use 100% of the animal instead of only using parts of it and discarding the rest."

Some respondents further cited procurement as a strategic start for early waste prevention. One interviewee refers to the fact that they have minimal left-overs because the portions are adequate in terms of quality and quantity:
"When we receive the plates back in the kitchen, they are empty."

Another interviewee attributed this result to providing the right amount of each nutrient group in the meal. They calculate this means a: *". . .portion of carbohydrate, one portion of vegetables, and one portion of protein of good quality"*.

Additionally, one respondent mentioned that they dealt with waste by charitable donation and food redistribution. They explained:
"My friend's father lives in a care home for the elderly. This is organised by the local government. By talking to my friend, we realised that his father wasn't having premium meals as advertised by the local government. Instead, the elderly living in this care home were lacking important nutrients from vegetables. I started to look at ways in which we could donate vegetables that would not be of the standard required for the menu. For instance, vegetables with unusual shapes or too small or too big. This turned into a partnership between the restaurant, some of our suppliers and the care home."

There were some responses about strategy that referred to the size of their business. For example, one interviewee mentioned that their relatively small business operation allowed them some agility. In their opinion, this helped them to control the generation of food waste. It seems that they also monitored food procurement and stock, based on day-to-day demand which they felt limited the propensity for wasting food stuff and other resources. On the other hand, a larger enterprise seemed to do something different, yet, with the same result – they redistribute among their points of sale that have more traffic, in order to clear any remaining stock.

The above data indicate that some HaFS personnel in Medellín have awareness and responsibility about cutting back on their business waste. Furthermore, in some cases this combination of reflection and action is fuelling initial changes as business capacity and opportunity allow. At the same time, we should note that these activities are not necessarily being thought through as whole organisation strategy, with long term plans for continuous improvement.

Physical Conditions

Two physical issues were noted as major barriers to effective waste management on the part of Medellín's HaFS. Firstly, some interviewees said that they did not have enough space to do the composting or to store organic waste. In other words, what to do with waste and where to put it (even temporarily) is problematic for these food businesses. One HaFS respondent informed that:

"We pay a company to collect organic waste but they don't come on time and because homeless people check the composting bin and make a mess of it, we can't leave it outside, so we have to store it inside until they come to collect it."

"I don't have the means or space to do the composting in my facilities"

In other words, once discarded food stuff is being thrown away, there may be subsequent foraging and food collection by local homeless and/ hungry people. This illustrates how environmental health can be linked to the food waste challenge. In the above-mentioned scenario, at least the food is not going to waste. On the other hand, an sanitation problem could be left at the doorstep of the HaFS business.

There was a second issue which showed how the physical conditions of the business could eventually contribute to generating waste. In this case, the issue was about controlling the temperature in the kitchen to avoid wasting certain foods (e.g. eggs) which 'go off'. For example, one respondent made the point that:

"We have a small kitchen and controlling the temperature in different parts of the kitchen is difficult. The eggs, the fruits and the vegetables sometimes go off because of the high temperature, we don't have a way to control the temperature properly yet."

5.1.2. Challenges perceived as outside of HaFS control

Lack of clarity around stakeholder roles and regulations

Lack of clarity and control regarding food waste seemed to be a grey area for the interviewees who mentioned it as a challenge. For instance, the HaFS that were based in shopping centres were trying to do their part about curtailing waste. Some representatives argued that the shopping centre was responsible for overall waste management. Thus, ultimately, it was not the responsibility of the HaFS. With regard to this issue, we learn that:

". . .food waste as such can't be consumed so this goes directly to a food waste container which is given to the shopping centre and they have their own organic waste collection and recycling. […] It would be great if all shopping centres had a programme to make the most of organic waste."

This suggests potential for link-ups and more B2B or other collaboration, on the part of HaFS based in shopping centres. There is no evidence in the interviews of reporting mechanisms or comprehensive food waste systems in shopping centres. Collaboration with other food outlets could present opportunities for learning and sharing good practice amongst the HaFS. There might even be further opening for testing open innovations with respect to managing the waste issue by involving other stakeholders on location. Improvements could lead to a more integrated approach that links the work of the HaFS businesses and the functional role of the shopping centre. There could also be some part to be played by collaborating with external stakeholders (both upstream and downstream) including as suppliers and food waste collection businesses, as well as customers and government agencies.

Similarly, with respect to HaFS based at universities, there is a lack of clarity around who should be making decisions regarding preventing food waste. Although some universities measure their environmental impact, the interviewees from this sub-sector highlighted a lack of comprehensive follow up on food waste as an issue. Potentialls this could include collaboration with the food businesses on campus (i.e. active partnerships which move beyond mere submission of business food waste figures). At least one respondent pointed out that this seems to be the case for other environmental management issues, such as single use plastic.

". . .the university wants us to measure the food waste we generate. When I was using the food waste collection business I would fill a form and then give it to both the university and the food collection business. The university said they needed to have that information because they have a commitment regarding their environmental footprint and other measures. However, the University doesn't give me any feedback.

We are the ones who weight the organic waste as we are the ones paying for food waste collection, the university doesn't do any of those measurements. In addition, the university has never asked for information regarding measurements of single use plastic, for instance."

"I've had training in solid waste management, I know about this topic so I've been trying to help the university with this and in general they seem interested. However, they start some small projects and write commitments, but it stays that way. It doesn't seem to turn into practice or anything beyond small disjointed projects",

Interestingly, this particular scenario, shows one HaFS representative who is keen for change but seems frustrated by research exhaustion - without fruitful delivery from universities. These comments cut to the core of the role of universities in both promoting and enabling key business change, regarding sustainable enterprise and specifically, preventing waste. Once more, this underscores the need for deeper integrated approaches and for creating alliances which result in improved business management and delivery (Miles et. al., 2015; Trencher, Yarime & Kharrazi, 2013) .

Therefore, HaFS businesses based in premises which are controlled by other stakeholders such as shopping centres or universities could work with their host organisations to develop strategies towards better food waste management. This could potentially have a ripple effect creating impact across the university, the shopping centre or even the region if other stakeholders such as supply chain contractors, or costumers are involved.

As indicated by the survey, the majority of HaFS businesses in Medellín rely on the municipality's waste collection system to dispose of organic waste. Even if food waste is separated within businesses, its fate is out of the control of businesses who have to reply on municipal services. According to one respondent "all waste ends up in the same bin at the end". As presented earlier in Section 2, regulations about food waste management in HaFS businesses have recently been implemented. However, some HaFS interviewees, held the view that the law and broader justice system is failing to enforce these directives in Medellín.

5.1.3. COVID 19 as a challenge to HaFS business continuation and innovation

COVID-19 clearly brought acute challenges for the HaFS sector. The sectoral impact has been on a global scale and resulted in significant financial hardships for restaurant owners, their staff teams and general operations (Davahli et. al., 2020; Gursoy & Chi, 2020; Liu et.al, 2021; Song, Yeong & Lee; 2021). LAC countries were not exempted from these troubles (IDB Invest, 2020). In the case of Colombia, COVID-19 caused financial hardships for HaFS in Medellín. Furthermore, there were specific challenges to combatting food waste and some of Medellín's HaFS were forced to stop paying for organic waste collection services.

HaFS also struggled with projections and meal planning. According to one restauranteur, before the pandemic they had developed systems to determine meal numbers. They knew the amount of meals they were likely to be prepared and, likely leftover food for disposal. However, as a result of curfews and lockdowns, it was a struggle to estimate how much produce would need to be purchased and prepared for their customers. This directly affected the pace of their sales strategy and the procurement of stock.

Although, this seemed to be the case throughout the interviews, one of the restaurants appears to have improved their processes in response to this:

"We started to do work with real time management of the inventory linked to sales and purchases. Everything connected using the same language. By doing this, we reduced non-plate waste by 50% during the pandemic"

Business resilience would determine readiness for unforeseen circumstances. Yet, it is especially challenging for a food business to plan for a pandemic. If waste management systems are not yet implemented throughout the whole organisation (or even nationally), adapting to the incomprehensible and the unpredictable is stressful. We see that the above restaurant managed to take advantage of the difficult situation and COVID 19 became a driver for business re-engineering. They responded to draconian national measures with innovation.

5.2 Challenges perceived as both within and outside of the control of HaFS

Lack of awareness and knowledge

Lack of awareness was a prominent theme throughout the interviews. Nine interviewees (n=28) discussed lack of awareness as a challenge for food waste management. The interviewees mentioned that they could act only in terms of their level of knowledge. Some mentioned that others in the organisation would be able to provide more details, suggesting that knowledge around food waste is not necessarily integrated throughout the businesses. Lack of awareness included external drivers such as regulations and the role of the local government. It also related to internal management issues such as practical steps to reduce food waste.

In terms of lack of awareness, interviewees mentioned that consumers as well as HaFS staff were used to throwing away food. This may be linked to lack of knowledge about food waste reduction and savings, as well as broader environmental and socio-economic impacts of food waste. In this case, interviewees expressed an interest in knowing more, but they mentioned that they thought they required support from external sources to address the lack of awareness and knowledge.

Developing support packages within and for individual SMEs is not often financially viable. However, a model that has worked in other settings is to create learning packages and training for groups of SMEs rather than individual ones.

Business costs

According to the interviews, there is no food waste collection service offered by the municipality. HaFS have to pay for these services: “this activity (food waste collection) requires paying for these services although it is for the benefit of the company who does this, in addition you need to drain all the moist out of the organic waste as you pay by weight”. Some suggested that they spend about 700.000 pesos per month in waste food collection services. This is equivalent to nearly the minimum wage in Colombia in 2020. This means that HaFS businesses, especially small ones might need to decide between one extra employee and paying for food waste services. For these reasons according to the interviewees only fine dining HaFS businesses can pay for professional food waste collection services. Other HaFS businesses collect food waste to be taken to landfill by the municipality’s standard waste collection services.

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Interviewees reported that during the pandemic, paying for waste food collection services was even more difficult due to the uncertainties and difficult financial situation. *"[. . .] we didn't continue with this activity (food waste collection) due to the financial effects of the pandemic but we are aware that as an organisation we need to start with these activities again"*. We can gather from the above information that an upstream focus on food waste prevention/reduction could be the most cost-effective way to minimise waste. Engineering away the problem saves the need for potentially costly solutions. Alternatively, if both upstream and downstream solutions were adopted, upstream reduction would have a beneficial effect on cost by reducing downstream volume/dependence.

However, representatives from HaFS businesses which are not necessarily classed as fine dining mentioned that they did pay for specialist food waste collection because of the ethos of their HaFS businesses. One stated that "sustainability is at the basis of the business model and a reason for clients to prefer the brand". Therefore, HaFS businesses could explore the benefits of developing their business model based on environmental management systems and social justice practices.

Upstream issues

HaFS representatives also explained in the interviews that sometimes they have produce which does not comply with in-house standards. In these scenarios, despite having made the purchase, in the interest of quality control, such produce cannot be considered as fit for purpose. Hence, these materials are then dumped. The implication here is that new inter and intra-organisational approaches and practices may be needed to avoid this type of waste. This is especially when considering HaFS business scale and attention to the scope of the operation.The interview responses especially suggest that appropriate coding around quality of produce, storage standards and subsequent usage would be helpful to HaFS businesses. Some of the produce standards may even be visually-based, in determining what produce is fine for consumption.

Food safety concerns

HaFS businesses and other organisations trying to take action to reduce food waste through donations seemed to be constrained by some regulations. For example, there were concerns about contamination and safety of the food and, the potential for litigation. Unfortunately, this reality would be despite any intentions for public good on the part of the HaFS. There were also concerns surrounding the health of vulnerable communities in the case of ongoing food donations.

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Consumer related issues

Four HaFS interviewees mentioned that there are often lots of leftovers on the plates. As a result of obvious health and sanitary concerns, these leftovers cannot be re-used as a meal. However, this information is still useful. In the spirit of operational research (and in keeping with the basics of TMA), monitoring and weighing food scraps etc. may help to inform portion size or menu changes of the particular food enterprise.

It is also worth noting the need for similar changes on the part of HaFS that are operating on university campuses. Food citizenship in this context would mean re-profiling the student and all other campus personnel as consumers. One observation was made about the consumer behaviour of university students:

For example, an interviewee commented: *"In addition, now they are trying to implement a new systems of plastic bags and bins by colour, they seem to be changing again, because at universities they've already made some changes before, so it's difficult for the students, you need to instil the responsibility as well as the new and changing processes".*

While Petetin (2020) makes the agrees about the need to generally embrace food citizenship in monitoring food waste, Lazell (2016) emphasises the role of the teaching institution and the student. In other words, education for sustainable development is an avenue for universities addressing food waste and promoting food valorisation. There are clear implications here for curricula reform.

5.3 Respondents' proposed actions towards change

Interviewees mentioned some potential and actual solutions and actions they are taking to prevent and reduce food waste. Diagram 1 below outlines a three-stage process. This is categorized as; before, during and after service. The diagram also shows a general category for a basic level of external collaboration for change. These relate to simply getting more support from other stakeholders and, HaFS businesses participation by raising awareness and general public education about tackling food waste. Such findings are consistent with a host of other studies which argue for collaboration and CE thinking as a basis for sustainable enterprise (Weetman, 2017, Lahti et al., 2018; Whicher et al., 2017; WRAP, 2020; WRAP n.d.).

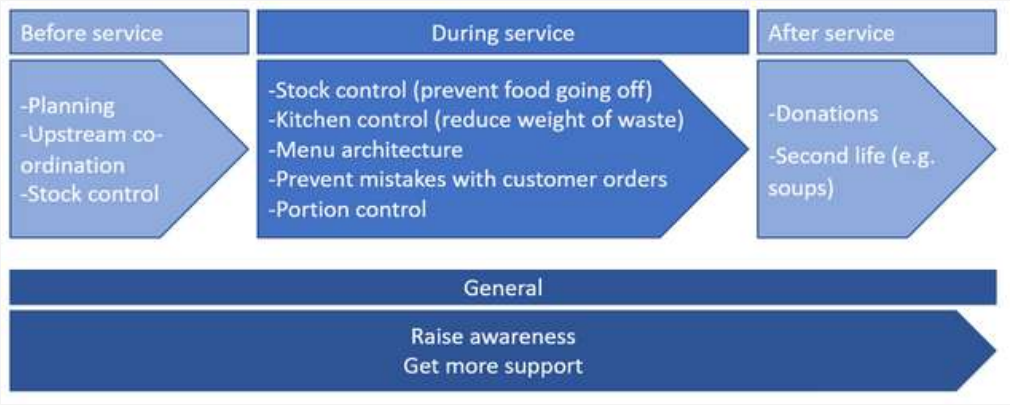


Diagram 1: Viewpoints of HaFS representatives about how to achieve change

Although the proposed solutions and actions are a starting point, they provide further evidence about the need to develop an integrated approach to managing food business waste, with particular attention to food separation, measurement and opportunities for redistribution. This is consistent with the maxim 'what gets measured gets managed' (Askew, 2018). Within the Medellín scenario, overall, there is truncated activity and a disconnect across HaFS businesses food procurement, preparation and disposal processes. This absence of functional linkages across the food waste divide is also present in the food supply chain. This includes B2B relationships that involve HaFS organisations and their wider ambit of internal and external stakeholders. It is here that strategic collaboration can help to establish and to boost food waste valorisation and re-distribution efforts (WRAP, 2015).

The data for Medellín resonates with other studies that call for social innovation in tackling food business waste. This has been specifically defined in one EU-funded document entitled 'How can social innovation help reduce food waste?' as being '. . . about new ideas that work to address pressing unmet needs' (EU, 2013). Saguy and Sirotinskaya (2016) comment later on this topic with a wider call for 'open innovation' pertaining to food businesses. Interestingly, a conversation is also developing about food waste action within the food SME sector. For example, the EU 'Report food for Life' Report (2017) pre-dated a number of more recent studies (Burrowes-Cromwell, 2021). These issues could be addressed by the development and implementation of environmental management systems which are international approaches for businesses. In the context of Latin America and Colombia environmental management systems are not a mainstream approach to deal with environmental management. In addition, the development of these systems requires long term human and financial resources, which is something that might be challenging for HaFS businesses to establish. However, established environmental management systems can result in significant savings for organisations. In addition, through the process of developing and implementing these, SMEs have the potential to improve performance, firm image, stakeholder relationships and overall management.

5.4. Summary of Interview and Survey Findings

In short, the challenges faced by HaFS representatives with regard to minimising food waste can be categories into three groups: challenges within control of the business; challenges outside of business control; and challenges both within and outside control. These, in turn, can be encapsulated in the following observations derived from the interviews with HaFS representatives in Medellín:

1.The implementation of strategic approaches to food waste management appropriate to the size and operating ethos of the business can have a direct impact on food waste levels.

2. Physical space and appropriate infrastructure are important factors to control waste. Appropriate storage space can limit both the ability to prevent food from spoiling and the options for separating and processing organic waste.

3. Lack of clarity about responsibilities and level of support from government, landlords and other stakeholders, prevents HaFS businesses from making greater progress in this area.

4. Lack of awareness about the challenges and solutions for food waste management are regarded as a key barrier, both for business operators and awareness among key stakeholders such as customers and employees.

5. Covid 19 has had a major impact on the degree of food wastage. This was largely related to difficulties predicting demand, lockdown requirements and supply issues.

6. The cost of implementing and operating food waste management systems is perceived as a barrier. The cost of private sector food waste processors is prohibitive for the majority of small HaFS businesses.

7. The quality of food supply and other upstream issues can have a large impact on food wastage. Greater consistency in supply chain quality and storage standards would reduce the amount of produce that is thrown away before use.

8. Plate Waste from consumers is a major source of food waste for businesses and an area that is difficult to control. Health and sanitary concerns restrict the scope of reusing plate waste, whilst consumer education on its importance remains low.

6.0 Reflections about the Online Workshop

Appendix B shows an introduction to the workshop and the Medellín food enterprises that contributed. This virtual event brought together HaFS personnel from 10 businesses. Some of these representatives had already participated in earlier COLLARES activities. Their continuation suggested a measure of positive uptake of the project.

Two well-known restaurant brands in Medellín conducted presentations. Apart from these Colombia-based stakeholders, there was also an international contingency of CE specialists in food waste and CE. This included the UK-based WRAP; as global leaders in managing food waste.

Overall, participation was vibrant and there was free flow of ideas about food waste, unique business responses and international practice. This workshop demonstrated capacity for focussed, crisp delivery, involving the HaFS sector- despite working across two international timeframes. It now provides a basis for future follow up about project impact and promoting strengthened food re-distribution systems in Medellín.

7. Conclusions

COLLARES explored enterprise-focused strategies to support responsible food consumption in Colombia through the HaFS sector. Strategies largely pertained to cutting back on food waste and raising awareness of the potential savings for HaFS businesses in Medellín. Through this approach the COLLARES promoted the 'waste to resource' principles of circular economy thinking.

In the short term, the intention was to expand knowledge about the importance of reducing wastage as it relates to providing and consuming food in restaurants, fast food outlets and other HaFS businesses. Over the long term, the project aimed to encourage more efficient food resource management, food waste redistribution or other re-use. In this regard, the Project was successful in rallying a mixed grouping of business leaders, practitioners and municipal representatives to examine the topic and, to explore practical change which was sympathetic to HaFS business scale.

The results illustrate the need for appropriate national policy and regulatory measures to support HaFS action against food waste. This could include incentivisation, supporting basic infrastructural changes and compelling businesses to minimise food waste. More broadly, HaFSs need to be supported to re-model processes commensurate with the business scale and commercial thrust of the organisation. Furthermore, greater adoption of environmental management systems would help improve the overall management of restaurants. The adoption of food waste management software systems were minimal among the respondent businesses.

Other recommendations include in-service staff training, informational messaging and on-site campaigning to raise the awareness of customers and the general public about tackling food waste. We uncovered implications for functional networks and stress the need to retain a local focus in any arrangements, across sectors. These linkages could facilitate more repurposing and redistribution of food that would normally end up in the landfill. Since only three respondents used software systems to monitor waste, developing this area is also a strategic action point.

In terms of methodology, we can conclude that our mixed-methodology approach was appropriate for the quantitative and behavioural aspects of this important topic. Additionally, flexibility allowed maximum participation of HaFS personnel. This was despite the challenges of the lock downs and other challenges of the pandemic. The online workshop facilitated vibrant exchange about best practice examples from both Colombia and the UK. Additionally, there was discussion about local strategies and support for managing food waste in HaFS businesses.

7.1. Recommendations

Based on the findings of this research, we propose the following general recommendations to support the effective management of food waste:

Food waste reduction and prevention

1. Food waste prevention training should be considered for staff across HaFS businesses.
2. As key generators of food waste, customers should also be targeted for awareness raising.
3. HaFS businesses should seek to identify and implement short-term actions and review food waste management practices on a continuous basis.
4. Medium and long-term strategies and policies at organisational level should be considered in order to improve the systematic management of food waste.
5. Governments and supporting stakeholders should develop and resource strategies and policies to support collective efforts to manage food waste at local and national levels.

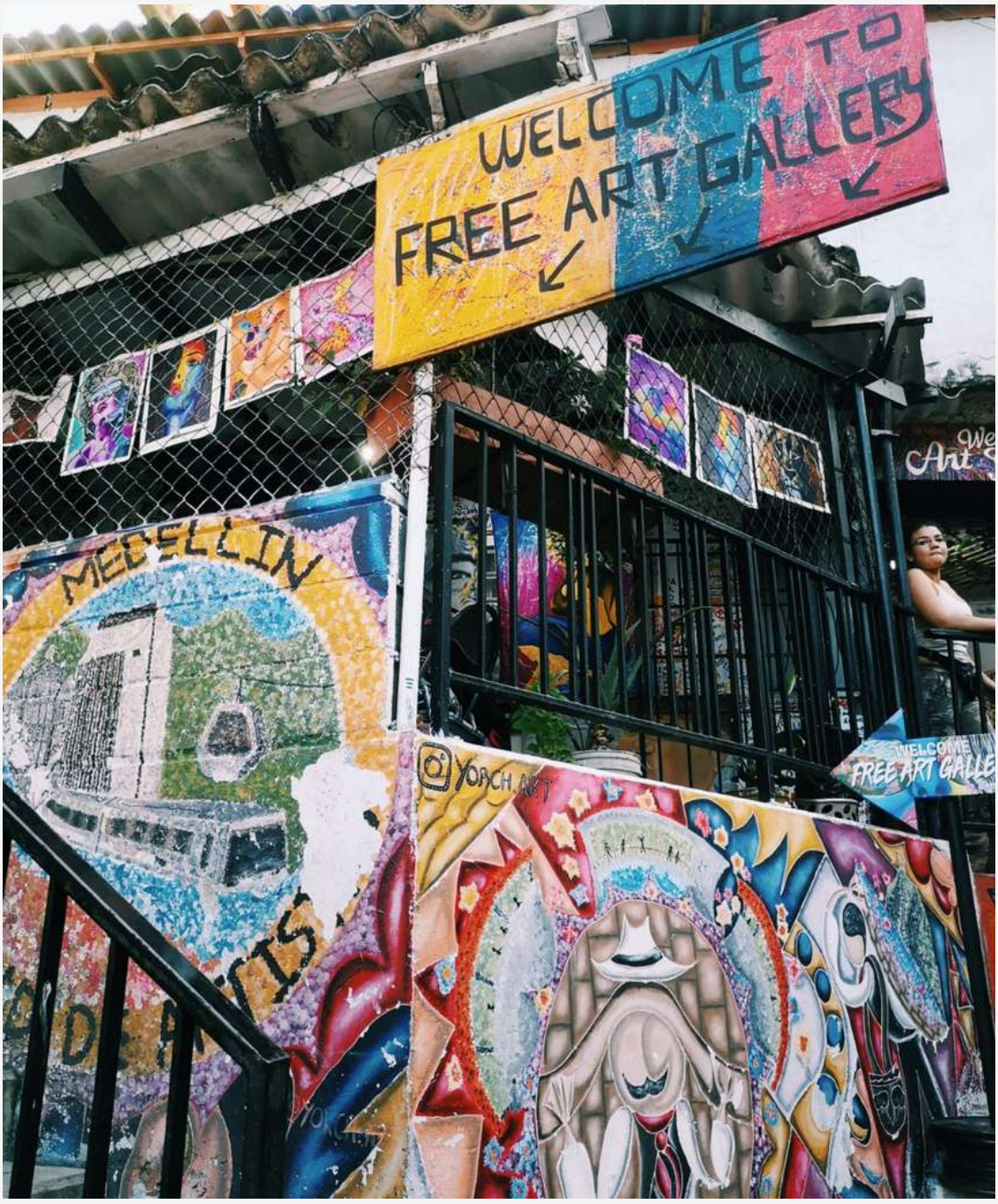
Beyond food waste management

1. Integrated approaches to sustainable business practice can further improve waste management systems. This should include stakeholder engagement, participation, partnership and collaboration activities that bring together environmental, social and economic aspects.
2. Environmental management systems will improve waste management as well as other environmental, economic and societal aspects at the organisational level. In addition, environmental management systems can improve the economic performance of HaFS businesses, especially small and medium enterprises.
3. Explore possibilities of developing business models and brands that have environmental and social concerns and related actions as a central aspect.

7.2 The Limitations of this Study

This document reports only on the findings from the city of Medellín. It was the sole study area for Colombia. The study's mixed method approach and staggered use of research instruments contributed to its logical progress. However, we make no claims to reliability or to generalisability. The data presented speaks only to a relatively small, purposive sample of food enterprises in a highly populated urban region.

As such, this work may be described as purely elemental research about a relatively new topic. We propose the below recommendations with this in mind. We look forward to future liaison with stakeholders and providing research support. This is to encourage HaFS uptake of new principles towards business resilience and their flourishing.



7.3. Reflections on the potential Impact and Legacy of the COLLARES Project

COLLARES was designed as a conceptually rich study that attempted to link themes of collaboration with food waste, responsible food enterprise, responsible consumption and HaFS uptake of CE practice. Therefore, one important outcome of this Project appears to be the creation of a learning setting about these concepts for its participants. Secondly, the study's interactive features meant that HaFS personnel were able to hear about local efforts and innovations that were already in place to cut back on food waste. The validity of this input should be emphasized. It could be a basis for further research about indigenous approaches to an acute business problem.

Thirdly, the collaborative partnership setting and structure of the COLLARES were geared towards exposure to international practices about tackling waste. This awareness raising among Medellín's restaurants and other HaFS businesses had an immediate impact which was most evident in the B2B exchanges which took place, during the online workshop. One common objective in using the surveys, interviews and workshop was to raise awareness, allow reflection and ultimately, to encourage commitment to business change.

Lastly, as a result of the above, this research highlighted the business case against food waste. HaFS owner managers were informed about this opportunity for much needed business savings, as a result of tackling food loss and waste along the supply chain, in meal preparation and discarding leftovers. Put succinctly, more resource efficient could lead to economic benefit, particularly in the longer term. The HaFS personnel recognised the importance of tackling this issue so that they would be in a better position to reap benefits. In the longer term, we anticipate that with appropriate follow up and funding and other resources, these project activities, and legacy may contribute to direct economic savings for the participating HaFS businesses in Medellín.

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Appendices

Appendix A: Online Survey Instrument

Encuesta sobre residuos orgánicos en Medellín

valeriaruizv@gmail.com (not shared) Switch accounts

Lo invitamos a responder nuestra encuesta sobre el desperdicio de alimentos en los restaurantes de la ciudad de Medellín. Este estudio es realizado por la Universidad Metropolitana de Manchester del Reino Unido, en colaboración con la Universidad EAFIT de Colombia. Nos interesa conocer más sobre cómo se manejan los alimentos en su negocio, específicamente, sobre los alimentos comestibles que se pueden comer pero que son desechados, por ejemplo, sobras de comida, alimentos completamente sin abrir, alimentos almacenados y, también, desechos orgánicos que no se pueden comer, como por ejemplo, pieles, cáscaras y huesos.

Todas las entradas entrarán en la rifa para ganar uno de los cinco premios en cupones de 500.000 pesos para implementos de cocina.

¡Muchas gracias por participar!

Haga clic aquí para obtener más información sobre la encuesta: http://tiny.cc/EncuestaCollares

Doy mi consentimiento para participar en este estudio.

☐ Sí

COLLARES

Sobre su Negocio

Tipo de comida

- ◯ Comida típica
- ◯ Comida internacional
- ◯ Comida callejera
- ◯ Comida rápida
- ◯ Other: _____

Flujo de comensales por dia

Your answer

Número de puntos de venta

- ◯ 1
- ◯ 2-5
- ◯ 6+

Número de empleados

- ◯ 1-9
- ◯ 10-49
- ◯ 50-249
- ◯ 250+

Cargo del encuestado

Your answer

Sección 1: GENERACIÓN DE RESIDUOS ORGÁNICOS

Responda la siguiente sección teniendo presente que los residuos orgánicos están clasificados en Excedentes de Alimentos (alimentos aún comestibles, lo que queda en la cocina como exceso de platos preparados) y en Desperdicio de Alimentos (comida en mal estado, partes no comestibles de frutas/verduras y sobras de los platos).

Por favor, responda con respecto a la situación antes de la pandemia.

Tipos de Residuos Orgánicos

COLLARES

Dónde ocurre la mayor cantidad de Residuos Orgánicos? Por favor califique (1= mayor, 7= menor)

	1	2	3	4	5	6	7	'Not applicable'
Ingreso de insumos de alimentos	◯	◯	◯	◯	◯	◯	◯	◯
Almacenamiento	◯	◯	◯	◯	◯	◯	◯	◯
Pre-producción	◯	◯	◯	◯	◯	◯	◯	◯
En la cocina durante horas de servicio	◯	◯	◯	◯	◯	◯	◯	◯
En la cocina al final del servicio (demanda impredecible)	◯	◯	◯	◯	◯	◯	◯	◯
Sobras en los platos	◯	◯	◯	◯	◯	◯	◯	◯
Otro	◯	◯	◯	◯	◯	◯	◯	◯

Mencione las razones por las cuales se generan residuos orgánicos en el área en la que más se generan estos

Your answer

Mencione las razones por las cuales se generan residuos orgánicos en el área en la que más se generan estos

Your answer

¿Cuáles son los tres tipos de alimentos mas comunes de los que se generan residuos orgánicos?

- [ ] Pan / arroz
- [ ] Carnes
- [ ] Frutas / vegetales
- [ ] Peladura / huesos y otra comida incomible
- [ ] Sobras en los platos
- [ ] Aceite

¿El restaurante/comedor mide de alguna manera las cantidades de residuos orgánicos? (puede seleccionar más de una opción)

- [ ] Sí, tenemos un sistema de software especializado
- [ ] Sí, mediante un control manual (inventarios – residuos)
- [ ] Sí, pesamos el desperdicio
- [ ] No.
- [ ] Otros

¿Cuál es la cantidad (kg) promedio de excedentes de alimentos que se genera diariamente?

Your answer

¿Cuál es la cantidad (kg) promedio de desperdicio de alimentos que se genera diariamente?

Your answer

¿Actualmente se separan los residuos orgánicos en excedente y desperdicio en el restaurante/comedor? (puede seleccionar más de una opción)

- [ ] Sí, contamos con contenedores de colores
- [ ] Sí, contamos con personal para la clasificación
- [ ] No
- [ ] Other:

Si la respuesta a la pregunta anterior es 'No', ¿Cuáles son las razones para no separar los residuos orgánicos en excedentes y desperdicios en el restaurante/comedor?

Your answer

ELIMINACIÓN / REDISTRIBUCIÓN DE RESIDUOS ORGÁNICOS DE ALIMENTOS

¿Qué se hace con los excedentes de alimentos (alimentos aún comestibles: lo que queda de alimentos en cocina - exceso de platos preparados, etc.)? (puede seleccionar más de una opción)

- [ ] Se dá lo queda de los alimentos preparados al personal
- [ ] Se dona a organizaciones benéficas
- [ ] Se usa para otras comidas
- [ ] Se usa para compostaje (producción de abono)
- [ ] Simplemente se desechan (relleno sanitario)
- [ ] Se paga por el servicio de reaprovechamiento de los excedentes de alimentos
- [ ] Se entrega a recicladores
- [ ] Other: _____

¿Cuáles son las razones para no aprovechar o donar el excedente de comida comestible? (puede seleccionar más de una opción)

- [ ] Costo
- [ ] Tiempo
- [ ] Falta de servicios
- [ ] Other: _____

¿Cómo se eliminan los desperdicios de alimentos? (comida en mal estado, partes no comestibles de frutas / verduras, sobras de plato, etc.- puede seleccionar más de una opción)

- [ ] Contenedores y recolección pública municipal (relleno sanitario)
- [ ] Compostaje (producción de abono)
- [ ] Contratación de empresa operadora de residuos sólidos (Privada)
- [ ] Other: _____

¿Si no se usa como compostaje, cuáles son las razones? (puede seleccionar más de una opción)

- [ ] Costo
- [ ] Tiempo
- [ ] Falta de servicios
- [ ] Other: _____

¿Qué acciones ha tomado el restaurante/comedor para prevenir los excedentes de alimentos? (puede seleccionar más de una opción)

- [ ] Cocinar a pedido.
- [ ] Control de porciones
- [ ] Capacitación del personal
- [ ] Menú corto
- [ ] Creación de platos usando insumos no consumidos
- [ ] Ninguna acción
- [ ] Other: _____

COLLARES

¿Qué acciones ha tomado el restaurante/comedor para influir en el comportamiento de los comensales para la disminución de desperdicios de alimentos? (puede seleccionar más de una opción)

- [ ] Mensajes informativos
- [ ] Ofrecer bolsas para llevar o empaques de comida, etc.
- [ ] Ofrecer diferentes porciones en la carta
- [ ] Campañas de concientización para el comensal
- [ ] Other: _____

IMPACTO DEL COVID19

¿Su restaurante/comedor ha cambiado en alguna de las siguientes maneras debido a la pandemia?

- [ ] Se redujo el menú
- [ ] Se redujo el horario de apertura
- [ ] Comida para llevar se adicionó
- [ ] Domicilio se adicionó
- [ ] Other: _____

En proporción a su uso general de comida, los residuos orgánicos durante la pandemia han...

- ( ) Incrementado
- ( ) Sido más o menos los mismos
- ( ) Disminuído
- ( ) Variado más
- ( ) Other: _____

En proporción a su uso general de comida, el excedente de comida durante la pandemia ha...

- ◯ Incrementado
- ◯ Sido más o menos el mismo
- ◯ Disminuido
- ◯ Variado más
- ◯ Other: _____

Nuestro proyecto tiene como objectivo apoyar a los negocios para que manejen y reduzcan el costo de los residuos orgánicos. Cuáles de las siguientes opciones le parecerían más útiles (puede escojer más de una opción).

- ☐ Video instructivo
- ☐ Brochure con instrucciones
- ☐ Infografía instructiva
- ☐ Taller virtual
- ☐ Un curso corto
- ☐ Other: _____

Escriba su nombre y dirección de correo electrónico si desea participar en la rifa.

Your answer

Appendix B: Online Workshop Agenda & Participating HaFS businesses, Medellín, Colombia

Agenda

ESTRATEGIAS Y BUENAS PRÁCTICAS EN TORNO AL DESPERDICIO DE ALIMENTOS EN LOS RESTAURANTES (Medellín, Colombia)

Parte 1:"Sostenibilidad: El gran reto de la Gastronomía"

- Saludo, objetivos, dinámica del workshop, presentación de los participantes.
- Sobre el Proyecto
- Presentación WRAP, United Kingdom
- Presentación Universidad EAFIT
- Diálogo sobre los retos actuales del desperdicio de alimentos para los restaurants de Medellín.

Parte 2: "Cocinar sin residuos"

- Toni Burrowes-Cromwell (Restaurant´s Food Waste expert), ¿Qué es un restaurante Circular?
- Diálogo/Discusión: 'Oportunidades de cambio': 2 restaurante local nos cuenta su iniciativa.
- ¿Qué sigue? Propuestas y posibles retos y compromisos de los restaurants, oportunidades de trabajo conjunto
- Cumplimos los objetivos del workshop?
- Inquietudes, agradecimiento, expectativas futuras del proyecto

Agradecimiento Restaurantes

- Carmen
- Bocaditos
- Zorba
- Casal
- Parmessano y TodoFresa
- Crepes y Waffles
- Mekadelicias
- Tuk Tú
- La Duquesa
- Cambria
- Ganso y Castor
- Punto Verde
- Western Wings
- AMA