LYCar Company project report

HOTELSCHOOL THE HAGUE - HOSPITALITY RESEARCH CENTRE

Launching your career – Company Project

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Report requirement	Tick
Executive Summary is present, concise, can be read independently, contains information about process and content, focuses on results and outcomes.	✓
LYCar Company Project Report is written in English and is professional, including common basic components such as Intro, ToC, Conclusion etc.- see Reading & Writing Guide.	✓
LYCar Company Project Report is max. 12.000 words (counting after Table of Content, incl. text in tables) - visual proof of wordcount is included in Appendices.	11 474 + 336 (pictures) = 11 810
Harvard Referencing Style is used consistently, referencing to primary sources only, List of References is well presented.	✓
Assessment & feedback form approved Proposal is included - in Appendices Company Project Report	✓
Proof of dissemination of the company project is shown: the disemminated piece itself or other relevant material	✓
LYCar Company Project Report is uploaded on Ephorus.	✓
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Ethical, integrity and data management requirements are met.	✓

Orbisk
zero food waste

PRESENT YOUR CHALLENGES	
COMMISSIONER'S CHALLENGE	***HTH and Orbisk, where food waste meets AI.***
PROBLEM DEFINITION	*The main problem within the hospitality industry lies with a significant food waste occurring in kitchens due to overproduction and kitchen employee behaviours causing environmental, complex ethical and economic issues.*
MAIN RESEARCH QUESTION (MRQ)	*What is the impact of AI technology (like Orbisk) on kitchen employees' behaviour to reduce food waste?*
DELIVERABLE	*A strategic advice on how to successfully implement and operate a new technology in a professional kitchen aimed at reducing kitchen FW.*
MAIN PLO	***PLO9*** *– Leadership & People – Interact with other constructively and effectively in realizing common goals, respecting diversity and in dealing with continuous change.*

Executive Summary

This report displays the complete process of my LYCar journey by including the series of investigations, processes, discussions and products I have been developing. It reflects my capabilities to improve a client operational process, and consequently, participate at a bachelor level in a professional learning environment. It will guarantee my readiness to be one day an Intercultural Hospitality Leader.

As part of the final phase of Hotelschool The Hague, I collaborated with Ms Anna De Visser, research fellow specialized in Food Circularity in the research center of HTH. Together, we investigated on **AI technologies aiming to further reduce kitchen food waste**. Food waste represents an environmental issue having an undesirable economic impact. It has been proven that the hospitality industry highly contributes to this waste. This contribution is coming from the production processes within kitchens. Therefore, a problem was defined:

> **The main problem within the hospitality industry lies with a significant FW occurring in kitchens due to overproduction and kitchen employees behaviour causing complex environmental, ethical and economic issues.**

To solve this problem, new technologies have been developed to measure and record automatically food waste at the source of discard. Being in the hospitality and research sector, HTH aims to understand its FW flow and comprehends the impact of this technology on its kitchen staff. Consequently, HTH acquired **Orbisk** within La Mangerie kitchen. This AI technology is an automatic food waste monitor using image recognition capacities and a connected scale to recognises and quantifies the discarded ingredients. Thus, the researcher took on the challenge to identify the impact of an AI technology (like Orbisk) on kitchen employees behaviour to reduce FW (**Goal of Research**); and to develop a strategic advice on how to successfully implement and operate a new technology in a professional kitchen aimed at reducing kitchen FW (**Goal of client**). To ensure a reliable research report, the Design Based Research cycle was used.

First of all, scientific literature were consulted for a better understanding of the subject. It demonstrated that AI is considered a complex discipline. In an organization, the implementation of such technology can be challenging as it can alter employees' behaviour. The Technology Acceptance Model was developed to tackle this issue. In this research, this model was used as a base to analyze kitchen employees' perception of food waste management and behaviour toward Orbisk. It helped to understand their emotions, motivations and cognitive processes toward waste and to form sub-research questions. Subsequently, an extensive research on the usage of Orbisk has been conducted to develop the designed solution and reach the client's goal. It was completed by running **quantitative and qualitative research approaches: Orbisk report analysis, participants observations and semi-structured interviews**.

These research approaches showed that such AI technology can reduce food waste. It has the capabilities of **enhancing tasks performance** and **diminishing perceived barriers.** Concerning employees' acceptance and adaptation, this research indicated that during the implementation of the innovation, **communication** between kitchen staff is vital. A strategic communication plan and variables should be considered and controlled throughout the entire implementation and adaptation stage. First of all, external variables including **training and system experience** impact the use of AI technology. It gives individuals clear **perceived usefulness and ease of use** of the machine, which affect user beliefs about using the system. Thereafter, they gain knowledge of **food waste management** by understanding the causes of waste as it gives a greater vision on the waste quantity and origin. It also enhances their **food waste behaviour** described as morality, knowledge and habits, which shape their comportments toward less food waste.

Based on these results, **a strategic advice on how to successfully implement and operate a new technology like Orbisk in a professional kitchen aimed at reducing kitchen FW was developed**. It is considered a solution as it will help to use efficiently the device, hence, to reduce FW occurring in kitchens due to overproduction and kitchen employees behaviour. Thus, this strategic advice includes five steps to enhance communication between kitchen employees. Starting off, training must be implemented to introduce (*Step1*) and explain the usage of the device (*Step2*). Thereafter, kitchen staff need to be involved in the food waste reduction process to demonstrate skills and behaviours towards the machine (*Step3*). To ensure that employees stay motivated and positively use the device, objectives and celebrations will be shared *(Step4)*. Finally, all these steps will form habits which could stimulate further waste management behaviours (*Step5*).

Time	Activities
W1	• Designing the training with the first MO team (Design of Step1-Step2).
W2-W10	• Implementation of the SA. • Monday; training session with MOs and PEs (Step1-Step2). • Wednesday; analysis of Orbisk report and setting goals (Step3). • Friday; celebrating success and developing point of improvement (Step4).
W5	• Feedback session on SA (Step5)
W6	• Adjusting training, report analysis and communication based on the feedback.
W10	• Evaluation of SA - Adjust SA.

The intended performance of this solution is an efficient understanding and use of Orbisk, and collective work toward food waste reduction. It will be evaluated through a **quasi-experiment** which uses control and experimental groups, and a before/after measurement. These groups' performances will be assessed based on **KPIs** gathered mainly from the Orbisk report, but also from observations and interviews (ex: Average kilograms per day of non-registered FW; Numbers of difficulties encountered...).

After doing a co-creation session with Ms Visser, the Commissioner and Mr De Vos, the executive chef of La Mangerie, showing the detailed intervention and evaluation plan they both fully accepted it. Unfortunately, due to the Covid-19 pandemic, the researcher couldn't implement the solution and evaluate it on site. Furthermore, other companies using the Orbisk device were also half-opened or closed preventing us to test our strategic advice (ex: Ramada…). Thus, it will be implement when Hotelschool the Hague will hopefully be able to welcome students at its full capacity. Consequently, it will ensure more usage of Orbisk and more data to analyze and evaluate. To conclude, as agreed with Ms Visser and Mr De Vos, the intervention and evaluation plan will be implemented in La Mangerie in **Block A, academic year 21/22**.

In the meantime, to share the knowledge gained and impact more people, various acts of dissemination have been done:
- Report to commissioner
- Executive chef and commissioner presentation
- HTH career fair
- In2Food Webinar
- Placement company presentation

To conclude, after completing an academic reflection on the company project process, I realized that I strongly developed my main PLO: *PLO9 – Leadership & People – Interact with other constructively and effectively in realizing common goals, respecting diversity and in dealing with continuous change.* In fact, I had the chance to continuously interact and constructively share my research topic and results to various individuals. From hospitality experts, technological experts, food experts, researchers, companies, universities to students, we all shared our knowledge to realize a common goal: **reducing food waste further**.

Preface

To graduate from Hotelschool The Hague, students must complete the last stage of the curriculum called "Launching Your Career" (LYCar). After delivering a proposal, they are asked to deliver a Company project report which is a research completing the five steps of the DBR cycle. In this report, the student has investigated a problem, produced a professional product or a solution, created a plan to implement and evaluate it.

This report presents in details a research conducted for Ms Visser, research fellow in food circularity in Hotelschool The Hague Research Center. The topic focusses on two on-going trends, Artificial Intelligence and Food waste to understand the impact of AI device aiming to reduce food waste on individuals. I am strongly interested in sustainability including Food waste, thus, this research was a real opportunity to broaden my knowledge and show my motivation in this field. The solution developed for the commissioner was mainly focus on technology acceptance: *A strategic advice on how to successfully implement and operate a new technology in a professional kitchen aimed at reducing kitchen FW.* Furthermore, this report also displays various acts of dissemination which allowed me to share my knowledge with others and improve my research. These acts prepared me to efficiently and clearly share my research with various stakeholders. Additionally, to continue with further research on technology and food waste, suggestions for future research have been proposed in details showing added IQ from the researcher.

I would like to express my gratitude to:

Mr Schermer, for his continuous support and positive attitude towards every situation. He was of a great support throughout my entire research process as well as internship. He helped me to keep motivation and focus on school while working for my placement company. Furthermore, his feedback on the proposal and during our coach sessions were highly valuable and help me grow toward an Intercultural Hospitality Leader.

Ms De Visser-Amundson, for her great advice throughout the entire research part of LYCar. She shared with me her passion and motivation for reducing food waste. I would like to acknowledge her dedication, constant support and ambition to make my research interesting and interactive as much as possible even during the Covid- 19 crisis. Moreover, I would like to thank her for all the opportunities she gave me to share my knowledge during various events. She continuously encourage me to share my knowledge as much as possible.

Mr Olaf, CEO of Orbisk, for always being available to answer my questions about the device.

Mr De Vos, for his help and inspiration in the kitchen. He welcomed me multiple time in La Mangerie kitchen sharing his knowledge and interest in food waste.

Ms Boer, for her valuable research classes and methods which helped me to conduct an effective and academic research.

HoCoSo, for giving me the opportunity during such unprecedented time to join their team. To all my colleagues for their support throughout my entire placement as well as their feedback on my research and presentation.

I hope you will find my report insightful and interesting and that you will see my growth toward an Intercultural Hospitality Leader!

Kind regards,
Léa Iacazzi

Abbreviations

AI: Artificial intelligence
AQ: Adversity quotient
CV: Computer vision
EQ: Emotional quotient
FW: Food waste
HTH: Hotelschool The Hague
KPI: Key performance indicators
LYCAR: Launching your career
ML: Machine learning
MO: Managing outlet
MRQ: Main research question
PE: Practical education
PEOU: Perceived ease of use
PICOC: Population, Intervention, Comparison, Outcome, Context
PP: Professional product
PU: Perceived use
RQ: Research question
SA : Strategic advice
SOP: Standard operating procedure
TAM: Technology acceptance model

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1. Problem Definition

Context

Food waste:

One-third of the food produced for human consumption is discarded daily. It represents 1.3 billion tonnes of food wasted per year or an equivalence of US$ 750 billion loss (Kilibarda et al., 2019). This food was produced for human consumption but was taken out of the food supply chain and coped through disposal (Dhir et al., 2020). It leads to an ethical dispute becoming significant considering that in 2018 more than 820 millions of individuals were missing food to survive (Kilibarda et al., 2019). Additionally, FW processes intensify emissions of dangerous gases and unnecessary use of water and soil which compromised biodiversity (ibid). Consequently, FW represents an environmental issue having an undesirable economic impact.

Food Waste within the hospitality industry:

According to Dhir et al.(2020), FW within the hospitality industry is significant with a contribution of 12% of the global FW in the previous years. To manage FW, it's important to understand the origins and sizes of it (ibid). FW is mainly occurring during "preparation, serving and consumption which includes overproduction, serving issues and plate waste"(ibid). Individuals believe that the majority of FW is due to customer's plates, however, it mostly occurs before it arrives at the consumer (Jackson, 2018). By enhancing FW management within kitchens, establishments could improve their FW and environmental impact, and reduce expenses.

Measuring Food Waste with new technology:

An intervention to reduce FW in professional kitchens is the measurement and recording of FW (Leverenz et al., 2020). Waste analytics is informative as it's weighing and monitoring wasted products at the source of discard (ibid). Tools for these analytics exists such as technological devices including artificial intelligence and image-tracking technology which identifies FW ingredients (ibid). Such device is associated with "awareness-raising and cause adaptive reactions", information issued is visible by the operator leading to behavioural changes among employees (ibid). Therefore, this technology could influence kitchen professionals behaviour towards less FW.

Introduction to Orbisk:

Being in the hospitality and research sector, HTH is aiming to understand its FW flow and comprehend the impact of the aforementioned AI technology on its kitchen staff. Consequently, HTH acquired **Orbisk** within La Mangerie kitchen. Orbisk is an automatic FW monitor that enables establishments to reduce their FW. This device provides ingredient recognition and weight measurement. Using image-tracking recognition technology and a connected scale, Orbisk recognises and quantifies which ingredients are thrown away (Orbisk, 2020). Thereafter, an online report showing the food waste flow is developed daily. It leads to a final report showing per week, day and ingredient the amount of product discarded and how to counteract it to reduce the food waste.

See appendix-1 for Orbisk Poster.
See appendix-2 for Orbisk SOP.

Conclusion:

Based on the above-mentioned, the problem was defined:

> *The main problem within the hospitality industry lies with a significant FW occurring in kitchens due to overproduction and kitchen employees behaviour causing complex environmental, ethical and economic issues.*

Based on the industry analysis and acquisition of Orbisk, it's vital to research the link between kitchen employee behaviour and the presence of AI to understand the impact of such device on reducing FW.

Figure 1: Conceptual Framework

See appendix-3 for explanatory research.

Research topic

> What is the **impact of AI technology** (like Orbisk) on **kitchen employees behaviour** to reduce **food waste**?

Research goals

Goal of Research: To identify the impact and influence of AI technology (like Orbisk) on kitchen employees behaviour to reduce FW.

Goal of Client: To obtain a strategic advice on how to successfully implement and operate a new technology in a professional kitchen aimed at reducing kitchen FW.

1. Literature Review

Artificial Intelligence – Machine learning – Computer vision

Figure 2: Computer vision technology (Ruffle et al., 2019) (8words)

Orbisk is an **Artificial Intelligence** (AI) and a **Computer Vision** (CV) technology with **Machine Learning** (ML) capabilities.

Currently, the top technologies increasing productivity are related to AI (Bini, 2018). AI is "the design, implementation, and use of programs, machines, and systems that exhibit human intelligence, with its most important activities being knowledge representation, reasoning, and learning" (Whitson, 2020). Simply, AI can process information similarly to humans with coherence and sanity (To Linh, 2019). In an evolving environment, businesses use AI to develop rapid and rational responses (ibid).

Within AI, CV and ML can give devices the human competencies for data detecting, data understanding, and act based on "past and present outcomes" (Khan&Al-Habsi, 2020). CV is an AI subgroup including image-recognition technology and is capable of identifying and understanding the content of photography comparably to humans (Lasky, 2019). It can do so thanks to the integration of ML capacity (ibid). ML learns from experience while improving its performance (Bini, 2018). With regards to CV, ML collects data and uses a trained model to make predictions (Khan&Al-Habsi, 2020). Similar to human vision, CV goes through image acquisition, processing to perception (Li et al., 2020). It means that computers collect photographic data, analyzes it and concludes the nature of that data (Lasky, 2019).

Implementation of AI technology in workplace

This implementation represents a change that needs to be accepted by end-users as they could resist to it (Skompopoulou et al., 2018). This AI technology can be valuable for organizations to improve sustainable competitive advantage, reduce production and labour expenses. Thereafter, it enhances the products created and adds value to business processes (ibid). However, its implementation also leads to important changes influencing professional activities and relationships, performance and skills utilization (Mirvis et al., 1991). These changes influence the technology adoption and quality of employees' working condition causing opposition to change(ibid). Such resistance can be the consequence of anxiety of uncertainty, fear of losing their job, and technology complexity (Skompopoulou et al., 2018).

Technology acceptance model

Figure 3: Technology acceptance model (Hubona&Kennick,1996) (22words)

User acceptance and confidence are vital to enhance the development of new technology in organizations as it influences employee behaviour towards the device (Taherdoost, 2018). Acceptance further develops user involvement in systems improvement (ibid). In 1989, the researcher, D.David, developed the technology acceptance model (TAM) to understand user acceptance, perception and behavioural impact of information technology. TAM analyses the cause-effect correlation between external variables, perceived usefulness (PU) and perceived ease of use (PEOU) towards attitude to use, which lead to concrete usage behaviours (Skoumpopoulou et al., 2018). PEOU considers the easiness to use the device whereas PU represents the enhancement of tasks performance (ibid). Furthermore, according to Davis et al.(1989), individuals perception of technology affects their attitude and intention to use it which impact the actual usage.

Nevertheless, TAM was reprimanded by other researchers. As Bagozzi (2007) explained, individuals could also respond differently to technology because of "individual emotions, motivations and cognitive (self-awareness) processes".

Cause of FW in commercial kitchens

Efficient FW management starts with understanding the causes of waste as it gives a greater vision on the waste quantity and origin (Dhir et al., 2020). Consequently, FW generation levels were categorized as "kitchen waste, serving loss waste, and plate leftovers" (ibid). Jackson (2018) showed that 70% of FW occurs in kitchens. Factors that increase FW are production processes, employee skills, portion sizes, kitchen employees behaviour, inventory management and consideration of environmental problems (Dhir et al., 2020). Therefore, to reduce FW the hospitality sector should limit FW generation and improve FW management by doing single portion size, menu planning, and educating their employees (Dagiliūtė&Musteikytė, 2019).

Furthermore, FW issued from the production processes are due to two categories of waste: unavoidable and avoidable (Dhir et al., 2020). Inedible waste like shells and peels are unavoidable, and food products that could have been used for leftover are avoidable (Schott, 2013). Looking at food processes, effective meal planning could reduce FW (Kasavan et al.,2019). Subsequently, during food preparation, employees skills are important as it's seen as one of the main FW factors in the hospitality sector (ibid). These cooking skills include eyes for details, adaptability and meals of quality (ibid). Dagiliūtė&Musteikytė (2019) suggest that FW management should include control and improvement of overproduction, storage and purchasing practices.

Thus, reducing FW within the hospitality industry could improve environmental and socio-economic issues (Sakaguchi et al., 2018). However, the behaviours compelling FW and approaches aiming to reduce it are poorly covered (ibid). Consequently, this gap should be covered to understand the underlying cause of FW.

FW behaviour

It is described as motivation arising from inside an individual such as morality, knowledge and habits (Aydin&Yildirim, 2020). As most FW research focuses on environmental damages, financial losses and FW causes, few research were done on the comportment driving FW (ibid).

Morality: Individual moral principles and self-image drive the FW level and is a crucial element shaping comportments (ibid). Individuals have bad feelings when wasting food (Evans, 2011; Parizeau et al., 2015; Richter, 2017). It can impact their moral attitude leading to embarrassment (Aydin&Yildirim, 2020). It was shown that persons who believe in sustainability and feel culpable of throwing food make less FW (ibid).

Habits: Morality also impacts individual habits. Mabaso&Hewson (2018) found that habits influence practices and behaviours toward FW. Waste comportments are formed regularly and automatically, thus, represent a habitual element done with less conscious than in the past (ibid). Therefore, by empowering and motivating employees towards the best FW practices it could stimulate further waste management behaviours (ibid).

Knowledge: To pursued the right habit, knowledge about FW and food conservation is vital (Aydin&Yildirim, 2020). Individual knowledge and experience on how to prepare and handle food impact their FW comportment considerably (ibid). Hence, more knowledgeable individuals on food conservation and preparation produce less waste.

Conclusion

AI is a complex discipline including numerous subgroups with multiple capabilities. This technology is comparable to humans which develop resistance among individuals. Hence, the implementation and adoption of such technology in a workplace can be challenging as it can alter employees' behaviour. Consequently, change management must be efficient and considers end-user acceptance as it determines the use of the device. Accordingly, TAM was developed to tackle this issue. Based on this model and additional researches, an efficient technology implementation must consider employees perception of ease of use and usefulness, as well as individuals emotions, motivations and cognitive processes towards the new technological device and others. Therefore, with regards to technology like Orbisk, it's important to take into consideration employees' perception and experience with FW management and behaviour to understand their emotions, motivations and cognitive processes toward waste.

Sub-research questions

External Variables:

RQ1: *What are external variables that influence the efficient use of Orbisk?*

Perceived Usefulness:

RQ2: *To what extend kitchen employees know and are aware of the causes of FW in their kitchen? What are perceived barriers to reduce FW?*

RQ3: *How an AI technology such as Orbisk can enhance tasks performance and reduce these barriers?*

Perceived Ease of Use:

RQ4: *What are critical success factors of AI technology (like Orbisk) to reduce further kitchen FW?*

Attitude toward using:

RQ5: *How do kitchen employees feel about kitchen FW in their restaurant?*

RQ6: *How do kitchen employees accept and adopt this AI technology in the kitchen to reduce FW? What are possible barriers to adoption?*

2. Methodology

Population-Sampling methods

According to Asiamah et al. (2017), researchers must understand their study population to conduct credible research. Therefore, the general, target and accessible population need to be well-defined (ibid):

Figure 4: Sampling framework for this research (27words)

For the aim of this research, the general population included kitchen employees; nevertheless, the target population consisted of kitchen employees using AI technology to reduce FW. Hotelschool The Hague, campus Amsterdam, implemented recently Orbisk, the AI technology aiming to reduce kitchen FW. This research is a field study taking place in the real world. More precisely, it excludes "direct manipulation of the environment by the researcher" (Salkind, 2010). The researcher observed and interviewed individuals in their natural environment (ibid). Therefore, the **accessible population** included inevitably kitchen instructors, MOs and PEs in Amsterdam as they directly and daily interacted with Orbisk.

Within this population, the sampling technique chosen was convenience sampling, belonging to non-probability sampling. Participants were chosen based on practical reasons such as accessibility, availability and willingness to participate (Etikan, 2016). This sampling technique is preferred as it is the least expensive and time-consuming (Taherdoost, 2016).

Data collection

This research is based on **qualitative information** and **quantitative data**. According to Barnham (2015), qualitative research enhance a deeper conversation and analysis including participant's feelings, experiences and motives. Additionally, quantitative research use measurable and numerical relationships ensuring reliability and accuracy (Devault, 2020). For this research, multiple data collection methods were used:

Report Analysis

The Orbisk device has a camera with AI technology connected to a scale that mechanically recognizes which ingredients are thrown away and how much (Orbisk, 2020). Every week, the food waste monitor automatically generates an online report giving you insights into your food waste flow (ibid). It avoids human errors. Thereafter, based on this data, the establishment can optimize its cooking and purchasing processes, menu and supply processes.

To understand the food waste flow of La Mangerie, the researcher analyzed the Orbisk reports from week 46 until week 50. Week 51 was removed as the lockdown was implemented and the kitchen closed.

See appendix-4 for report analysis.

Participant Observation

Participants observations is an instrument collecting data about individuals, procedures and cultures (Kawulich, 2005). This type of observation is "the process of learning through exposure to or involvement in day-to-day or routine activities of participants in the researcher setting" and provides the context for interview guides (ibid).

To understand the behavioural impact of Orbisk, the researchers made three weeks of observations in La Mangerie. A pilot week was realized during which observations and patterns in the usage of Orbisk were found. Thereafter, recurrent attitudes and established themes were categorized. During two weeks, the researcher observed participants' attitudes based on the categorized themes and documented their frequencies.

Observation	
Date:	
Time:	
Duration:	
Instructors:	
MOs:	
Green MO:	
Kg of food waste during observation:	
Additional information:	

Observation	
Actions	**Frequencies**
Use of Orbisk device	
Orbisk is correctly used	
Orbisk's screen is pressed multiple time	
Multiple pictures are taken	
No picture was taken, food is still thrown in the bin	
Bin is moved off the scale	
Food is thrown next to the bin	
Food is thrown in the bin	
Tray is carried out just below the camera	
Tray is placed on the bin while taking the picture	
Use of food waste recipients	
Use of hands	
Use of bowls	
Use of medium tray	
Use of large trays	
No FW tray in the section	
Ingredients in Food waste trays	
Pile of food	
Mixed ingredients	
Organized ingredients	
Food waste management	
Ingredients that don't belong to waste thrown in Orbisk (could be Re-used)	
Wrong element thrown in Orbisk bin	
Food waste thrown in the wrong bin	

Figure 5: Categorized themes observed by the researcher (150 words)

See appendix-5 for Observations results.

Semi-Structured Interviews

Semi-structured interviews enhance consistent and comparable qualitative data and provide space for interviewees to converse sensitive issues (Schmidt, 2004). Thus, open questions were formulated based on the sub-research questions, research purpose, observations and analysis of Orbisk report. Furthermore, follow-up questions were used to allow participants to share their judgments. The sample size was 9 participants.

See appendix-6 and 7 for Interviews schedule and structure.

Data Analysis

The quantitative data gathered from the machine was analyzed using graphs, tables and diagrams automatically generated by the AI technology. This method of data analysis ensures straightforward analysis. In fact, it is creating complex statistics and translating them into easily readable statistical graphs (Devault, 2020). Using such technology reduces errors and subjectivity (ibid).

To analyse the data from the semi-structured interviews, Nvivo software was used. According to Alhojailan (2012), it analyzes qualitative data by means of gathering all evidence and organizing it into comparable themes. Nvivo uses a thematic analysis method to "identify, analyse, organize, describe, and report themes found within a data set" (Nowell et al., 2017). Furthermore, this software uses an inductive approach to "condense raw textual data into a summary format and establish clear links between the evaluation or research objectives and the summary findings derived from the raw data" (Thomas, 2006). Thus, Nvivo is time-saving and improves the accuracy of the analysis activity (ibid).

See appendix-4 for statistical graphs gathered from Orbisk report.
See appendix-8 and 9 for Color coding and interviews.
See appendix-10 for interviews results

Data Ethics and limitation

The researcher signed a declaration of confidentiality (*See appendix-11*). During the observations and interview processes, each respondent participated voluntarily and was informed of the research purpose and objectives through the Ethic informed consent form (*See appendix-12*).

Some limitations arose throughout the research:

Observation bias:

During the observations, MOs, Instructors and PEs were aware the researcher was observing their behaviours toward Orbisk. Participants might try to behave differently than they would normally to look more socially acceptable (Cherry, 2019). To reduce this bias, the researcher worn the kitchen uniform to blend with the staff.

Confirmation bias:

It occurs when researchers already have assumptions on a topic, and subsequently, could lead with purpose participants in the direction that is needed for the research (Nickerson, 1998). For this research, observations and investigations were made before the interviews leading to hypotheses and expectations already formed. Nevertheless, by using semi-structured interviews, this bias was reduced by not using leading questions and letting interviewees expressing opinions.

Covid-19 lockdown:

Due to a lockdown in the Netherlands, HTH had to close its Amsterdam campus. Consequently, the researcher could only investigate two weeks instead of three. Hence, online interviews was an efficient way for additional insights.

Data Management

All data from this research are the property of Ms. Visser. In fact, at the beginning of our collaboration, a statement in our contract has been signed. Thus, all data from literature review, observations, pictures, interviews, transcriptions to presentations have been sent to her. Furthermore, the Data Management Research Centre gave the researcher a research number: **2021-9**. All data have also been uploaded on Intranet and sent to larchive@hotelschool.nl as a pre-condition for the assessment of the LYCar Execution (*See section-12 for the confirmation of the upload*).

3. Results

Orbisk device

Starting off, the results showed that with experience and practice, Orbisk can recognize all ingredients discarded in the bin and employees can efficiently use the device. In fact, HTH registered correctly 79,32% of waste against 66,85% on average for other clients using the Orbisk device.

Figure 6: Average kilograms per day in the past weeks

Regarding La Mangerie FW flow, week 47 represented the week of most FW with 55,60Kg against week 49 being the week with the fewest FW with 37,92Kg on average per day. Regarding the type of waste, the majority is due to FW including meals and cooked ingredients followed by cuttings. Consequently, most waste discarded is considered **avoidable waste**. On average, 36,12Kg of waste is generated per day representing a loss of €119,40 per day. This waste is largely produced during **dinner**.

Figure 7: Average kilograms per day

Furthermore, most waste occurs on **Thursdays** with 41,10Kg and **Fridays** with 42,60Kg of waste on average which generate important costs per day. In fact, on Fridays leftovers are thrown away and fridges are being checked to ensure fresh ingredients on Mondays. Additionally, the type of ingredients mainly discarded weekly is the **vegetable mix, sauces and pizzas**.

The analysis of Orbisk report will help La Mangerie to understand its FW flow and to optimize its cooking and purchasing processes, menu and supply based on data. Furthermore, it helped the researcher to form specific interviews questions to better understand the FW flow in La Mangerie and employees' behaviours towards Orbisk.

Observation results

The researcher conducted naturalistic observations by looking at kitchen employee behaviour towards Orbisk. The observation process helped to determine how to efficiently use Orbisk and showed the external factors influencing the device:

Correctly used	The tray with FW needs to be placed close to the camera. The first picture will be taken, and subsequently, the food needs to be thrown away in the bin. Thereafter, the picture and grams are displayed on the screen.
Tray below the camera	The tray needs to be placed right below the camera, and not on the bin itself. Otherwise, the weight of the tray is taken into consideration.
Use of medium tray	The best tray for FW is a medium iron tray in which kitchen employees can organize and separate ingredients. While using large trays, part of the FW end up on the floor, bowls and hands lead to a pile of mixed ingredients difficult to be recognized by Orbisk.
A tray in section	FW trays must be placed in every section which encourage employees to use Orbisk.
Organized ingredients	To ensure effective recognitions, ingredients need to be distinctively separated per type in the tray.

| Picture 1: Orbisk set up (2 SOPS and a poster) | Picture 2: Food waste place in a bowl leading to food pile and food mixed. | Picture 3: Food thrown next to the bin due to a large tray used to display food waste. |

Additionally, the main issues that appeared during usage and generating errors in the Orbisk report (e.g. percentage of ingredients recognized) were identified:

- Multiple pictures taken for the same tray
- No picture taken, food was still thrown in the bin
- Tray placed on the bin while taking the picture
- Use of hands and bowls
- Mixed ingredients
- FW Tray is not placed in every section

Even though two SOPs were placed next to Orbisk device, individuals incorrectly use the device. Moreover, it was observed that when instructors and MOs are present on the floor, students are being more careful on how to use Orbisk. The phenomenon is called the Hawthorne effect, consciously, individuals behave differently when being observed (Cambridge, 2021).

To conclude, the observations helped to determine how to use efficiently the machine and which mistakes should be avoided. It also showed that multiple employees actions have an impact on the Orbisk report (eg. Not using the machine properly leading to Orbisk not being able to take proper pictures).

Interview results

Participants have been interviewed and answered questions categorized into the main Technology Acceptance Model variables. The Orbisk report analysis as well as the observations helped to form the interview questions.

External variables - The external elements impacting the device usage
All interviewees agreed on a lack of communication and training within La Mangerie with regards to Orbisk. In fact, they all mentioned that information such as what it is, how to use it and mistakes to avoid must be shared with the entire kitchen team. It would enhance Orbisk usage and motivate them to use it efficiently. Furthermore, 2 out of 9 interviewees expressed their need for a green chef more involved with the Orbisk device and food waste flow.

All the above mentioned leads to faulty use of the system increasing the unregistered waste in the Orbisk report.

Perceived usefulness – The enhancement of tasks performance
First of all, within La Mangerie, individuals do not fully understand Orbisk's purposes. The various purposes of Orbisk; monitoring food waste, reducing food waste, improving the ordering process and cutting cost hasn't been understood by everyone. The majority of the interviewee, 7 out of 9, see Orbisk has a machine only able to track food waste.

Furthermore, the majority of participants, 6 out of 9, were not aware of the food waste levels and causes within their kitchen. All interviewees stated that they would like to be aware of and receive this information. In fact, all interviewees stated that the Orbisk report isn't shared with them. They mentioned that they would like to have access to it to be conscious of the food waste levels and its causes. 7 out of 9 interviewees agreed that the detailed report should be shared with the green MO and Executives chef; and only the main numbers, information and graphs should be shared with the rest of the team.

Moreover, 7 out of 9 interviewees mentioned that Orbisk had an effect on their behaviour towards less food waste. They stated that using a tray had a psychological effect making them realize how much food waste they generate and the composition of it Nevertheless, the majority of interviewees, 7 out of 9, stated that Orbisk's screen should be used more efficiently. It could enhance their motivation to use and interact with the machine. They require more interaction such as measurement references, steps to follow, fun facts…

Perceived ease of use – The easiness of the device and its use
In line with the observation made by the researcher, 7 out of 9 interviewees mentioned the easiness of using the Orbisk device but still encountered some difficulties. Difficulties that arose the most were: multiple pictures taken at the same time, trays placed on the green bin which leads to inaccuracy of data, and impossibility to close the lid of the bin. Additionally, 6 out of 9 interviewees mentioned that the most important critical success factor of Orbisk is its User-friendly characteristic.

Attitude toward using – The individuals' perception of food waste and technology

First of all, results have shown that all interviewees easily adopted the new technology. 8 out of 9 interviewees expressed their positive experience with such AI technology. They enjoyed having new technology in their kitchen. More precisely, 2 out of 9 participants also mentioned that it became a habit to use it. However, all interviewees mentioned multiple time the lack of information and communication about Orbisk. This lack of information includes how it works, why having such a device in La Mangerie, what are the results of the machine, what is the goal for our school with this machine. Concerning this lack of information, all interviewees expressed their misunderstanding of not receiving any numbers or any information generated by Orbisk which impacted their motivation to use the device.

Adding on to that, all interviewees felt uncomfortable with the amount of food waste generated within La Mangerie. All of them would like to see improvement in the restaurant. They also mentioned being keen to learn more about food waste management. All interviewees are eager to increase their motivation to gradually and efficiently use the machine. 4 out of 9 participants expressed their need for goals. 3 out of 9 stated that analyzing and having the Orbisk report would strongly increase their motivation. In conclusion, the large amount of food wasted has an impact on them increasing their motivation to successfully use the machine.

All of the aforementioned contribute to the stagnation of food waste level between week 47 and week 50. In fact, as information, objectives and numbers about Orbisk and its report haven't been shared, students do not have the motivation to work towards reducing food waste.

4. Conclusion

Based on the literature review and the report, observation and interviews analysis:

External Variables – The external elements impacting the device usage

RQ1: What are external variables that influence the efficient use of Orbisk?

Burton-Jones et al. (2006) stated that external variables within TAM include training and system experience. Thereafter, it affects user beliefs (PU, PEOU) about using the system. The interviews indicated that training and technical information about Orbisk are missing. This lack of information includes what is it, how to use it efficiently and the device objectives, which had an impact on employees' behaviour towards Orbisk. Furthermore, all of the above is reflected in the Orbisk report. This lack of information stated in the interviews leads to unregistered waste due to faulty use of the system. Additionally, it has also been seen in the observation process that this lack of information lead to the impossibility to take a proper photos due to a faulty use of the machine. It shows that the employee's behaviour toward the usage of the machine has an important impact on the report results generated by Orbisk.

To conclude, training and technical information about the device are influencing its efficient use. In fact, the kitchen team requested weekly training on Orbisk and its objectives to ensure consistency, professional use and accurate data in the report.

Perceived Usefulness – The enhancement of tasks performance

RQ2: To what extend kitchen employees know and are aware of the causes of FW in their kitchen? What are perceived barriers to reduce FW?

According to Dhir et al. (2020), FW management starts with understanding the causes of waste as it gives a greater vision on the waste quantity and origin. Results showed that majority of the kitchen staff are not aware of the level and cause of FW within La Mangerie even if they are eager to learn about it. Employees mentioned having difficulties understanding the scale of FW due to a lack of measurement processes and communication with instructors and each other.

Perceived barriers to reduce FW arose: lack of measurement process, lack of information and communication, employee's lack of FW knowledge, menu planning, overproduction, purchasing procedures and storage practices.

RQ3: How an AI technology such as Orbisk can enhance tasks performance and reduce these barriers?

An intervention to reduce FW is the measurement and recording of FW (Leverenz et al., 2020). Tools for waste analytics, such as Orbisk, enhance tasks performance of controlling and weighing FW. It also improves ordering processes and cutting costs by making it automatic. Furthermore, the image-tracking recognition has a psychological effect on users as stated in the interviews. In fact, when participants display their waste in a tray and take a picture of it, they realize the significant amount they discard.

Additionally, the Orbisk report is a valuable tool enhancing performance and helping employees to optimize menu planning, purchasing and storage practices. It shows why waste occurs. All interviewees expressed their misunderstanding of not receiving any numbers generated which impacted their motivation to use the device. Thus, this report must be shared to kitchen staff to diminish barriers to reduce FW.

In conclusion, AI technology like Orbisk enhance task performance and reduce barriers by measuring and recording efficiently FW, interacting with users through its screen, informing employees about their FW level and reducing actively FW by provoking a psychological effect.

Perceived Ease of Use – The easiness of the device and its use

RQ4: What are critical success factors of AI technology (like Orbisk) to reduce further kitchen FW?

For Orbisk, operators value its user-friendly characteristic. Their experiences using the device were positive due to its easiness, which is a key factor in active kitchens. Moreover, the technology accuracy was mentioned by interviewees and considered in the Orbisk report analysis. Orbisk, as an AI and machine learning device, learn by experience and improve its accuracy over time. Thus, it will successfully recognize and weight all ingredients which will improve its report and possibility to reduce FW. Finally, the design of such technology ensure a flowless utilization and motivate individuals to use it.

Attitude toward using – The individuals perception of food waste and technology

RQ5: How do kitchen employees feel about kitchen FW in their restaurant?

FW behaviour is described as motivation arising from inside an individual such as morality, knowledge and habits (Aydin&Yildirim, 2020). Individual moral principles and self-image drive their FW level and can shape their comportment. With regards to morality, all interviewees felt uncomfortable and ashamed of the large amount of FW within La Mangerie. Consequently, they were positive towards Orbisk's implementation, it helped them to form habits and gain knowledge about FW.

RQ6: How do kitchen employees accept and adopt this AI technology in the kitchen to reduce FW? What are possible barriers to adoption?

The implementation of AI technology in a company, especially in kitchens, is a change which needs to be accepted by the end-user as they are the one that could resist to it (Skompopoulou et al., 2018). All participants stated that they easily adopted Orbisk thanks to its user-friendly characteristic and efficiency. It has also been seen during the observation. Nevertheless, few interviewees confessed that individuals could be scared of such technology leading to an impact on their experience, behaviour and work toward the machine.

See appendix-4 for detailed Orbisk report analysis.
See appendix-5 for detailed observation conclusion.
See appendix-10 for detailed interview results.

5. Solution Design

Based on the research, a strategic advice (SA) on how to successfully implement and operate a new technology like Orbisk in a professional kitchen aimed at reducing kitchen FW was developed. It's considered a solution as it will help to use efficiently the device, hence, to reduce FW occurring in kitchens due to overproduction and kitchen employees behaviour. This SA includes five steps:

- **Step1:** Introduction to the machine
- **Step2:** Explanation of its usage
- **Step3:** Fostering an ongoing adoption
- **Step4:** Reinforcement to make the changes stick
- **Step5:** Actual usage

After analyzing all data, it concluded that during the implementation of new devices and to ensure continuous efficient usage in such an unusual environment, **communication** between kitchen staff is vital. Starting off, a training must be implemented to introduce and explain the usage of the device (***Step1-2***). Thereafter, kitchen staff need to be involved in the FW reduction process to demonstrate skills and behaviours towards the machine (***Step3***). To ensure that employees stay motivated and positively use the device, objectives and celebrations will be shared *(**Step4**)*. Finally, all these steps will form habits which could stimulate further waste management behaviours (***Step5***). Social acceptability, economic interest and technical feasibility were taken into consideration. This SA can be quickly and easily implemented, does not include extra costs and fits with HTH culture which is continuously learning and enhancing sustainability.

Adaptation of the TAM model:

These steps have been formed based on the TAM model. Burton-Jones et al (2006) demonstrated that **external variables**, such as training, affects users beliefs about using the device. This training will form **perceived usefulness** and **perceived ease of use** which subsequently influence users **attitudes** about using the device. With the right perception and information, users will be able to demonstrate skills and behaviours toward the machine which will enhance and increase their **intention** to use it. Intentions along with reinforcement to make the implementation of a new device stick regulate the level of **usage of the device**.

Figure 8: Adapted version of the TAM (97words)

Co-creation:

To evaluate and improve the SA, a presentation/co-creation session has been done with Ms Visser, the Commissioner and Mr De Vos, the executive chef of La Mangerie and supervisor of Orbisk. This session, which occurred on 10/02/21, allowed ideas to be shared and collaborative innovations from the stakeholders perspective. These stakeholders were pleased with the SA, which is a feasible and actionable solution within HTH.

The intervention and evaluation plans have been **accepted** by both stakeholders. Unfortunately, due to the Covid-19 pandemic, the researcher couldn't implement the solution and evaluate it on site. In fact, La Mangerie was closed starting on the third week of the observation process in blockB 20/21. Furthermore, other companies using the Orbisk device were also half-opened or closed preventing us to test our SA (ex: Ramada…). Thus, it will be implement when Hotelschool The Hague will hopefully be able to welcome students at its full capacity. Consequently, it will ensure more usage of Orbisk and more data to analyze and evaluate.

To conclude, as agreed with Ms Visser and Mr De Vos, the intervention and evaluation plan will be implemented in La Mangerie in **Block A, academic year 21/22**. Furthermore, they consider the strategic advice as the first step to a food waste education within the practical education curriculum at HTH.

See appendix-13 for a description of the steps.
See appendix-14 for the Steps presentation done to the Commissioner
See appendix-15 for extra solutions given to the Orbisk company.

6. Intervention plan

Redesigned system

With the SA including new trainings, new responsibilities and new objectives, the practical education system within La Mangerie Kitchen will be redesigned. Overall, the redesigned system represents a communication plan giving information on the device and FW level reduction.

This communication plan includes:

1. An **interactive workshop presentation,** as well as a live or recorded **demonstration** on how to use the machine. It will be shared weekly with all kitchen staff including MOs and PEs. Additionally, as kitchen instructors are in charge of the general efficient use of Orbisk and further reducing food waste, they will be required at the beginning of each block to follow this workshop and demonstration. It will ensure alignment between all kitchen members. (**Step1-Step2**)

2. The green MO will receive **additional responsibilities** as he/she will be responsible for the machine and its usage *(See Appendix-13 – Figure 10 for the redesigned job description of the Green MOs).* Every week, the green MO will be in charge of analyzing the Orbisk report and simplified it for the rest of the team *(See Appendix-13 – Figure 9 for an example of a simplified report version).* (**Step3**)

3. An **analysis of Orbisk report** during the leadership meeting happening every day at 2 pm. During these meetings, time will be allocated to analyze the Orbisk report and to understand the food waste flow of La Mangerie Kitchen. Based on this data, the team will work together to optimize the supply, the ordering process and menu planning. It will lower the purchasing costs, increase the profit margin and reduce the impact on the planet. (**Step3**)

4. An ongoing process including **feedback, set goals** and **celebration.** Every week feedback will be given to the MO kitchen team on their food waste flow. Furthermore, objectives towards less food waste will be set weekly to keep people engaged and motivated. It will increase individuals' intention to use the machine. (**Step4**)

5. Overall, a **feedback session** on the SA itself. To improve the SA, reduce further food waste, and engage the kitchen staff in the process, a feedback form will be sent online. (**Step5**)

To conclude, the intended performance and objectives of this redesigned system is an efficient understanding and use of Orbisk, and a collective work toward reducing FW.

Resources required for implementation

Steps	Resources	People involved	Time needed
Step1 Workshop	• PowerPoint presentation • Interactive quiz	MOs will be in charge of developing the training.	• 2-3h
Step2 Demonstration Option 1: Video Option 2: Live demonstration	Option 1: • Camera • Edited video		Option 1: • 3-4h
Step3 Analysis of the report	• Simplified report template	The green MOs has the responsibility to create the simplified report and share it to his team.	• 1h
Step4 Feedback, goals and celebration	• No resources needed	MOs	-
Step5 Actual habit	• Feedback form	The responsible of the SA implementation	• 1h

These resources are required during the implementation of the SA. When these multiple elements are developed, no other resources are needed as it could be re-used every block.

Stakeholders involved

Figure 9: Stakeholder diagram (15 words)

Green MOs and MOs are the main stakeholders and must be managed closely. The solution design was tailor-made to them to improve Orbisk usage and reduce the FW level. They will be involved in the change processes and responsible for Orbisk users (PEs). PEs must be managed closely as they will be receiving the training and using Orbisk the most. With regards to instructors, they should be kept informed. They have a high interest in the implementation process of Orbisk as their goal is to reduce FW within their kitchen. Furthermore, it's part of the learning process they are delivering to HTH students. Besides, Orbisk project was developed by HTH which aims to reduce its FW level which can be optimized by the solution designed. Thus, it should be kept satisfied with the progress and efficiency of the machine. Finally, Orbisk company delivers the weekly report, thus, will always be in contact with companies implementing their product.

Intervention timeline

The Orbisk device was placed in Block B 20/21. Thus, this research was done through this period. Due to the pandemic, the solution will be implemented in Block A 21/22.

Time	Activities	People involve in the process
W1	• Designing the training with the first MO team (Design of Step1-Step2).	• MOs
W2-W10	• Implementation of the SA. • Monday; training session with MOs and PEs (Step1-Step2). • Wednesday; analysis of Orbisk report and setting goals (Step3). • Friday; celebrating success and developing point of improvement (Step4).	• MOs, Green MO, PEs
W5	• Feedback session on SA (Step5)	• Responsible of SA, MOs
W6	• Adjusting training, report analysis and communication based on the feedback.	• Responsible of SA
W10	• Evaluation of SA. • Adjust SA.	• Responsible of SA

See appendix-16 for the overall and weekly timeline presented to the commissioner.

Resistance

Employees will be aware of the need for change within step1. As part of reactive resistance management, employees feedback will be gathered in W5, instructors will be available to provide feedback to kitchen employees and a final evaluation on the change will be done in W10 (Prosci, 2021).

Communication

As seen in the technology acceptance model, communication and engaging individuals in the processes are keys when implementing new technology.

Time	Activities
W1	• Notifying all stakeholders about the SA (Emails). • Informing Green MOs of their new responsibilities (Direct contact).
W2-W10	• Informing MOs and PEs on the SA, importance of Orbisk and its objectives (Training and demonstration).
W5	• Asking for feedback on the SA to MOs and PEs (Online form).
W6	• Updating MOs and PEs about the adjustment based on the feedback (Direct contact).
W10	• Share the evaluation results of the solution with all stakeholders (Emails).

7. Evaluation plan

Evaluation method

The objectives of the SA are (1) efficiently use Orbisk to (2) positively impact Kitchen employees behaviours, and thereafter, (3) reduce food waste further. Additionally, this SA will also have an impact on the awareness of food waste on HTH students and instructors. To evaluate this solution and access the success of these objectives, a quasi-experiment will be used.

Figure 10: Quasi-experiment used to assess the SA (17 words)

This method uses a control group and before/after measurement (CarnegieMellon, 2021). The control group is used as a benchmark to compare against the experimental group as it will not receive the intervention (ibid). Besides, a baseline is needed to define if a decision influences the desired outcome. We first need to understand and analyzed what the situation was before the intervention was implemented (CarnegieMellon, 2021). Furthermore, it's called "quasi" as it lacks random assignment of people to the experimental and control group (ibid). Kitchen staff are not randomly assigned but chosen for the control and intervention group.

Evaluation process

The kitchen team of blockB 20/21 will be used as a **control group**. They have experienced the implementation of Orbisk, worked with it for ten weeks and did not receive the SA (intervention). Furthermore, thanks to this research the report have been analyzed, observations have been done and interviews with kitchen employees have been conducted.

The kitchen team of blockA 21/22 will be considered the **experimental group** as they will receive the SA. In week1, the different resources needed for the SA will be developed. In the meantime, the kitchen team will be informed of the implementation and the need of the SA to avoid resistance. In week 2, the SA will be implemented.

For both groups, week1 and week10 results will be compared to determine whether the intervention has caused an effect and also what causes what.

KPIs assessment

The Orbisk report gives valuable KPIs to assess:

Objectives	Assessment criteria	KPIs
Orbisk Usage (1)	Efficient use of Orbisk	• Percentage weight with photo • Average kilograms per day of non-registered FW • Numbers of difficulties encountered (gathered through observations)
Food waste reduction (3)	Reduction of FW	• Average kilograms per day of FW
	Costs saving	• Average price per day of FW
	Environmental impact	• Average kilograms of CO_2 Emissions
Positive Kitchen employee behaviour (2)	Motivation/experience of employees	• Number of participants lacking information about Orbisk (gathered through interviews)

During the research, these KPIs have already been measured for the control group (Baseline measure/ Outcome measure). The Orbisk report also allows you to compare and evaluate KPIs from different weeks. Thus, week1 and week10 for both group are comparable. The assessment criteria will be evaluated in week1 and week10. The baseline measure and outcome measure of the experimental group will be compared with the control group to understand the effect and efficiency of the SA. Each KPIs will be compared one by one.

Success

Evaluating the outcome with before/after assessment and a control group guarantee **validity** and **reliability** (CarnegieMellon, 2021). Most KPIs assessed are direct/objective outcomes that enhance the **trustworthiness** of the assessment (ibid). These KPIs are looking at different perspective: the user perspective, the environmental perspective and the machine perspective. Furthermore, most KPIs are gathered automatically by the Orbisk machine which **avoids human errors**.

To conclude, the evaluation and KPIs chosen to assess the SA ensure validity and consistency to know if the project is effective. When comparing the KPIs, it will reveal the level of success of the SA

8. Dissemination

Based on PHCRIS (2015), these criteria are important to define for effective disseminations:

Act of dissemination 1 Report to Commissioner		
Message	Strategic advice on how to successfully implement and operate a new technology in a professional kitchen aimed at reducing kitchen FW.	
Audience	**Research domain**, Ms Visser representing HTH research center as a research fellow in Food circularity.	
Method	A research report displaying explicitly data collection, data analysis and solution design.	
Timing	After research (BlockB-Week11).	
Effect	To inform on the impact a technological device can have on human behaviour.	

The LYCar proposal report as well as all data gathered throughout the research process have been sent to Ms Visser. It is considered as a deliverable and act of dissemination as Ms. Visser will be able to use the report to enhance the operational effectiveness of the Orbisk machine within La Mangerie and understand the impact of technological devices on human behaviour. It results in an evaluation form and positive feedback from Ms Visser *(See appendix-17)*. The "Where food waste meets Artificial intelligence" research was evaluated **excellent** by the commissioner.

Proof of dissemination:

	Act of dissemination 2 **Commissioner and Kitchen chef presentation**	
Message	An implementation plan on how to successfully implement and operate Orbisk within La Mangerie to reduce HTH food Waste level.	
Audience	**Industry domain**, Kitchen chefs/instructors of La Mangerie.	
Method	An online presentation communicating the main research results and the implementation plan tailor-made for Orbisk.	
Timing	After research (BlockC-Week1).	
Effect	To implement efficiently Orbisk in La Mangerie to diminish FW.	

A co-creation session was organized with Ms Visser, commissioner, and Mr De Vos, executive chef. Major elements gathered from the research were presented (Literature overview, methodology, results, solution…). The goal of this session was to explain how to efficiently implement Orbisk within La Mangerie. Therefore, the observations and interviews results were analyzed in details with the audience. As a researcher, I also explained in depth how to read and understand the Orbisk report which was highly valuable for Mr. De Vos. Furthermore, the solution, intervention and evaluation plan were approved by both stakeholders. They proposed to implement it in BlockA 21/22.

Proof of dissemination:

Act of dissemination 3 Dissemination Event at HTH Career Fair		
Message	A technological device, Artificial intelligence like Orbisk, can have an impact on human behaviour to reduce food waste further.	
Audience	**Research Domain**, numerous researchers from HTH research center joined. **Industry Domain**, companies attended.	
Method	An online presentation communicating the main research results (Desk research, observation, interviews) and showing the impact of such artificial intelligence on human behaviour and food waste.	
Timing	After the research and co-creation with the two main stakeholders. The webinar occurred on March 18th.	
Effect	To inform on the impact technological devices can have on human behaviour.	

HTH organized a Dissemination event allowing students to share their research and knowledge with research professionals and external companies. I was included in the *Hospitality & Transformation track* to present innovation within the hospitality industry. After my presentation, I got the chance to receive positive and valuable feedback to improve my research and be prepared for my LYCar final event. It was also a nice opportunity to see what other students have been researching on.

Proof of dissemination:

Act of dissemination 4 Webinar In2Food	
Message	An interdisciplinary method trying to develop innovation in food waste management is important to make a change in reducing food waste further.
Audience	**Research Domain**, numerous universities participated to enables collaborative research for innovation. **Societal Domain**, Indonesian education institutions and non-academic partners are looking at ways to reduce food waste within their country.
Method	An online presentation communicating the main research results (Desk research, observation, interviews) and my personal growth and interest in this research focused on food waste management.
Timing	After the research and co-creation. The webinar occurred on April 13th.
Effect	To show the importance of interdisciplinary course addressing food waste management at universities.

Ms Visser invited me to participate in the "In2Food" conference. In2Food is a collaboration between multiple education institutions and non-academic companies to create and put into action interdisciplinary courses to improve food waste management (In2Food, 2021). It will enhance co-curricular actions throughout all partners to reduce food waste within Indonesia (GhentUniversity, 2021). I was invited to present my research, innovations within the hospitality sector and its impact on hospitality students and professionals. Additionally, I wanted to show the importance of an interdisciplinary course addressing food waste management at universities. My research on food waste management and AI technology taught me a lot about sustainability, gave me envy to help reduce it and to share my knowledge with others.

Proof of dissemination:

	Act of dissemination 5 Placement company – Consultancy	
Message	A technological device, Artificial intelligence like Orbisk, can be a solution within the hospitality industry to further reduce food waste.	
Audience	**Industry domain**, all experts/consultants of HoCoSo were present to listen and see any possibility to connect this project with their clients.	
Method	An online presentation communicating the main research results (Desk research, observation, interviews) and showing the impact of such artificial intelligence on human behaviour and food waste.	
Timing	This presentation occurred on April 15th 2021.	
Effect	To inform on the impact a technological device can have on human behaviour and find possible collaboration with companies to reduce their food waste.	

My placement company, HoCoSo, is focusing on Hospitality Consulting Solution. Its experts/consultants are constantly trying to find solutions for their clients regarding expansion, strategy, growth, innovation, financial improvements but also **sustainability**. Therefore, they were interested in my research as well as the Orbisk product and its functionalities. I developed a tailor-made presentation to explain in-depth the Orbisk machine, its advantages and disadvantages. At the end of the session, we discussed possible collaborations with some of their clients that could be interested in being a pilot client for Orbisk. Additionally, we talked about the possibility of an article to be published on their website: *"Food waste and innovation within the Hospitality industry".*

Proof of dissemination:

Conclusion:

These various acts of dissemination participated fully to the development of my main PLO: ***PLO9 – Leadership & People – Interact with other constructively and effectively in realizing common goals, respecting diversity and in dealing with continuous change.*** I had the chances to interact and connect with various individuals: hospitality experts, technological experts, food experts, researchers, companies, universities and students. I had to constructively and effectively communicate and present my research topics and results to these individuals. Each presentation were adapted with regards to the audience, four presentations were done. I have also learned that these acts of dissemination is a chance to gain external insights and improve your research further.

See appendix-18 for an example of presentation presented to stakeholders.

9. Academic reflection

To write an academic reflection and to focus on new meaningful insights, the **D.I.E.P** model has been used. In this method, the four steps to take are to describe a new understanding, to interpret and evaluate it, and to plan how to use it in future practices (RMITUniversity, 2015).

Reflection on the body of knowledge – *Technology acceptance*

•**Describe**: This research taught me a lot about two important trends within our industry: *New technologies such as artificial intelligence and Food waste, part of the sustainability trend*. It was a real learning experience to work with the Orbisk device. First of all, I've learned a lot about artificial intelligence and what it is exactly. Furthermore, focusing on human behaviour towards such devices gave me valuable knowledge on technology acceptance and the reaction individuals have towards new technology. The acceptance model, TAM, helped to understand the behaviour of individuals towards innovation and new devices. **The most interesting insight is that innovations are efficient and needed to solve daily problems. However, people must accept innovations to work with them and obtain positive and insightful results. Involving individuals in the implementation process is vital.**

•**Interpret**: First of all, analyzing AI technology and the TAM model was a challenge. They are two complex concepts. It was difficult to understand them but talking with the CEO of Orbisk helped me to understand the basis of it. What I understood is that technology must be accepted, people need to be involved in the process to boost their motivation and give them the envy to work with the new device. In fact, people can be reluctant to use this innovation being scared of making mistakes or losing their job (Skompopoulou et al., 2018). **To summarize, this new understanding of the technology acceptance means that (1) companies should be aware of the difficulties of implementing new technologies and (2) a plan must be in place to motivate individuals to use and work with the new machine.**

•**Evaluate**: As technology is currently everywhere and in every industry, understanding it and how to efficiently implement it in an organization is highly valuable. Additionally, while doing my observations and interviews I did see individuals being scared of using the device or not motivated to work with it. It shows that the acceptance model, TAM, has an impact on the attitude toward using (Taherdoost, 2018). **I believe my research and understanding of technology acceptance had an impact on my perceived usefulness and ease of use of technology. Thereafter, it will help me to know how to accept new technology in a better way. Hopefully, it will also help the stakeholders involved.**

•**Plan**: This research on new technology and human behaviour is a key topic in our current world. Additional researches should be done and knowledge covering this topic should be shared. Thus, I did a presentation to my placement company, HoCoSo delivering consulting solutions, which continuously make research on innovation and creative concepts. They will be sharing the contact of Orbisk with some of their clients to enhance this technology. Furthermore, this new understanding will certainly be useful in my future career in the hospitality/ marketing/ business industry as I will probably come across new technology. **In conclusion, the knowledge gain from this research had an impact on my perception of technology, and how to use and approach it efficiently.**

Reflection on societal needs – *Food waste, an environmental and societal issue*

•**Describe**: When doing the first desk research to find the problem definition as well as the research question, I realized that food waste is an extremely important environmental issue having an undesirable economic and societal impact. Food waste compromises biodiversity, leads to a large loss of money but mainly contributes to the large numbers of individual missing food to survive. Consequently, with this first desk research, I have learned in more details how much food waste is occurring in the world (1.3 billion wasted per year) and surprisingly 70% within the hospitality industry. I did not know how bad the situation was. I have also learned that it is our behaviour toward food that leads to such waste. Thus, we must react by improving our morality, habit and knowledge towards the importance of food and its conservation. **To conclude, reducing food waste represents an important societal needs that must be improved now.**

•**Interpret**: Starting off, I was overwhelmed with the number of information on food waste and its impact. I first felt that nothing could be changed as the current situation is already at a dangerous stage with people surviving for food. What I understood is that we have to react now and try to use as many innovations we have in hand to reduce the impact on biodiversity. It will also help to solve the societal issue of individual surviving for food. Adding on to that, I also comprehended even more that food is one of the most important resource that we need and have to cherish for our current and future generation. Our behaviour towards it needs to change. However, on a positive note, I realized that there are solutions such as artificial intelligence, like Orbisk. **To summarize, this new understanding of the dangerousness of food waste means that (1) we need to speak more about this societal need, (2) we need to cherish food to protect our current and future generation and (3) we need to continuously innovate.**

•**Evaluate**: In my opinion, what I have learned on food waste and its societal and environmental impact is highly valuable and should be shared. I realized that few people were aware of it. For example, when doing observation within La Mangerie I saw a lot of students throwing a large amount of fresh food in the bin because they didn't know what to do with it or how to conserve it. Thus, knowledge about food waste is important to share as early as possible. Universities like HTH could be a good starting point as we form the next generation. To link it back to some theory, food waste behaviour is a motivation that arises from inside individual such as morality, knowledge and habits (Aydin&Yildirim, 2020). **I believe my research and understanding of the dangerousness of food waste had an impact on my morality and knowledge. Thereafter, it will help me to form habits in my daily life.**

•**Plan**: As mentioned earlier, this research on food waste must be shared with others to make them realized the situation and the need for change. Thus, I shared my knowledge and learnings in multiple events (HTH dissemination event, In2Food webinar, HoCoSo presentation). It was a great opportunity to discuss with experts in the field. Furthermore, this new understanding of the importance of reducing food waste will certainly change my daily habits. I will be more careful when cooking, eating and storing my food. Additionally, I would like to keep sharing this research with research entities or companies to grow the number of initiatives towards reducing food waste. **In conclusion, this research will have a long-lasting change in my daily life and hopefully, in the life of others.**

Reflection on research design – *Exploratory research with a mixed data collection*

•**Describe**: This Orbisk research was an exploratory research which is exploring a problem that has not been studied or fully explored (Swedberg, (2020). Orbisk is an innovative device and currently in its testing phase. Thus, no research on such device has been done yet. Consequently, findings the scope of the desk research was a challenge. In fact, identifying the elements to research on was difficult. I had the opportunity to discuss and brainstorm with experts such as Mr De Vos, executive chef in La Mangerie; Ms De Visser, research fellow in food circularity and Mr Olaf, CEO of Orbisk. It helped me to define topics to cover in the desk research and which method to use for data collection. **One thing I realized is that exploratory/qualitative research can be challenging in finding the scope and context of the research as well as gathering efficient data collection.**

•**Interpret**: At the beginning of my research, I was confused on where to start, which subject to research on, what is the actual problem and what is the research question we are investigating on. Stakeholders and experts in the field helped me narrowing down my research and understanding which points are relevant and valuable for this investigation. What I understood is that exploratory/qualitative research is also about collaboration and searching for ideas with other people. It also means gathering the perception, feelings and experience of others individuals (Barnham, 2015). Furthermore, the mix of data collection helped us to gather various data: Orbisk report gathering numbers and growth data, Observations collecting direct behavioural reactions and Interviews gathering individuals judgements and feelings. **Thus, this understanding means that exploratory research can be challenging, however, asking for help enhances collaboration and ensure valid and reliable research.**

•**Evaluate**: Personally, what I have learned during this experience should be shared with others student doing research. Thanks to the experts/stakeholders I reached out to, I could deliver a complete report. This report contains reliable desk research, observations and interviews. It will hopefully enhance the utilization of Orbisk within La Mangerie and help to comprehend human behaviour towards technology. **I believe this research is valuable for Ms Visser to continuously innovate and reduce food waste, for Mr De Vos to control the food waste flow of its restaurant and for Mr Olaf to continue exploring Orbisk capacities.**

•**Plan**: I contacted Ms Visser to offer my help for new students that will do extra research on Orbisk and food waste. I could share my knowledge on technology acceptance, food waste and also help to conduct constructive and valid research. **Furthermore, as I am planning on completing a Master degree after my study at Hotelschool the Hague, this learning will be useful when I will be working on my final thesis/research to graduate.**

10.   Demonstration of IQ

Implication for future research

- **Could further research be performed in new settings, with different population?**

Based on the same research topic, main question and settings; some improvements can be made leading to more reliable and trustworthy results:

1. During the desk research/ literature review, an **expert in the field of technology** could have been interviewed to better approach the technology acceptance model and the complexity of artificial intelligence. This expert could give a valuable perspective on how the Orbisk device works and how to motivate and engage others to use it.

2. The **study population**, MOs, PEs and Instructors, should all be interviewed. In fact, they are using Orbisk daily. However, due to the pandemic, interviews needed to be online. Consequently, it was harder to contact people. Few kitchen staff answered, thus, only MOs could be interviewed. In my point of view, PEs and kitchen instructors would have brought additional and valuable insights. PEs are the main user of Orbisk. They are participating the most in the production and waste process. Additionally, the kitchen instructors are responsible for the kitchen production as well as the food waste flow. They are also considered as experts, they know food waste management, menu planning, food conservation… These elements were important factors in the large amount of food wasted. PEs, MOs and Instructors should all participate in this research.

Different settings involving new populations could be interesting. It would still be focused on Orbisk and its impact on individuals:

3. One of the main results gathered during the research was the lack of knowledge and experience toward food production and food waste management. Implementing Orbisk in **a professional kitchen with kitchen experts** could give additional insights. In fact, as stated in the literature review, to follow the correct habit, knowledge about FW and food preservation is a key element (Aydin&Yildirim, 2020). Individual knowledge and experience on how to cook and handle food impact their FW comportment significantly (ibid). Moreover, traditional kitchen experts could react differently to such innovation with the anxiety of uncertainty, fear of losing their job due to innovation and technology complexity (Skompopoulou et al., 2018). Consequently, their approach and acceptance towards Orbisk would probably be different than PEs and MOs.

4. Another interesting setting that could reach and impact more individuals would be **placing the Orbisk device on the side of the customer**. The artificial intelligence machine could be placed in the service area of La Mangerie. Students and lecturers would be asked to through their leftover in Orbisk. It could be interesting as it could influence their perception of the amount of food they need and thereafter, reduce food waste further. They will see how much they leave on their plate, and how much is wasted daily due to leftovers. Furthermore, other people could see individual wasting food as well as the quantity wasted. Individual moral principles and self-image drive their FW level and are a crucial element shaping their comportment (ibid). These settings could give different insights on food waste and technology acceptance.

- **Should new topics be researched that results or are outcomes of your research?**

New possible topics of research arose:

1. **Food waste management knowledge and young adults**:
   Outcomes of the research were that numerous students didn't know how to re-use ingredients before throwing them away, how to properly conserve food and how to define inedible or edible ingredients. An investigation on how much food waste management knowledge young adults have and how to acknowledge them efficiently within universities could be interesting.

2. **The shame of wasting food**:
   When conducting the interviews, numerous kitchen staff mentioned feeling embarrassed and uncomfortable towards the large amount of food wasted daily. Investigating how shame could impact individuals behaviour towards reducing food waste could give valuable insights.

3. **Orbisk and its interaction with users**:
   Another outcome from the research was that Orbisk isn't interacting with users enough to engage and encourage them to use it efficiently. In fact, 7 out of 9, interviewees mentioned it: "*You can use the screen for a lot of purposes for extra interaction".* A possible research could be: how the Orbisk device could successfully interact with users to make them feel at ease and more aware of the amount of food they are wasting.

4. **The after-life of food waste:**
   During the interview with a green MO, he mentioned using some of the food waste to create a garden in the patio of the Amsterdam campus. It made me reflect on the after-life of food wasted in Orbisk. In my opinion, an insightful research could be on what could student do with this food waste, what initiatives could they start with it. Additionally, a research can also be done on what the government is doing with the food wasted in hospitality companies.

Company project and stakeholders

- **What did the stakeholders benefit from?**

The three main stakeholders benefiting from the company project are Ms Visser, Mr De Vos and Mr Olaf:

1. **Ms Visser, the commissioner**:
As a research fellow specialized in food circularity, the main goal of Ms Visser is to reduce food waste further and understand the behaviours towards it.

First of all, Ms Visser gains knowledge on the food waste flow within La Mangerie. Thanks to the interviews, observation and report, she knows when the food waste occurs, how much and which ingredients are wasted the most. Additionally, this research also gave her valuable insights into Orbisk and its impact on kitchen employee behaviour. With regards to Orbisk, Ms Visser now knows what is the machine, what technology it is, how to use it efficiently, how to read its report, what to focus on when working with it and how to enhance the food waste flow thanks to its report.

Finally, the main insight she was looking for is technology acceptance. She is now aware of the difficulties to implement new technology like Orbisk in an organization. She is also aware of how to implement it efficiently and to motivate people to use it. To conclude, her main benefit is the knowledge on how to implement efficiently an artificial intelligence like Orbisk in a professional kitchen to reduce food waste further. **All these new insights are a benefit for Ms Visser as they will help her reducing La Mangerie food waste and inform numerous students on this environmental issue.**

2. **Mr De Vos, Executive chef of La Mangerie :**
As the Executive Chef of La Mangerie, the aim of Mr De Vos is to control efficiently his kitchen. It means producing food of quality, reducing costs and improving its production process. He is also responsible to teach student the kitchen basis (How to cook, recognize ingredients, innovate, act in a kitchen and have a good relationship with food). The research on Orbisk will contribute to multiple of these points. By explaining how to use efficiently Orbisk and how to read its report; the production process will be improved, costs will be reduced and students will learn more about food and waste. **Consequently, this research is highly valuable for Mr De Vos as it will ensure a successful implementation of the machine in its kitchen. Thereafter, it will enhance the food waste flow within La Mangerie.**

3. **Mr Olaf, CEO of Orbisk:**
As the CEO of Orbisk, Mr Olaf is constantly looking at ways to improve his product. This research gave valuable insights on the machine itself: how to use it efficiently, the most common errors made by users and how to implement it in an organization. **To conclude, it will help the Orbisk company to improve its product and advice their clients on how to implement their product successfully in their organizations.**

- **How should the deliverables be continuously improved?**

The Strategic advice needs to be tested and constantly improved:

1. As this research contains an intervention and evaluation plan, they would have the opportunity to improve the strategic advice at the end of BlockA.

2. Furthermore, a feedback session is set in Week 5 to improve even further the SA (*see intervention and communication timeline within the intervention section*).

3. Afterwards, the green MO will be responsible for the Orbisk device and its usage, he/she could continuously improve the SA by observing and asking for feedback.

4. The above-mentioned possible new research topic such as "Orbisk and its interaction of users", "the shame of wasting food" and "Food waste management knowledge and young adults" could help to investigate further in food waste and technology. It would help to improved and increase the success of the SA.

5. This SA should also be included in the practical education preparation. It is considered as an additional theory student would have to learn and adapt. Sharing this SA earlier could improve its process and increase its efficiency.

11. Appendices

Appendix 1: Deliverable 1: Informative Poster Orbisk

Become a
ZERO WASTER
with HTH & Orbisk

WHAT IS ORBISK?
A food waste monitor with an AI image-tracking technology.

WHAT DOES IT DO?
It recognises and quantifies which products are being thrown away.

WHY DO WE HAVE IT?
To understand our kitchen food waste level.

Hotelschool The Hague & Orbisk
Where Food meets AI

Appendix 2: Orbisk SOP placed next to the machine

WHERE FOOD WASTE MEETS
ARTIFICIAL INTELLIGENCE

WELCOME TO ORBISK

Place empty trays at PE stations

DAILY

Place trays on an easy accessible place for PE's so they will be continuously reminded to place food waste in their tray

Place food waste per item in tray

DAILY

Place food item per item in the trays, make sure products are not stacked on each other. This so the Orbisk device has a clear view on the tray and can identify all items.

Bring tray to Orbisk device

DAILY

There is only 1 green bin in the kitchen. This bin is located at the Orbisk device. If this green bin is full replace it for a new one from garbage area downstairs.

Present tray underneath Orbisk camera

DAILY

Keep some distance from the camera so the whole tray is visible. You can check this by looking at the top screen on the device.

When picture is taken throw food in green bin

DAILY

Check on the bottom screen if the picture is correctly taken. If so, you can throw the food in the green bin.

TO MEASURE IS TO KNOW. THANKS FOR HELPING
REGISTERING OUR WASTE!

Appendix 3: Problem definition – Explanatory Research

To have a better understanding of the problem and formulate a problem definition, explanatory research with various steps has been conducted in addition to the desk research presented in the context of the research:

- **Orientation activities:**

1. **Intake meeting with the Commissioner:** To create quality and get the root of the problem, an intake meeting with the Commissioner has been done. The commissioner, Ms Anna de Visser-Amundson, is a Research Fellow in Food Circularity within the HTH Research Center. She has done a lot of research on food waste and is fighting again it daily with students at HTH. She explains that food waste is a major issue worldwide and especially in the hospitality industry. As Hotelschool The Hague has various kitchen outlets, promote sustainability and aim to actively fight food waste, a new device has been placed in the main restaurant. Orbisk, a food waste monitor with an AI image tracking technology will help kitchen employee to evaluate their food waste flow and thus reduce it. The device can recognize and quantifies products that are thrown away and could help HTH to understand its kitchen food waste level. Thereafter, students will be able to understand the importance of reducing food waste and could be able to understand when and where the main food waste is coming from.

2. **Practitioner Interview:** To have an expert point of view, a meeting with Mr De Vos, a kitchen chef and instructor at Hotelschool the Hague, has been conducted. He mentioned that food waste is a real issue that happens daily in every establishment of the hospitality industry. As an example, he stated that Hotelschool the Hague canteen is throwing daily food that could be reuse or sell at a lower price to avoid food waste. Therefore, he is hoping that the new device will help to understand the food waste flow and show to students that food waste can be reduced.

- **PICOC model:**

Population	Who?	Kitchen employees
Intervention	What / How?	Food waste monitored with Orbisk which is an AI image-tracking recognition technology placed in kitchens
Comparison	Compare to what	Food waste monitor in a traditional way (self-reporting) and kitchen environment.
Outcome	What are you trying to accomplish	Gain a better understanding of the impact of this AI technology on kitchen staff behaviour and food waste flow to reduce the food wastage.
Context	In what kind of organization	Kitchen environment in the hospitality industry

- **Forming the problem definition:**

The problem definition has been rephrased multiple time to make it as specific as possible and consider different root causes. As the research is mainly focused on kitchen waste consumer consumption leading to food waste hasn't been taken into consideration. Furthermore, Kitchen employee behaviour includes consideration of environmental problems and conduct during the food production process.

1) The main problem within the hospitality industry (Where), lies with a large amount of food waste in the kitchens (What) causing an environmental problem (Why).

2) The main problem within the hospitality industry (where) lies with a significant food waste occurring in kitchens due to overproduction and kitchen employee behaviour (What) causing an environmental problem (Why).

3) The main problem within the hospitality industry (Where) lies with a significant food waste occurring in kitchens due to overproduction and kitchen employee behaviour (What) causing environmental, complex ethical and economic issues (Why).

Appendix 4: Orbisk report results

Every week, waste details are available in an online report. It displays when the waste occurs and why. Thereafter, the establishment can optimize its cooking and purchasing processes, menu and supply based on data. An analysis of La Mangerie FW flow has been done from week 46 until week 50. Week 51 has been removed as the lockdown was implemented and the kitchen closed.

General analysis:

Figure 1: Average kilograms per day in week 46 until 50

This graph shows that the first two weeks of utilization an important amount of FW wasn't registered within Orbisk meaning that Orbisk couldn't recognize the ingredients or pictures weren't taken but food still thrown away. However, with practices and experience, it improves with fewer unregistered elements. Furthermore, it shows that most waste is made mainly from FW followed by Cuttings. Week 47 represents the week of most FW with 55,60Kg on average per day against week 49 being the week with the fewest FW made with 37,92Kg on average per day.

Analysis of week 47:

Figure 2: Average kilograms per day per category and ingredient in week 47

Week 47 represent the week with most waste due to sauces, entire meals, and vegetables.

Average KG per day per Category

Category	Price / Kg	Kg / day ▾	Cost
Sauce	4	6,8	27 €
Meals and purees	**10**	**5,4**	**54 €**
Vegetables	3	2,5	7 €
Snacks	4	2,3	9 €
Potato	3	1,8	5 €
Bread	2	1,4	3 €
Bread toppings	9	1,4	13 €
Fish	15	1,0	14 €
Pasta and rice	2	0,9	2 €
Egg	2	0,8	2 €

1 - 10 / 20 ‹ ›

Average GR per day per ingredient

Ingredients	Gr / day ▾
Vegetable mix	4 599
Macaroni pasta with pieces	676
White rice dish	124
Macaroni pasta with sauce and pieces	-
Macaroni pasta with sauce	-
Casserole	-
Bell peppers stuffed	-
Pasta noodles / spaghetti with sauce and pieces	-
Stew mashed	-

1 - 10 / 11 ‹ ›

Figure 3: Report displaying what type of meals were thrown in week 47

Average KG per day per Category

Category	Price / Kg	Kg / day ▾	Cost
Sauce	4	6,8	27 €
Meals and purees	10	5,4	54 €
Vegetables	**3**	**2,5**	**7 €**
Snacks	4	2,3	9 €
Potato	3	1,8	5 €
Bread	2	1,4	3 €
Bread toppings	9	1,4	13 €
Fish	15	1,0	14 €
Pasta and rice	2	0,9	2 €
Egg	2	0,8	2 €

1 - 10 / 20 ‹ ›

Average GR per day per ingredient

Ingredients	Gr / day ▾
Seaweed	1 209
White onion	263
Tomato	183
Garlic	111
Spinach	106
sauerkraut	103
Carrot	87
Broccoli	61
Celery	54
Arugula	53

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Figure 4: Report displaying what type of vegetables were thrown in week 47

This part of the report helps to understand specifically what type of ingredients were thrown away. Regarding meals, vegetable mix, macaroni and white rice dish were throw the most. Additionally, the vegetables that were discarded the most are seaweed, onions, tomatoes, garlic and spinach. It helps kitchen staff to understand which dishes weren't successful and if products were ordered in unnecessary large quantities. Thereafter, they can adapt they purchase and cooking processes.

General analysis:

Figure 5: Average kilograms and cost of waste per day time

Orbisk report also displays which part of the day generates most waste. In La Mangerie, the largest amount of FW and cost is produced during dinner, followed by lunch and breakfast for every week.

Figure 6: Average waste per KG and cost per day

Moreover, it has been revealed that most waste happen on Thursdays with on average 41,10Kg and Fridays with 42,60Kg which generate an important cost per day. In addition, on average 36,12Kg of waste is generated per day representing a loss of €119,40 per day.

Average KG per day per Category

Category	Price / Kg	Kg / day ▾	Cost
Meals and purees	10	3,5	35 €
Sauce	4	3,3	13 €
Vegetables	3	2,2	7 €
Bread	2	1,5	3 €
Potato	3	1,3	4 €
Snacks	4	1,2	5 €
Salads	10	1,2	12 €
Sandwiches	10	0,9	9 €
Bread toppings	9	0,8	7 €
Fruit	6	0,8	5 €

1 - 10 / 20

Average GR per day per ingredient

Ingredients	Gr / day ▾
Vegetable mix	2 568
Brown sauce	1 173
Pizza	709
Potato stew	673
Red sauce	665
White sauce	515
Bread topping ham	503
Couscous salad	492
Vegetable salad	450
Potato	411

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Figure 7: Average waste per category and ingredients per day

Orbisk report also shows which type of ingredients are being thrown the most. It will help kitchen staff to design efficient menu and purchasing process. In La Mangerie, the main ingredients wasted are vegetable mix, sauces and pizzas.

Figure 8: Cost per guest and number of guest on average per day

This graph shows that on Friday it occurs the most important cost per guest with fewer number of guests. Therefore, we can suppose that numerous ingredients kept from the entire week are thrown away on Friday adding up on the daily waste. In fact, on Friday leftover are thrown away and fridges are being checked in order to ensure fresh ingredients on Monday.

Conclusion:

Every week, waste details are available in an online report. It displays when the waste occurs and why. An analysis of La Mangerie FW flow of week 46 until week 50 has been done.

Conclusion of analysis:
The results shown that with experience and practices, Orbisk recognizes all ingredients discarded in the bin and employees efficiently use the device. When comparing to other Orbisk's client results, HTH registered correctly 79,32% of waste against 66,85% from other clients. Week 47 represents the week of most FW with 55,60Kg on average per day against week 49 being the week with the fewest FW made with 37,92Kg on average per day. Regarding the type of waste, the majority is due to FW including meals and cooked ingredients followed by cuttings. Consequently, most waste discarded are considered as **avoidable waste**. On average, 36,12Kg of waste is generated per day representing a loss of €119,40 per day. This waste is largely produced during **dinner**. Furthermore, most waste occurs on **Thursdays** with 41,10Kg and **Fridays** with 42,60Kg of waste on average which generate important costs per day. In fact, on Fridays leftovers are thrown away and fridges are being checked to ensure fresh ingredients on Mondays. Additionally, the type of ingredients mainly discarded weekly are **vegetable mix, sauces and pizzas**.

The analysis of Orbisk report will help La Mangerie to understand its FW flow and to optimize its cooking and purchasing processes, menu and supply based on data. Furthermore, it helped the researcher to form specific interviews questions to better understand the FW flow in La Mangerie and employees' behaviours towards Orbisk.

Appendix 5: Observation results

1) Observation procedure:

To understand the usage and behavioural impact of Orbisk, the researchers made rounds of observation in La Mangerie, Hotelschool the Hague, Amsterdam Campus. To have a better understanding of the behaviour, to find recurrent attitudes and establish categorized themes observed, a pilot week has been done. The observations were done on specific days which were :
- Monday mornings, the day of the most preparation resulting in a lot of waste.
- Wednesday morning counted as a neutral day.
- Friday afternoon, the last day of the week when the most whole food and dishes are thrown away.

During this pilot week, the researcher made general observations and found patterns in the usage of the Orbisk device. Recurrent attitudes and establish themes have been categorized. Thereafter, during the two observations weeks, the frequency of the recurrent attitudes towards Orbisk could be analysed.
More specifically, the researchers came on:
- **Week 4 (pilot week)**: Monday 30th November from 8:30am until 2:00pm
  Friday 4th December from 2:00pm until 7:00pm

- **Week 5**: Monday 7th December 8:30am until 2:00pm
  Wednesday 9th December from 8:30am until 2:00pm
  Friday 11th December from 2:00pm until 7:00pm

- **Week 6**: Monday 14th December from 8:30am until 2:00pm
  ~~Wednesday 16th december~~ *Cancelled due to Covid-19*
  ~~Friday 18th December~~ *Cancelled due to Covid-19*

Additionally, observations were made in the various working sections and next to the Orbisk device. Furthermore, to be transparent and efficient as possible and obtain the most qualitative natural observations, the researcher was wearing the kitchen uniform to blend within the workforce. The observations were mainly focused on: how kitchen employees cut food to go in waste, how do they manage and understand food waste, how do they use the tray to separate the waste, how do they use the Orbisk machine and how do they react with the machine.

2) Pilot week Observations results

- **Usage of the ingredients recipients**
  - The food waste is not organized in the standard trays, ingredients are mixed.
  - Some sections do not have the standard food waste trays (using bowls, hands, big trays, medium trays)
    <u>Hands</u>: Pictures are not being taken, students still throw it in the bin.
    <u>Bowls</u>: Ingredients are on top of each other and mixed.
    <u>Medium trays:</u> Standard tray, allowing picture and food to go directly to the bin.
    <u>Big trays</u>: Some ingredients fell on the floor, out of Orbisk's bin

- **Usage of the Orbisk device:**
  - Some students (PEs-MOs) throw directly the ingredients in the bin without taking a picture.
  - When turning 'on' the machine, the student pushed the bin against the scale. Orbisk took a picture and the weight of this action into consideration. Thus, the result of food waste weight of the day is false leading to an error in the report.
  - When students do not know how to use the machine: taking multiple pictures, moving the bin out of the scale, pressing multiple buttons on the screen.
  - Tray should be closer to the camera, otherwise, it doesn't take a picture of the food.
  - When taking a picture, students place their tray on the bin. The Orbisk is then taking the weight of this action, and not of the food thrown away.

- **Food waste management and behaviour:**
  - When cutting fresh food (fruits/ vegetables), students are cutting important part of ingredients (*Ex: half an onion, half bell pepper*).
  - Ingredients that could be used in other sections and for other recipes are thrown away (*Ex: green part of leeks could be reused for soup but was thrown away*)
  - Food waste is put into the wrong bins, not into Orbisk (*Ex: Pasta, eggshells*…)
  - Ingredients are not considered as food waste are thrown into Orbisk. *(Ex: Paper, plastics)*

- **Kitchen staff behaviour toward the machine:**
  - When observed, students separate correctly the waste in the tray and use correctly Orbisk. When not observed, student throw FW without taking a picture. It includes MOs and PEs.
  - When MOs introduce the machine to their staff, they explain briefly the use of Orbisk (*Ex: "It is the bin for food waste, it is important"*).

- **Error from the machine**
  - When turning 'on' the machine, 8.3kg was already written on the screen and registered in the system. Thereafter, the actual Food waste weight of the day was false.

3) Categorized themes to observe

OBSERVATION	
Date:	
Time:	
Duration:	
Instructors:	
MOs:	
Green MO:	
Kg of food waste during observation:	
Additional information:	

OBSERVATION	
Action	**Frequencies**
Use of Orbisk device	
Correctly used	
Pressing multiple time Orbisk's screen	
Multiple pictures taken	
No picture was taken, food is thrown in the bin	
Moving the bin off the scale	
Food next to the bin	
Food in the bin	
Tray carried out just below the camera	
Tray placed on the bin while taking the picture	
Use of food waste recipients	
Use of hands	
Use of bowls	
Use of medium tray	
Use of large trays	
No FW tray in the section	
Ingredients in Food waste trays	
Pile of food	
Mixed ingredients	
Organized ingredients	
Food waste management	
Ingredients that don't belong to waste thrown in Orbisk (Re-used)	
Wrong element in Orbisk bin	
Food waste in wrong bin	

Definition an efficient use of Orbisk:

Correctly used: The standard tray for Food waste needs to be placed close to the camera. The first picture will be taken, and subsequently, the food needs to be thrown away in the bin quickly. Thereafter, the picture and grams are displayed on the screen.

Tray carried out just below the camera: The tray needs to be placed right below the camera, and not on the bin itself. Otherwise, the weight of the tray and food waste is taking into consideration.

Use of medium tray: The standard tray for FW is a medium iron tray in which kitchen employees can organize ingredients.

Tray placed in section: Standard FW trays must be placed in every section

Organized ingredients: To ensure efficient and effective recognitions from Orbisk, ingredients need to be distinctively separated per type in the tray.

4) Observation week 5

OBSERVATION	
Date:	*Monday 7/12/2020*
Time:	*8:30 until 13:30*
Duration:	*5 hours*
Instructors:	*2 on the floor (Mr. De Vos, Mr Van de Spree)*
MOs:	*Group 1*
Green MO:	*Robbert Daemen*
Additional information:	*3 MOs were missing (Sandwich, Executive chef, Pasta/Pizza)*

OBSERVATION	
Action	**Frequencies**
Use of Orbisk device	
Correctly used	**3/15**
Pressing multiple time Orbisk screen	**3/15**
Multiple pictures taken	**3/15**
No picture was taken, food is thrown in the bin	**3/15**
Moving the bin off the scale	**1/15**
Food next to the bin	**3/15**
Food in the bin	**12/15**
Tray carried out just below the camera	**10/15**
Tray placed on the bin while taking the picture	**5/15**
Use of food waste recipients	
Use of hands	**3/15**
Use of bowls	**6/15**
Use of medium tray	**0/15**
Use of large trays	**6/15**
No FW tray in the section	**2 sections at 8:30**
Ingredients in Food waste trays	
Pile of food	**5/15**
Mixed ingredients	**7/15**
Organized ingredients	**3/15**
Food waste management and behaviour	
Ingredients that don't belong to waste thrown in Orbisk (Re-used)	**0**
Wrong element in Orbisk	**1**
Food waste in wrong bin	**2**

Other observations:
- Sauces/ Yogurt/ Jus are not thrown in Orbisk, but in the wrong bin.
- Time spent on the machine approximatively 3seconds – 5seconds

OBSERVATION	
Date:	*Wednesday 9/12/2020*
Time:	*8:30 until 13:30*
Duration:	*5 hours*
Instructors:	*2 on the floor (Mr. De Vos, Mr. Host)*
MOs:	*Group 1*
Green MO:	*Robbert Daemen*
Additional information:	*1 MOs was missing (Salad)*

OBSERVATION	
Action	**Frequencies**
Use of Orbisk device	
Correctly used	**3/10**
Pressing multiple time Orbisk screen	**0/10**
Multiple pictures taken	**3/10**
No picture was taken, food is thrown in the bin	**4/10**
Moving the bin off the scale	**0/10**
Food next to the bin	**0/10**
Food in the bin	**10/10**
Tray carried out just below the camera	**7/10**
Tray placed on the bin while taking the picture	**2/10**
Use of food waste recipients	
Use of hands	**2/10**
Use of bowls	**4/10**
Use of medium tray	**3/10**
Use of large trays	**1/10**
No FW tray in the section	**3 sections at 8:30**
Ingredients in Food waste trays	
Pile of food	**5/10**
Mixed ingredients	**4/10**
Organized ingredients	**1/10**
Food waste management and behaviour	
Ingredients that don't belong to waste thrown in Orbisk (Re-used)	**1 (fresh fried onions)**
Wrong element in Orbisk	**0**
Food waste in wrong bin	**0**

Other observations:
- Various section do not have FW trays
- Sauces/ Yogurt/ Jus are not thrown in Orbisk, but in the wrong bin.
- Activities were calmer than on Monday 7/12/2020. MOs spend more time in their section.

Additional Information:
- The team of MOs and executive chef have been informed of the results from the pilot week. They are aware of the actual usage of Orbisk. The SOP (Appendix-2) and main issues observed have been shared with the group.

OBSERVATION	
Date:	*Friday 11/12/2020*
Time:	*14:00 until 18:00*
Duration:	*4 hours*
Instructors:	*1 On the floor for dinner (Mr Splinter)*
MOs:	*Group 1*
Green MO:	*Robbert Daemen*
Additional information:	*-*

OBSERVATION	
Action	**Frequencies**
Use of Orbisk device	
Correctly used	**6/16**
Pressing multiple time Orbisk screen	**1/16**
Multiple pictures taken	**3/16**
No picture was taken, food is thrown in the bin	**5/16**
Moving the bin off the scale	**0/16**
Food next to the bin	**0/16**
Food in the bin	**16/16**
Tray carried out just below the camera	**12/16**
Tray placed on the bin while taking the picture	**4/16**
Use of food waste recipients	
Use of hands	**4/16**
Use of bowls	**3/16**
Use of medium tray	**6/16**
Use of large trays	**3/16**
No FW tray in the section	**2 sections at 14:00**
Ingredients in Food waste trays	
Pile of food	**5/16**
Mixed ingredients	**7/16**
Organized ingredients	**4/16**
Food waste management and behaviour	
Ingredients that don't belong to waste thrown in Orbisk (Re-used)	**0**
Wrong element in Orbisk	**1**
Food waste in wrong bin	**0**

Other observations:
- Sauces/ Yogurt/ Jus are not thrown in Orbisk, but to the dishwasher.
- During the lunch service, the Orbisk bin is closed for hygiene with regards to the guests.
- At 2:00pm, the MOs and instructors meeting is taking place. Thereafter, PEs are cleaning on their own. Therefore, the number of incorrect use of Orbisk was more frequent.

5) Observation week 6

OBSERVATION	
Date:	*Monday 14/12/2020*
Time:	*11:00 until 16:00*
Duration:	*5:00 hours*
Instructors:	*3 instructors (Mr. van de Spree/ Mr. De Vos/ Mr Splinter)*
MOs:	*Group 2*
Green MO:	*Friso Bleeker*
Additional information:	*All MOs present*

OBSERVATION	
Action	**Frequencies**
Use of Orbisk device	
Correctly used	**7/17**
Pressing multiple time Orbisk screen	**0/17**
Multiple pictures taken	**5/17**
No picture was taken, food is thrown in the bin	**4/17**
Moving the bin off the scale	**0/17**
Food next to the bin	**0/17**
Food in the bin	**17/17**
Tray carried out just below the camera	**15/17**
Tray placed on the bin while taking the picture	**2/17**
Use of food waste recipients	
Use of hands	**5/17**
Use of bowls	**9/17**
Use of medium tray	**2/17**
Use of large trays	**1/17**
No FW tray in the section	**2 sections at 11:00**
Ingredients in Food waste trays	
Pile of food	**7/17**
Mixed ingredients	**9/17**
Organized ingredients	**1/17**
Food waste management and behaviour	
Ingredients that don't belong to waste thrown in Orbisk (Re-used)	**1 (fresh bread)**
Wrong element in Orbisk	**0**
Food waste in wrong bin	**0**

Other observations:
- Food not eaten in the pastry section are send after the lunch to Le debut (Pain au chocolat, croissant)
- After service (2:00pm), PEs only use bowls to throw food in Orbisk. These bowls were used during service to serve the guest.
- At 2:00pm, the MOs and instructors meeting is taking place. Thereafter, PEs are cleaning lunch display on their own. Therefore, the number of incorrect use of Orbisk seems to be more frequent (6/9 incorrect use)
- Some PEs are currently doing their second week in La Mangerie.

6) Pictures illustrating the observation

Picture 1: Orbisk set up (2 SOPS and a poster)

Picture 2: Food waste place in a bowl leading to food pile and food mixed.
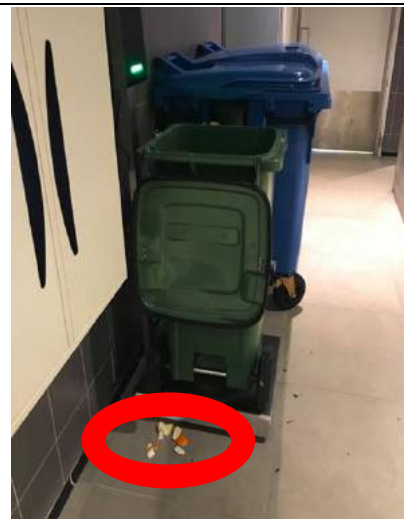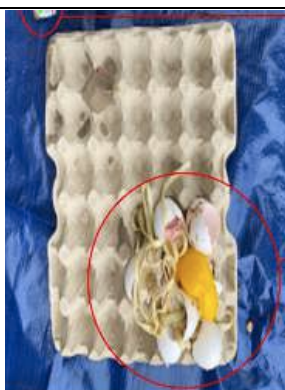

Picture 3: Peels and whole pizzas thrown away

Picture 4: A pile of mixed food waste (Not organized)

Picture 5: Food organized and separate in a standard tray

Picture 6: Food thrown next to the bin due to a large tray used to display food waste.

Picture 6: Food waste thrown in the regular bin instead of Orbisk

Picture 7: Total amount of food waste that was not thrown in Orbisk

7) Conclusion

The researcher conducted selective observation by looking at kitchen staff behaviour towards Orbisk. During the pilot week, recurrent comportments were defined. Furthermore, the observations helped to determine how to efficiently use Orbisk and showed the external factors influencing the device:

Correctly used	*The tray with FW needs to be placed close to the camera. The first picture will be taken, and subsequently, the food needs to be thrown away in the bin. Thereafter, the picture and grams are displayed on the screen.*
Tray below the camera	*The tray needs to be placed right below the camera, and not on the bin itself. Otherwise, the weight of the tray and FW is taken into consideration.*
Use of medium tray	*The best tray for FW is a medium iron tray in which kitchen employees can organize and separate ingredients. While using large trays, part of the FW end up on the floor, and bowls and hands lead to a pile of mixed ingredients difficult to be recognized by Orbisk.*
A tray in section	*FW trays must be placed in every section.*
Organized ingredients	*To ensure effective recognitions, ingredients need to be distinctively separated per type in the tray.*

Additionally, the main issues that appeared during usage were identified:

- Multiple pictures taken for the same tray
- No picture was taken, food was still thrown in the bin
- Tray placed on the bin while taking the picture
- Use of hands and bowls
- Mixed ingredients
- FW Tray is not placed in the sections

Even though two SOPs were placed next to Orbisk device, individuals incorrectly use the device. Moreover, it has been observed that when instructors and MOs are present on the floor, students are being more careful on how to use Orbisk. The phenomenon is called the Hawthorne effect, consciously, individuals behave differently when observed. To conclude, some improvement must be implemented.

Appendix 6 : Interview Schedule

Interview	Function	Date	Location	Method	Duration
Pilot Interview	MO1	11/01	MS Teams	Online Interview	30-40 min
2	MO2	11/01	MS Teams	Online Interview	30-40 min
3	MO3	12/01	MS Teams	Online Interview	30-40 min
4	MO4	12/01	MS Teams	Online Interview	30-40 min
5	MO5	12/01	MS Teams	Online Interview	30-40 min
6	MO6	12/01	MS Teams	Online Interview	30-40 min
7	MO7	13/01	MS Teams	Online Interview	30-40 min
8	MO8	13/01	MS Teams	Online Interview	30-40 min
9	MO9	13/01	MS Teams	Online Interview	30-40 min

Appendix 7: Interview Structure

Topic	Script
Presentation	Thank you for your time and participation in this research. My name is Léa Iacazzi and I am currently doing my academic research project as part of the LYCar programme at Hotelschool The Hague. The purpose of this study is to understand the food waste flow of La Mangerie and the impact an AI technology like Orbisk on kitchen employee behaviour to reduce food waste. This study is highly relevant for HTH to understand the importance of new technology to reduce food waste and how to implement it correctly in an organization. The interview should take 30 to 40 minutes to complete. Please remember that your participation in this study is voluntary and that you can withdraw at any time.
Introduction	Starting off, a presentation of Orbisk is necessary. Orbisk is the new device placed in La Mangerie and is considered a **Computer Vision** (CV) technology which includes **Machine Learning** (ML) capacities and is part of the broad field of **Artificial Intelligence** (AI). AI is a technology able to process information similarly to humans. Additionally, Orbisk is not only taking picture of the FW but is also generating a weekly report analysing the food waste flow within the kitchen. It display where the waste occurs and why.

Topics covered:
 	
• Artificial Intelligence
• Implementation of AI technology in workplace
• External Variables
• Perceived usefulness
• Perceived Ease of Use
• Attitude toward using
• Cause of Food waste
• Food waste behaviour
 	
Coding based on the TAM model:
 	
• External Variables
• Perceived usefulness
• Perceived ease of use
• Attitude toward using
	• You worked in La Mangerie kitchen this block, right? How did you experience that?
	
	• It was the first block we had the Orbisk device installed in La Mangerie kitchen. Why do you think it was installed?
	
	• What is your opinion about a device like Orbisk in a kitchen?
	
	• How do you actually feel about kitchen food waste in La Mangerie?
	
	• Are you aware of the level and cause of food waste in La Mangerie?
	
	• Would you like to be informed about it?
	   o Yes, why and how?
	   o No, why not?
	
	• How did you experience working with this device?
	
	• Did you easily adopt this device in the kitchen? What could make it difficult for you to adopt/ accept Orbisk?
	
	• What made your experience easy? What made it difficult? Why?
	
	• What could make your use of Orbisk easier?
	
	• Did Orbisk have an effect on you wasting less food?
	   o Yes, in which way?
	   o No, why not?

	• What would enable you to reduce food waste in La Mangerie? What is the role of Orbisk in this? • What could increase your motivation to use Orbisk to reducing food waste? • In your opinion, what are critical success factors of AI technology (like Orbisk) to reduce further kitchen FW? • As you can imagine, to gain the advantages of a device like Orbisk to reduce food waste, it is important that it is used correctly. Currently, we have a Green chef, a video SOP and a visual SOP to explain its usage. Are there other ways/modes of communication that you think would improve the correct use of this device? • As you might have seen, I spent some time in the kitchen before the lockdown, more specifically to understand how the Orbisk device is being used. I noticed that while the device was used correctly, it came to my attention that several students also struggled with following the correct procedures and thus e.g., Multiple pictures were taken, mixed ingredients were presented to Orbisk, no picture were taken but food was still discarded…. Why do you think that is? How do you think we can improve this? • As you have seen, Orbisk has a screen displaying neutral information including the latest picture taken and the total waste generated so far. What would you like to see displayed on this screen to enhance your performance in reducing food waste? • After analysing the Orbisk report displaying the Food waste flow of la Mangerie, it was shown that most waste happen in Thursday and Friday, what do you think causes this large amount of FW? In your opinion, what can be done about it? • This report has not yet been shared with students. Do you feel that it would be helpful? 　　○ Yes, in which way ? 　　○ No, why not? • The report can be either a dashboard with the major results or in detail. What would you find the most helpful and effective? How do you feel that this might help employees to reduce further food waste?
Conclusion	I would like to thank you again for your time and participation. Do you have any questions regarding the research or your rights as a research participants? Please, feel free to contact me if you have any questions after our interview.

Appendix 8: Color coding

Nvivo software helped to determine these themes and codes.

Category	Link to research questions	Color code
External Variables **External Variables :** Description of the variables affecting the efficient use of Orbisk	RQ1	Description
Perceived usefulness **Purpose of Orbisk :** Used to track food waste Used to reduce food waste Used to order efficiently **Level and cause of food waste:** Aware of the level and cause of FW in La Mangerie Not aware of the level and cause of FW in La Mangerie Want to be informed about it Don't want to be informed about it **Effect of Orbisk on wasting less food:** Effect on individuals to waste less food No effect on individuals to waste less food **Screen information:** Neutral information Additional information **Food waste occurring in La Mangerie:** Cause of large amount of waste on Thursday and Friday Solutions to reduce this amount of waste within La Mangerie **Report:** Share the Orbisk report to the kitchen team Do not shared the Orbisk to the kitchen team Share detailed report with numbers and graphs Share report with main insights	RQ2 RQ3	Track Reduce To order Aware Not aware Want to be informed Do not want to be informed Effect No effect **Neutral** Additions Cause Solutions Shared Not shared Detailed Not detailed
Perceived ease of use **Experience :** Easy to use Orbisk Difficulties have been encountered while using the machine Solutions to make the use of Orbisk easier Critical success factor of the machine	RQ4	Easy Difficult Solutions Description

Attitude toward using **Feeling about kitchen food waste:** Positive feelings toward food waste in La Mangerie Negative feelings towards food waste in La Mangerie **Experience with Orbisk:** Positive experience (insightful) working with the machine Negative experience working with the machine **Adoption :** Easy to adopt this device in the Kitchen Difficult to adopt this device in the Kitchen **Information about Orbisk** Missing information about Orbisk Not missing information about Orbisk **Motivation:** Description on how to increase motivation to use Orbisk and reduce food waste within La Mangerie	RQ5 RQ6	Positive Negative Positive Negative Easy Difficult Missing Not missing Description

Appendix 9: Interviews color coded

Who?	Where?	When?
MO1	Online MS Team	11/01/2021

Léa: You worked in La Mangerie kitchen this block, right? How did you experience that?

MO1: It was quite good. So, I was the executive chef in La Mangerie. It was less cooking and more administrative tasks and also walking around, running around people and making sure everything was on track. I actually enjoyed it a lot as I'm not the greatest cook. But, It was very, very intense. But I learned a lot even though it was only six weeks.

Léa: Good being executive chef is a lot of responsabilities and pressure. It is nice that you liked it. Diving into our subject, It was the first block we had the Orbisk device installed in La Mangerie kitchen. Why do you think it was installed?

MO1: Well, I believe first to track the food waste in the restaurant, to just see how much we actually do waste or throw away. And then hopefully, to know what you throw away, how much they throw away, and also see where you can improve and reduce further our food waste.

Léa: Ok perfect, that is great. What is your opinion about a device like Orbisk in a kitchen?

MO1: I think it was definitely a very good initiative. And it's quite cool to see such device in a kitchen, how technology can help us to reduce food waste. It also help use to see food waste as something tangible and not only speaking about it. Because in La mangerie, you have so many sections, so you don't how much each section is wasting or how much it is in total. So I did like it. I wish there were some more explanations as to how it works, why we do it, what you can do with it. In my opinion, it was so new, and everyone was getting used to it, so we didn't have proper workshops about it.

Léa: Nice to hear that you liked it and find that it was a good initiative. How do you actually feel about kitchen food waste in La Mangerie?

MO1: It's the first time I've worked in the kitchen. So, I guess I don't really have a reference point as to if it's a lot of food waste or not. We are trying some initiative like the Friday, during which we tried to only use leftovers. But it is I still hurting to see food being wasted that could be re-used. For example, one time we came in on a Monday and there were two or three trays of chicken, which were incorrectly labeled. As we didn't know when it was opened and placed on the trays we had to throw everything away for safety… So it does hurt. But I think what I liked was that instructors had interesting idea to re-used leftovers or food cuttings. I would like to believe thatour school is doing better than average on that. But it can always be better.

Léa: So, Are you aware of the level and cause of food waste in La Mangerie?

MO1: We didn't get anything shared. So, I asked my green MO green if he can make a report on how much food waste we did over the past week.

Léa: Ok that a good idea. But Would you like to be informed about it? why and how?

MO1: Yes, we must be informed to improve and stay motivated. We did use it every week, but, I've never heard a number. I think it would be helpful to know how much and why.

Léa: Ok. Next question is How did you experience working with this device?

MO1: I personally didn't use it much as the executive chef, I wasn't much in the kitchen. I did use it once or twice. I think it was user-friendly. I mean, it was quite easy if you do it correctly and following the SOPs. However, I did notice that it was quite fragile. During service sometimes it was quite smelly, so we wanted to put the bin out but apparently

you couldn't just take it off or put the put a lid on it because It would change the food waste weight.

Léa: Yes I can understand that as an executive chef you don't really use it. But I can imagine that you used it few times, so Did you easily adopt this device in the kitchen? What could make it difficult for you to adopt/ accept Orbisk?
MO1: Yes, it was easy. User-friendly with a video SOP and two SOPs next to the machine.

Léa: What could make your use of Orbisk easier?
MO1: I think it was fine. It sometimes took multiple photos like, if you put your hand over it or something. So maybe if you could, like, see the photo that you took and decide if you want to delete one or two or just chose the correct one. But other than that, I thought that process was quite easy.

Léa: Ok good to hear that tit was user-friendly. Did Orbisk have an effect on you wasting less food? in which way?
MO1: Maybe I'm not the right person to ask you as i didn't cook too much. But, I guess it does. It does make you more aware of your waste as you see it in your tray, you kind of see how much it is in total at the end of your cooking process. At the same time, I also didn't know how we could reduce it our food waste. Because if you have a potatoe for example you do have to appeal it, right?. You know, I wouldn't know what I could do to reduce food waste.

Léa: Ok perfect. What could increase your motivation to use Orbisk to reducing food waste?
MO1: I think if you do have the numbers, and you can kind of visualize it, and see how it goes down, or up Im sure it could motivate a lot of us. Or something that would motivate me if I would see it on the orbisk screen: like today, it was 50 kilos, and, yesterday it was 60. So we know we are on the right track.

Léa: More technics here, In your opinion, what are critical success factors of AI technology (like Orbisk) to reduce further kitchen FW?
MO1: I think for me, it would be to know the machine, what it is and if the results of the machine are accurate. Because we did scan everything but I didn't know what it did, what the machine see, what the machine recognizes. I think that would be important for me to know that: The accuracy of the tracking and what is this machine.

Léa: As you can imagine, to gain the advantages of a device like Orbisk to reduce food waste, it is important that it is used correctly. Currently, we have a Green chef, a video SOP and a visual SOP to explain its usage. Are there other ways/modes of communication that you think would improve the correct use of this device?
MO1: I think every MO should just do a little tutorial on Monday morning. It should be quite straightforward. The SOPs next to the machine are quite helpful if you forgot what to do. I also think the video should be shown to everyone every Monday and make a little food waste quiz or something.

Léa: As you might have seen, I spent some time in the kitchen before the lockdown, more specifically to understand how the Orbisk device is being used. I noticed that while the device was used correctly, it came to my attention that several students also struggled with following the correct procedures and thus e.g., Multiple pictures were taken, mixed ingredients were presented to Orbisk, no picture were taken but food was still discarded…. Why do you think that is? How do you think we can improve this?
MO1: Obviously, laziness. And maybe they were not aware of the importance of this machine. And maybe, they haven't really been explained. But I do think awareness could help.

Léa: Regardin more the design and functionalities of Orbisk. As you have seen, Orbisk has a screen displaying neutral information including the latest picture taken and the total waste generated so far. What would you like to see displayed on this screen to enhance your performance in reducing food waste?

MO1: I think a measuring reference, it would be quite nice. Such as the food waste of the previous day so you can compare with the food waste of today. And then it is like an incentive to keep it below that previous day level. In addition, a little animation could be motivating PEs: if you take a picture and put it in correctly it shows you a thumbs up, or "don't forget to take a picture next time". Because to be honest, I've never looked at the screen.

Léa: As the research I could see the Orbisk report and analyze your food waste. After analysing the Orbisk report displaying the Food waste flow of la Mangerie, it was shown that most waste happen in Thursday and Friday, what do you think causes this large amount of FW? In your opinion, what can be done about it?

MO1: Thursday makes sense. Because last day of a menu. And on Friday, it all the food leftover we tried to keep to re-used that we finally throw away. Because everyone always give leftovers to the salad bar, the only problem is that the salad bar is not very popular.

Léa: Any initiatives about it?

MO1: I think we should have a better overview of our food waste. Because, as an executive MO I was everyday checking the fridges of every section to know what we could re-used. However, In La Mangerie everyone is just exchange food without letting the executive chef no so you can't control it. Also, I think we should have classes or workshop to know what to do with leftovers. For example, with chicken bones you can do a broth.

Léa: The report can be either a dashboard with the major results or in detail. What would you find the most helpful and effective? How do you feel that this might help employees to reduce further food waste?

MO1: I think for the green Mo, and for the executive Mo, it is helpful to have a detailed report. I think it would be kind of a waste to have all this data, but then don't do anything with it. But then maybe have a more graphical easy way to understand it for the other MOs and PEs.

Who?	Where?	When?
MO2	Online MS Team	11/01/2021

Léa: You worked in La Mangerie kitchen this block, right? How did you experience that?

MO2: I really enjoyed La Mangerie, it was a lot of fun. We had a very nice team. I was the green MO. It was a very nice outlet to work for because we were working altogether toward a goal: setting up the lunch for 11:30.

Léa: Good to hear that you enjoyed it. I was also in La Mangerie kitchen, in pastry, we didn't have the green MO at that time. It was the first block we had the Orbisk device installed in La Mangerie kitchen. Why do you think it was installed?

MO2: I think La Mangerie is considered a big kitchen, there is a lot of guests coming every day. Therefore, it implies a lot of food waste. So, I think it is important that we understand how much we throw away. And then we can analyze: see what we order, how we can order better in the future. I think that the problem in La Mangerie is the ordering process and Orbisk could help to readjust that.

Léa: Ok, good that you mention the ordering process. What is your opinion about a device like Orbisk in a kitchen?

MO2: Well I really like it. I was the green chef, so I was responsible for the device. I really think it's a good thing to have in the kitchen. I also think it has a good location, guests can see it. Guests see it and know we work with the machine. Numerous guests ask about it, to know what it is, what does it do, why we had it. So, I think it was a good device to have in a kitchen: not only to reduce costs but also to improve the protection of the environment.

Léa: Perfect, the next question that I am interested in is How do you actually feel about kitchen food waste in La Mangerie?

MO2: From my point of view, there's a lot of room for improvement. Especially because PEs and MOs tend to make too much food. They're thinking like: "Okay, if we don't eat it, then we will find a solution or we will just throw it because it's not our money, and we don't really care about it. We just order it, and school pay for it". It doesn't really matter to them. So, yeah, I think we have a lot of food waste, way too much food waste actually.

Léa: Being more precise, Are you aware of the level and cause of food waste in La Mangerie?

MO2: Well, from my position as I explained green chef position, this was something I really focused on. So I was aware of it. But I'm sure that my fellow MOs, and especially PEs were not aware of it. It's because they are really focused on their own section and work. They only see their own section. If you look at one section of course it's not that much food waste, but, if you have an overview on the different sections you see that in the end, if you combine all section it's a lot. So, yeah, I think people are not even aware of it.

Léa: So you think that more explanation and information about food waste should be share within La Mangerie team?

MO2: Yeah, it was kind of my responsibility to share this information with other. However, it was very difficult as I didn't get any data from the Orbisk device. I could see the amount of waste daily because it is displayed on the screen, however, I had no access to hard data. I talked multiple time with Mr. Host and Mr. De Vos and they were also confused with the report.

Léa: Ok perfect, How did you experience working with this device?

MO2: I really enjoyed working with it. I think it was not that hard to use it. I also saw that in, for example, PEs after few hours really understood how it works. So, just taking a picture and throwing it in. It was not really that difficult. I think it's good that you don't have to touch anything, because you're working with waste and if you have to touch the screen it is not very hygienic. However, one difficulty that I saw was if a PE or MO scans the tray of food waste, then it's very common that they put the food waste tray on the green bean itself. Maybe because of laziness. And then if you do that, the Orbisk registers the food waste twice, so the data is not correct anymore. We tried to be cautious on this by saying: don't put anything on it, don't bump into it. Because it's a very sensitive device. The slightest touch is analyzed and that's something that is not always very handy because the data gets very easily incorrect.

Léa: Did you easily adopt this device in the kitchen? What could make it difficult for you to adopt/ accept Orbisk?

MO2: I think I did actually easily accepted it. Yeah, I think I adopted quite easily. It was like becoming a habit, just to go there and throw the food waste. Other student also became use to it: separated the food waste in a tray and then walk to the Orbis once every an hour. Something very usual for them. I also did binbag checks to see how people separate food and then what I really saw is that food waste was well separated.

Léa: Yes I saw the binbag checks picture it was such a great initiatives. I really like the idea and I think it can push student to properly use Orbisk. What could make your use of Orbisk easier?

MO2: I tried in the beginning to get the data and motivate people with that saying like: "okay guys we now have 60 kilos of food waste let's try to get that below 30 kilos in the end of the week". We could form it as our goal. But that was very difficult because I didn't really know where the waste was coming from. So it was less meaningful for everyone, they were like going for a little while to the machine, throw the food and come back. Some kind of a mini break for them to have a relaxing moment so that kind of helps.

Léa: Ok, I can understand this little break. Did Orbisk have an effect on you wasting less food? in which way?

MO2: Yeah, what I liked was when I saw the tray, I looked at the different components on a tray and I was always thinking okay yes we see this now as waste what can we do with it, what can we do differently. It made me reflect on food waste. I don't know if you are aware of the worm project we'd have at school. It's a container in the garden where worms live and then you can throw your food waste. They eat it and it turns to very good compost. So we re-used the waste to create new life, it was forming flowers and helping the nature.

Léa: Super nice! I didn't know we had this in our garden. So many new environmental initiative at HTH. It is good to hear all of that. What could increase your motivation to use Orbisk to reducing food waste?

MO2: I think it is good at the moment, I was really motivated to use it as the food waste and protection of the environment are really important to me.

Léa: More technics here, In your opinion, what are critical success factors of AI technology (like Orbisk) to reduce further kitchen FW?

MO2: As I said the sensitivity is a problem right now. But I think that the design was good, small and looking good. People were really attracted by the design as a state of the art technology. And easy to use, the green bin fits perfectly and easy steps to follow.

Léa: As you can imagine, to gain the advantages of a device like Orbisk to reduce food waste, it is important that it is used correctly. Currently, we have a Green chef, a video SOP and a visual SOP to explain its usage. Are there other ways/modes of communication that you think would improve the correct use of this device?

MO2: Well, maybe you can use the screen of the device itself to make more interaction. Every time you scan something it also automatically shows like what you should do now You will automatically look at a screen because you want to see the picture you made that's something I think that just goes automatically so why not using this screen to motivate and show the correct use of it. If for example you divide the screen into parts and then see like on the top part, the picture and on the bottom part something "be careful Don't put your tray on the green bin and throw it in like this" or something like that. You can use the screen for the a lot of purposes for extra interaction.

Léa: As you might have seen, I spent some time in the kitchen before the lockdown, more specifically to understand how the Orbisk device is being used. I noticed that while the device was used correctly, it came to my attention that several students also struggled with following the correct procedures and thus e.g., Multiple pictures were taken, mixed ingredients were presented to Orbisk, no picture were taken but food was still discarded…. Why do you think that is? How do you think we can improve this?

MO2: Regarding the students, I think that's a bit of carelessness. For example, not taking the picture some students maybe were like "okay well we don't really care about it". And I think a big problem is the multiple picture taken. Sometimes you put the tray under it, and it doesn't really do anything and then you're like, you get a tray away and then it takes a picture, and then put the tray again. It is a continuous process of taking three or four pictures at the same moment. I can imagine it was an error of the machine but it can also of course a human error. They should actually do a message showing that it works. Maybe a message like five seconds on the screen and then wait five seconds before the next picture can be taken, you know. People actually see a result of what they did.

Léa: As the researcher I had access to this report. After analysing the Orbisk report displaying the Food waste flow of la Mangerie, it was shown that most waste happen in Thursday and Friday, what do you think causes this large amount of FW? In your opinion, what can be done about it?

MO2: Monday and Tuesday, we have a main menu. Then on Wednesday or Thursday we have another menu. And, on Friday we have leftover day. Thursday the second menu ends so leftovers that can't be use on Friday are thrown away. On Friday, you have to throw away the food that's left over because we can't store it any longer.

Léa: what do you think can be done about this?

MO2: Yeah, need more efficient ordering. Because if you order more efficiently if you really look what is expected to sell this day, really look at forecasting. You don't really have the problem of throwing too much food away, I would say. But you need to have access to the report to do that.

Léa: This report has not yet been shared with students. Do you feel that it would be helpful? in which way ?

MO2: Yeah, we should definitely have it at least the green MO and executive chef should have it. And then we should make it like a daily part of the meeting with the MOs and share our food watse flow. To let people know what is going on. People will then know why Orbisk is there. I think it's not that hard just talk about it three minutes and then you're done.

Léa: More specificity about the report. The report can be either a dashboard with the major results or in detail. What would you find the most helpful and effective? How do you feel that this might help employees to reduce further food waste?

MO2: I think for the executive chef or green chef, the more detailed data is important because then we really can analyze to know more. Then, I think for MOs it's good to have this easy overview to let them know what is happening.

Who?	Where?	When?
MO3	Online MS Team	12/01/2021

Léa: You worked in La Mangerie kitchen this block, right? How did you experience that?
MO3: I loved it. The instructors are amazing, and I learned a lot. Really felt like I developed my leadership skills as well and got to know myself as a leader. I also really enjoyed the team we had.

Léa: That is really It was the first block we had the Orbisk device installed in La Mangerie kitchen. Why do you think it was installed?
MO3: I believe to reduce and control our food waste

Léa: yes that is correct, so What is your opinion about a device like Orbisk in a kitchen?
MO3: Very useful and not complicated to use. You can with your tray take a picture throw the food and leave. And I think it is a good initiatives to reduce food waste, it's important.

Léa: Ok that is good to hear. How do you actually feel about kitchen food waste in La Mangerie?
MO3: It's a shame that on a school like hotelschool the hague were sustainability is a key aspect of our education we still have so much food waste. We throw a lot everyday and I don't think we are doing a lot about it.

Léa: Ok, I take note of that. Are you aware of the level and cause of food waste in La Mangerie?
MO3: Since I worked there I am, before not. I mean I was seeing the trays with all the food in every section which made me realized the amount of food waste we do.

Léa: Would you like to be more informed about it? Why?
MO3: yes, we need to know that in order to reduce our food waste. If you don't know you can improve and you don't have objectives.

Léa: How did you experience working with this device?
MO3: I personally did not work with it a lot since I was executive Chef but the few times I used it I was surprised how easy it was. And you also stay at the machine just few second and you don't have much to do. Super efficient I think.

Léa: Ok good to hear that you found it efficient. Did you easily adopt this device in the kitchen? What could make it difficult for you to adopt/ accept Orbisk?
MO3: Nothing, it is already very easy to use. So you can adopt it pretty quickly, it is just a concern of getting used to put in the tray and go to the machine. But that is not a lot of effort.

Léa: Ok, good. The next question is What made your experience easy? What made it difficult? Why?
MO3: Everything is automated which makes it easy. I can't think about anything to make it easier. And to be honest I haven't heard anything massive difficulties with it.

Léa: Ok, perfect. Did Orbisk have an effect on you wasting less food?
MO3: Mmmh as I said I didn't use it much, so it didn't have much effect on wasting less food. But I realized working in La Mangerie that we were wasting a lot and that was done thanks to the tray with food waste for Orbisk.

Léa: What would enable you to reduce food waste in La Mangerie? What is the role of Orbisk in this?

MO3: Better communication with MO's of that week. Green Chef should be more involved. Talk about food waste every day, update other MO's, make everyone aware of the importance of reducing food waste, aware of the importance of Orbisk, and share number and results.

Léa: Ok that are great ideas. I liked the fact that you had a green MO that wasn't the case during my practical time at Hotelschool. So, What could increase your motivation to use Orbisk to reducing food waste?

MO3: Make the effects visible or at least share the results. We didn't know if we were doing good or not compare to the other week or the other group. So more information and data.

Léa. A bit more technics here, In your opinion, what are critical success factors of AI technology (like Orbisk) to reduce further kitchen FW?

MO3: It's very easy to make use of, which is a factor that I really like. So user friendly.

Léa: As you can imagine, to gain the advantages of a device like Orbisk to reduce food waste, it is important that it is used correctly. Currently, we have a Green chef, a video SOP and a visual SOP to explain its usage. Are there other ways/modes of communication that you think would improve the correct use of this device?

MO3: Well first of all, the green chef's weren't always 100% motivated to execute their task, start with finding the right people. Second, as mentioned above, there must be better communication with the green MO and the MO's in their turn need to inform their PE's on a daily base or at least a few times a week about the developments of food waste. More communication is needed, we didn't talk about food waste a lot.

Léa: As you might have seen, I spent some time in the kitchen before the lockdown, more specifically to understand how the Orbisk device is being used. I noticed that while the device was used correctly, it came to my attention that several students also struggled with following the correct procedures and thus e.g., Multiple pictures were taken, mixed ingredients were presented to Orbisk, no picture were taken but food was still discarded…. Why do you think that is? How do you think we can improve this?

MO3: At the beginning of the week, when the MO's make a round though the kitchen with their PE's to show them around, they stop at the Orbisk and show everyone how it is correctly done. I think really showing it face to face is better than SOP. At least the PE are really listening to you hopefully.

Léa: As you have seen, Orbisk has a screen displaying neutral information including the latest picture taken and the total waste generated so far. What would you like to see displayed on this screen to enhance your performance in reducing food waste?

MO3: **Nothing, this is enough I think. You have to keep it simple not to overwhelm people with information.**

Léa: As the researcher I was able to have access to Orbisk report. After analysing the Orbisk report displaying the Food waste flow of la Mangerie, it was shown that most waste happen in Thursday and Friday, what do you think causes this large amount of FW? In your opinion, what can be done about it?

MO3: Well Thursday is when you throw all the food from Monday Tuesday which are with another menu. And Friday it is the leftover day, so you just throw everything that is left. As well, Mo's not as strict as at the beginning of the week.

Léa: This report has not yet been shared with students. Do you feel that it would be helpful?

MO3: No, I don't think that a lot of students would look at it. Maybe think about a reward system or try to make it their problem as well. We live in a demand society. People don't do anything for nothing. So It would just be helpful to talk about it and show the problem of food waste in an efficient way.

Léa: Do you think the executive chef or/and green MO should maybe aware of this report?

MO3: I think the green MO for sure, he is here for that. But as the executive chef we already have a lot of extra task so having this on top would be a lot. It can make us confused I think personally.

Léa: Ok, I see your point of view. I can understand that executive MO it is a bit overwhelming. Again a question on the report, the report can be either a dashboard with the major results or in detail. What would you find the most helpful and effective? How do you feel that this might help employees to reduce further food waste?

MO3: Keep it simple, dashboard with major results is a good idea. In kitchen you are here to cook and other things need to be easy and quick.

Who?	Where?	When?
MO4	Online MS Team	12/01/2021

Léa: You worked in La Mangerie kitchen this block, right? How did you experience that?
MO4: Yeah, I enjoyed it and along the way I got to know the other MO and tudents of hotelschool. Because I am a fast track student, I didn't really know anyone at school. So I needed some time as an MO to figure out how everything worked, the equipment and everything. At first, it was challenging to work. First I came in and of course I didn't know what it was to be a PE as I am a fast track student. So, I really didn't have any expectations. To be honest, I was really lost in the first week, I figured out how it works and it was fine. And I got some feedback and I was doing alright so it was nice. And I liked being the Sandwich and soup MO.

Léa: Ok, good to hear. I was also a MO and had a lot of fun. It was the first block we had the Orbisk device installed in La Mangerie kitchen. Why do you think it was installed?
MO4: I think to know how much food waste we are making and to be aware of it. Because normally you just throw it away in a normal bin. And now with Orbisk you see how much is going there.

Léa: Yes you are right. So, What is your opinion about a device like Orbisk in a kitchen?
MO4: I think it's really good. I think it's really an eye opener also for the students, Mos and Pes. Because we really throw it away easily like on an apple oh it's not good. But you can always use some food waste for another purpose. You can use for a lot of things. Again, so I think it's really good eye opener for all the students and for me as well from how much food you throw away.

Léa: How do you actually feel about kitchen food waste in La Mangerie?
MO4: I've never worked in a kitchen before so I don't have the comparison. But I feel like Orbisk is really helping with the food waste. Because if I have a lot of left overs instructors will always put it in in a soup or they will implement it somewhere else. So, I don't have a comparison point of it but I think I've managed it quite well. We used the machine quite often.

Léa: Are you aware of the level and cause of food waste in La Mangerie?
MO4: So we didn't get any information from instructor or from school on the food waste and the results of Orbisk. We had a green chef, and they explained why we had it. The green MO also explained how to use the machine and did bigbags check. I think these initiatives are good.

Léa: Yes, ive hear about the bigbag check really interesting. Next question is Would you like to be informed about it?
MO4: I'm not sure about the numbers because I think PEs receive already a lot of information. Maybe it's nice to know what they do with the food waste from Orbisk and what is our goal with it.

Léa: Ok perfect, How did you experience working with this device?
MO4: Oh, it was really easy, easy because what we just put one bucket in the sectionand we put everything in there. And then, like, after a couple of hours or when it's full we just scan it and then throw it in there. So, it's really easy to use. I heard only some feedback about the smells during the service. Yeah, because it was open and you can't close it, I believe. But yeah, it was really easy to use.

Léa: Did you easily adopt this device in the kitchen?
MO4: It was easy to actually adopt it because normally you'd throw it away but now we would get everything in one bucket and then we just throw it away so it was a small walk through so was easy for us to implement.

Léa: What could make it difficult for you to adopt/ accept Orbisk?
MO4: Well I think if you're used to throwing away food like in normal beans, then sometimes can be quite hard to think of oh now we have a separate bin for it. But, yeah, as long as you tell us on Monday morning. Okay, we have this new device, you use it like this and we use it for this.

Léa: Ok perfect, What made it difficult? Why?
MO4: I didn't have a difficulties with it but I heard that some people are taking multiple pictures. But no, I didn't have any problems with Orbisk never.

Léa: So related to this, What could make your use of Orbisk easier?
MO4: Oh, that's a good question. I don't know, I mean, I think, maybe like the green MO do a presentation every Monday morning. Also why we have it, because now we know we throw it away in there but not what's good, what gets done with food waste. I think that's all, maybe to raise more awareness.

Léa: Ok good to know. Next question is Did Orbisk have an effect on you wasting less food? in which way?
MO4: Yeah, for sure because ive never worked in a kitchen before. And with Orbisk and the help of instructors we knew about using waste for the soup or for another dish. So It really opened my eyes as well and also for PE. In the sense that you know how much you throw away. And seeing everything in the tray help you to realize your food waste as well.

Léa: Good to hear. What could increase your motivation to use Orbisk to reducing food waste?
MO4: I think what's getting done with food waste, because now we throw it in there and we really don't know what's happening. And also what are they doing with the pictures.

Léa: ok fair enough. A bit more technics here, in your opinion, what are critical success factors of AI technology (like Orbisk) to reduce further kitchen FW?
MO4: Well I think it was easy to use and that is the most important I think. But also we had problems with the smell so maybe something with its location and if we could be able to close the lid.

Léa: Ok good, As you can imagine, to gain the advantages of a device like Orbisk to reduce food waste, it is important that it is used correctly. Currently, we have a Green chef, a video SOP and a visual SOP to explain its usage. Are there other ways/modes of communication that you think would improve the correct use of this device?
MO4: I think it would have been nice for the PE to have a presentation, maybe on Monday morning to explain why, how you use it instead of the MOs telling them. Because most of us didn't know everything. So, yeah, it was already a suggestion to our green MO.

Léa: ok that is a good idea thank you. As you might have seen, I spent some time in the kitchen before the lockdown, more specifically to understand how the Orbisk device is being used. I noticed that while the device was used correctly, it came to my attention that several students also struggled with following the correct procedures and thus e.g., Multiple pictures were taken, mixed ingredients were presented to Orbisk, no picture were taken but food was still discarded…. Why do you think that is? How do you think we can improve this?

MO4: I didn't have any difficulties, but I think just not enough information, or maybe the Green mo could have for example explain like you scan it like this, and then you throw the food like this. So more explanation is needed.

Léa: Ok, I take note of that. As you have seen, Orbisk has a screen displaying neutral information including the latest picture taken and the total waste generated so far. What would you like to see displayed on this screen to enhance your performance in reducing food waste?

MO4: Maybe it's nice to see like how much you put in there, like the grams, maybe so you are aware how much during the day you waste. Because you see the food waste in your bucket, but you don't know how much it is. So maybe that's nice to also see like the grams, how much you throw away, and maybe make it more fun and interactive. Like a fun fact about food waste or something.

Léa: yes that is a great idea actually. So as a research I had access to Orbisk report. After analysing the Orbisk report displaying the Food waste flow of la Mangerie, it was shown that most waste happen in Thursday and Friday, what do you think causes this large amount of FW?

MO4: Well, on Friday is leftover day. So, if you have leftovers at the end of the day you throw it away I think that's why. And on Thursday in my experience is the busiest day. So now you also produce more foods. And of course, throw away more foods. So I think that's why. I'm guessing.

Léa: Ok good, I understand now. And In your opinion, what can be done about it?

MO4: I don't know actually, because you need to produce food for everyone. I do not have ideas for that.

Léa: ok that is fine. Regarding the Orbisk report, This report has not yet been shared with students. Do you feel that it would be helpful? in which way ?

MO4: I think as an MO and PE you're already quite busy so I wouldn't say share it to everyone. But maybe we have an mo meeting every two or three o'clock, maybe the Green MO can share the big number with us. And it make a challenge with the other MO group to make it more fun. So we'll be like improving our goals, objectives regarding food waste.

Léa: oh yeah that is a good idea to also keep everyone motivated. Again on the report, The report can be either a dashboard with the major results or in detail. What would you find the most helpful and effective? How do you feel that this might help employees to reduce further food waste?

MO4: I think for MOs big numbers, because we're not use to the report and we don't really understand the report, you know. So we are gonna see a lot of numbers and don't know what to do with it. But if you see like the graphs and it will be more efficient. Maybe green Mo and Executive can have the more detailed report.

Who?	Where?	When?
MO5	Online MS Team	12/01/2021

Léa: You worked in La Mangerie kitchen this block, right? How did you experience that?
MO5: Yes, I was MO. I really liked it because you get to interact with all the students that come for lunch, the student from other year. And I think it was a nice team, I get to know the other MOs pretty well.

Léa: Yes, I was also an MO in La mangerie, pastry section. I also had a lot of fun and I agree with you, you meet a lot of people. It was the first block we had the Orbisk device installed in La Mangerie kitchen. Why do you think it was installed?
MO5: Ah nice to hear that were also an MO. I think Orbisk was used to keep track of how much waste we produce in La Mangerie. But we didn't receive that much information about the machine itself.

Léa: Ok, I take note of that. What is your opinion about a device like Orbisk in a kitchen?
MO5: I think in theory it is a great device, it is easy and a new technology in a kitchen. But I actually don't know if we used it correctly.

Léa: So if I understand correctly you were missing information about the machine and its results?
MO5: Yes, we didn't really talk about the machine with MOs, intructors or PEs.

Léa: ok, the next question is How do you actually feel about kitchen food waste in La Mangerie?
MO5: I personally feel like we waste too much. Because I was the salad section I would get about 6kg of bread per week at least dumped my way to make croutons because other people couldn't estimate well enough. So I cant even imagine how much waste there is overall. And I also think that everyone gives everything to the salad bar but we can't use everything.

Léa: Yes, I understand what you mean. Are you aware of the level and cause of food waste in La Mangerie?
MO5: To some extent like I knew and could see in my section the food waste that we had. But I have no idea about the other sections. So to be honest I don't have much information on the level and cause in general in mangerie.

Léa: ok, that is unfortunate. Would you like to be informed about it?
MO5: Yes I would like to know how much and of what we waste so we can reduce it. Through email for example as an MO it could go in the handover email at the end of the day so the section can be careful. And maybe in the MO meetings so we can discuss together.

Léa: Ok, the next question is How did you experience working with this device?
MO5: I used it every time but I never really got any of the info, like the result I mean. So I thought it was easy to use but why do we use it, what is the result you know.

Léa: Yes I understand your point of view. Did you easily adopt this device in the kitchen?
MO5: It was easy for me to walk over to the orbisk instead of just the normal green bin so I didn't really see the difference in effort. It was easy to adapt not too many changes. And I think changes are what people are afraid of.

Léa: Yes, you are correct I also think that changes can make a technology adoption more difficult. What could make your use of Orbisk easier?

MO5: I would say place more than one then you don't have a lot of people walking around. But I can imagine that is expensive. And also not in the service area because Orbisk was place not far away from the cashier and sometimes people complaint that it was smelling bad.

Léa: Yes, I can imagine. Next question is Did Orbisk have an effect on you wasting less food?

MO5: No because I never saw any numbers so I don't know if what we did was good or not. And overall I already try to watch out with food waste as much as I can. Like in my daily life.

Léa: That is good to hear that you are being careful. What would enable you to reduce food waste in La Mangerie? What is the role of Orbisk in this?

MO5: well I think for is to Knowing what is being wasted. Orbisk takes pictures so we could find out. We need to understand where the waste is coming from to actually reduce it.

Léa: Ok, What could increase your motivation to use Orbisk to reducing food waste?

MO5: Same as before. Knowing the information. Then we can create goals and objectives and stay motivated, and move forward as a team.

Léa: A bit more technics here, In your opinion, what are critical success factors of AI technology (like Orbisk) to reduce further kitchen FW?

MO5: That a bit difficult I don't really know what you mean here.

Léa: I mean like what is important in the technology to reduc food waste, the design, easiness, interaction with others. This type of factors.

MO5: I see, I think easiness. Working in the kitchen, everything is fast you need to be quick so you need to quickly understand how the machine work and you shouldn't spend too much time in front of it.

Léa: Ok, nice point. As you can imagine, to gain the advantages of a device like Orbisk to reduce food waste, it is important that it is used correctly. Currently, we have a Green chef, a video SOP and a visual SOP to explain its usage. Are there other ways/modes of communication that you think would improve the correct use of this device?

MO5: I think PE's should be informed in person through a demonstration or presentation. Because some students are lazy to read it I think. So it needs to be a face-to-face explanation to make them listen to it.

Léa: As you might have seen, I spent some time in the kitchen before the lockdown, more specifically to understand how the Orbisk device is being used. I noticed that while the device was used correctly, it came to my attention that several students also struggled with following the correct procedures and thus e.g., Multiple pictures were taken, mixed ingredients were presented to Orbisk, no picture were taken but food was still discarded…. Why do you think that is? How do you think we can improve this?

MO5: We didn't know we couldn't mix. For example for salad it's impossible not to mix things. And I think there were machine and human errors, but you can't always be perfect.

Léa: Yes, the more the ingredients are separated the easier for Orbisk it is to recognize them. As you have seen, Orbisk has a screen displaying neutral information including the latest picture taken and the total waste generated so far. What would you like to see displayed on this screen to enhance your performance in reducing food waste?

MO5: The amount of kilos in total displayed bigger. It was so small that no one probably looked at the total waste per day. It was too simple in my opinion.

Léa: Ok, I will take note of that. After analysing the Orbisk report displaying the Food waste flow of la Mangerie, it was shown that most waste happen in Thursday and Friday, what do you think causes this large amount of FW? In your opinion, what can be done about it?

MO5: Because Friday you have to throw everything away because you can't keep it over the week. On Thursday things from Monday will no longer be good so that is thrown out too.

Léa: Ok I understand better know. Question again related to the report, This report has not yet been shared with students. Do you feel that it would be helpful? in which way ?

MO5: Yes, Otherwise we there's no point in us doing it if we don't know what info is coming out of it. I would like to understand what is going in La Mangerie regarding food waste because we do waste a lot.

Léa: In which way do you think it should be shared?

MO5: During the meeting a printed version, and on Friday maybe we can all take a look at it and discuss how to improve in the future or set goals.

Léa: Ok, that is a good solution. Last question it is, The report can be either a dashboard with the major results or in detail. What would you find the most helpful and effective? How do you feel that this might help employees to reduce further food waste?

MO5: I would like to see both, so that if Im interested in a specific thing I can look further into it.

Who?	Where?	When?
MO6	Online MS Team	12/01/2021

Léa: First question, You worked in La Mangerie kitchen this block, right? How did you experience that?
MO6: I really enjoyed working in the kitchen and being an MO. I had a lot of responsabilities and enjoy working with the PEs. But it was also a lot of pressure and really dynamic.

Léa: good to hear, I was also an MO in Mangerie. It was the first block we had the Orbisk device installed in La Mangerie kitchen. Why do you think it was installed?
MO6: Well I think to make sure there will be less food waste. Also, to monitor all the food waste in the kitchen of La Mangerie.

Léa: Yes you are correct. What is your opinion about a device like Orbisk in a kitchen?
MO6: I liked it, it is new and I think efficient.

Léa: Could you explain a little bit more?
MO6: Well, I thought it was easy to use, take a picture and throw the food away. You spend really few minutes at the machine. And I also think it is nice to have technology in the kitchen, it's unusual.

Léa: Ok, great. How do you actually feel about kitchen food waste in La Mangerie?
MO6: I think we are being aware of what we trough away, however I do also think there is still a lot of waste regarding plastic mostly. Like with orbisk you see what you throw away in your tray so you can see if it is a lot or not. And I think it is sad to throw that much, we should do something about it.

Léa: Ok, next question will be Are you aware of the level and cause of food waste in La Mangerie?
MO6: No, when I think about it actually we do not receive any information on that. Like for example we don't have numbers on how may we waste and where is it coming from, like which section waste the most.

Léa: Ok, so if I understand correctly you are missing information. Would you like to be informed about it? why and how? Or why not?
MO6: If I work in La Mangerie kitchen as an MO yes, otherwise as a normal student I would prefer not since I will be busy with other things. I will read the information but not take much initiatives to do something about it.

Léa: As an MO, it would be important then?
MO6: Yes, to control my section better. And communicate with my PE where they can improve. But I think we need to have clear explanation on it to share it efficiently.

Léa: Ok, I see your point of view. So, How did you experience working with this device?
MO6: It works good and it is easy to use. You spend few minutes at the machine, so I like it. You don't waste time.

Léa: Ok, that is good to hear. Did you easily adopt this device in the kitchen? What could make it difficult for you to adopt/ accept Orbisk?
MO6: It was very easy for everyone to adopt this device I think. At least, PEs didn't ask much questions about it. I found it just weird that we didn't receive much information about it, why do we have it, what do we want to do with it, why is it exactly. This kind of things.

Léa: So you were missing information on the device and its purpose. Ok, I understand. The next question is What made your experience easy? What made it difficult? Why?
MO6: the experience was easy because all the butons on the device are clear and easy to use. Like you don't have that much to do everything is authomatic. But I think if I remember correctly hearing the green MO that we had issue with the machine because people were put the tray on the bin and not you know under the camera. He said it was change the data and weight of food waste.

Léa: Yes, Friso told me about it, I had a call with him yesterday. So, What could make your use of Orbisk easier?
MO6: well I think for me it is already very easy to use. Just a better explanation about how to use the machine to everyone at the beginning of every week would be nice.

Léa: Ok, yes that is a solution. Now, Did Orbisk have an effect on you wasting less food? in which way?
MO6: yes, I think so. Since you have to make pictures, you actually look at your waste twice. Like you look in your tray so it has an effect you know and then you see again the picture of it on the machine, so double effect.

Léa: So you think that the picture has a good effect you individual using the machine?
MO6: yes I think. Visuals are important to make an impact on people.

Léa: What would enable you to reduce food waste in La Mangerie? What is the role of Orbisk in this?
MO6: I think as I said earlier the pictures it makes help to reduce food waste, so everyone can look back into what the food waste they made. And you can realize oh it is a lot I should reduce it. Maybe Orbisk should show all the pictures of everyone. Because now people just know their waste in their section. The waste they are doing.

Léa: Ok, so What could increase your motivation to use Orbisk to reducing food waste?
MO6: I don't know to be honest. It is already an easy machine so I think we just have to make it as an habit. Then you don't need motivation you just do it.

Léa: Ok, I understand your point of view. A bit more technic here. In your opinion, what are critical success factors of AI technology (like Orbisk) to reduce further kitchen FW?
MO6: I think for me easy to use. In the kitchen you don't have a lot of time so it needs to be quick.

Léa: Yes I understand that is true that in the kitchen everything is fast. As you can imagine, to gain the advantages of a device like Orbisk to reduce food waste, it is important that it is used correctly. Currently, we have a Green chef, a video SOP and a visual SOP to explain its usage. Are there other ways/modes of communication that you think would improve the correct use of this device?
MO6: Not that I could think of at the moment. I mean a video and two SOPs it is already a lot. You don't want to overwhelmed people with information you know. PEs already have to learn every week new things in different outlet so you need to keep it simple you know.

Léa: Yes, I see what you mean. As you might have seen, I spent some time in the kitchen before the lockdown, more specifically to understand how the Orbisk device is being used. I noticed that while the device was used correctly, it came to my attention that several students also struggled with following the correct procedures and thus e.g., Multiple pictures were taken, mixed ingredients were presented to Orbisk, no picture were taken but food was still discarded…. Why do you think that is? How do you think we can improve this?

MO6: Because it is still a new system. So, the combination of people using it and the device is still new for everyone. That why we are making mistake, so I think we had human mistake and machine mistake. Also sometimes student are lazy to do something if MOs or instructors are not around. It is sad I know but everyone is doing it.

Léa: I see what you mean As you have seen, Orbisk has a screen displaying neutral information including the latest picture taken and the total waste generated so far. What would you like to see displayed on this screen to enhance your performance in reducing food waste?

MO6: **I think right now it is ok. Not too much information. So Leave it like this. It is structured and clear in this way.**

Léa: Ok, nice to hear that you enjoy the efficient and easiness of the machine. As a researcher I have access to Orbisk report. Next question is After analysing the Orbisk report displaying the Food waste flow of la Mangerie, it was shown that most waste happen in Thursday and Friday, what do you think causes this large amount of FW?

MO6: I think it is because Thursday it is the end of the second menu of the week. So everything that you didn't use and don't want to keep for Friday you throw away. And Friday, is left over day and the last day of the week in La Mangerie. So everything that was not used is throw away.

Léa: ok I understand that better now. And, In your opinion, what can be done about it?

MO6: Mmmmh that is difficult we already do this leftover day on Friday. And I think that student don't really want to come and take takeaway back with leftover food on Friday night when mangerie is closed. You know you don't want to eat always the same. So I don't really know.

Léa: Yes I understand what you mean. This report has not yet been shared with students. Do you feel that it would be helpful? in which way ? or No, why not?

MO6: Mmmmh again I had no information on this report. As mos we didn't received anything about it. I didn't really thought about it but actually when I think now it would have been nice to know what was going on in the kitchen. I think maybe sharing it in the daily MO meeting would be nice but we talk about so many things already.

Léa: Yes, the meeting could be a solution. And another question related to the report, The report can be either a dashboard with the major results or in detail. What would you find the most helpful and effective? How do you feel that this might help employees to reduce further food waste?

MO6: I think green chef should have the detailed report and the other MOs main data. We already have a lot of information every day, ordering, planning, menu so it would be too much information I think.

Who?	Where?	When?
MO7	Online MS Team	13/01/2021

Léa: You worked as an MO in La Mangerie kitchen this block, right? How did you experience that?

MO7: My experience in La Mangerie was very good. I have learned a lot working in the Pastry section and working together with the instructors, MO's and PE's. It was really intense, a lot of work, a lot of responsibilities but overall a really good learning experience.

Léa: Ok perfect that is good to hear, I was also MO in La Mangerie Pastry and I had a lot of fun as well. But a lot of pressure. It was the first block we had the Orbisk device installed in La Mangerie kitchen. Why do you think it was installed?

MO7: They told us the device was installed to reduce waste in the Mangerie which I think is a great idea. However, I do think we were missing information about it. I would have like to know more about it: how to use it, what it is, why do we have it.

Léa: Yes you are correct. What is your opinion about a device like Orbisk in a kitchen?

MO7: It was still in the first phase of implementation in my opinion meaning it was a new device and no one really knew how to use it, why we have it, the results of the device, what it is exactly which made it sometimes easy to forget about it. Moreover, it was not in our system. However, we got used to it and the PE's as well. With more practices, we were used to using it.

Léa: If I understand correctly you were missing information. How do you actually feel about kitchen food waste in La Mangerie?

MO7: I think there is a ridiculous amount of waste in the Mangerie so I really like this initiative of the Orbisk in the Mangerie. I think a lot of student do not know about food enough and just throw away when it looks unusual or when they do not know what to do with the food. So, Instructors and MO's can pay attention to waste, but if the PE's do not do it you still have a big waste amount as they are the one mainly cooking and preparing food.

Léa: So, you are saying that a lot of student do not know about food waste. Are you, as an MO, aware of the level and cause of food waste in La Mangerie?

MO7: Yes I am. We have learned about it this block thanks to Orbisk and the green chef and we have been talking with instructors about dishes we can make out of waste from other sections which is very interesting.

Léa: Ok, that is good to hear. Would you like to be informed about the level of food waste and its cause? why and how?

MO7: Yes, I think if the MOs are aware of the food waste in every section we can take initiatives to reduce it with our PEs. I also think it make us think twice when we create our recipe, to think: are people going to buy this dishes a lot, are we using too many ingredients, how can we re-used ingredients… I also think that to understand the real usage of Orbisk we need to have access to the level and cause of our food waste flow.

Léa: So if I understand correctly you are saying that you need to have more information on what is going on with your waste. So, How did you experience working with this device?

MO7: It is easy to use, furthermore two SOPs were placed next to the machine. Its location in the Mangerie was very good and easily accessible for the kitchen team. However, the service team was not very happy with it as it was in the middle of la Mangerie, close to the clients and sometimes smelly. The service team closed it or removed it couples of time which led to errors in the system.

Léa: What type of errors?
MO7: If they were moving it or closing the top part, the weight registration was fluctuating.

Léa: Ok, I will take note of that. Did you easily adopt this device in the kitchen? What could make it difficult for you to adopt/ accept Orbisk?
MO7: After two days I was used to it. However, as the PE's mostly do the cooking, they are the one that must to it. I saw that the PE's in my section (pastry) and the sandwich section threw everything in there as it was very close to our section. However, the PE's from the sections a bit further (salad, grill) did not always used Orbisk.

Léa: So if I hear correctly, not all sections were using Orbisk for their FW. Where were they putting their waste then?
MO7: In other bins or directly put on the dishwasher trolley.

Léa: Oh I see. The next question will be What made your experience easy? What made it difficult? Why?
MO7: It is very easy to use. You hold it, it takes a picture and you throw it in. I did not encounter any issue with it.

Léa: And What could make your use of Orbisk easier?
MO7: Maybe some interaction or explanation on the screen would make it easier. Then you don't have to look at the SOPs. And more explanation about it.

Léa: Did Orbisk have an effect on you wasting less food? in which way?
MO7: Yes, definitely! We threw way less into the orbisk that we would before as you can actually see your waste in the tray. You realize on the spot how much you waste and what do you waste. Furthermore, as there is a report at the end you need to be even more careful. We thought of how we could use food again or how other sections can make something out of it.

Léa: What would enable you to reduce food waste in La Mangerie? What is the role of Orbisk in this?
MO7: It shows you how much you throw away. In the pastry section we made a list of what we threw away and how much kg's it was. I gave my PE's the task to let them think about who could use our waste before we threw it away. At the end of the day, we counted the waste and we tried to reduce it de day after. So we had the information because we were counting ourself, however, we never receive any results from Orbisk on how food waste level.

Léa: More on motivation, What could increase your motivation to use Orbisk to reducing food waste?
MO7: Rewards for the PE's who come with the best ideas for reducing food with the Orbisk device. I think the motivation with the MO's is good enough but the PE's can still use some motivation to use the device correctly and more often. Additionnaly, if we see our results and our improvement on reducing food waste we could gain motivation.

Léa: A more technique question, In your opinion, what are critical success factors of AI technology (like Orbisk) to reduce further kitchen FW?
MO7: I think: user-friendly, it needs to be easy to use; good explanation on how it work and what type of technology it is; and more interaction with the user.

Léa: As you can imagine, to gain the advantages of a device like Orbisk to reduce food waste, it is important that it is used correctly. Currently, we have a Green chef, a video SOP and a visual SOP to explain its usage. Are there other ways/modes of communication that you think would improve the correct use of this device?

MO7: Explain more about it to the PE and mostly the Service team. The service team caused a lot of errors in our block because they closed it or removed it from the correct spot. They did not realize it was this important for the Mangerie kitchen team.

Léa: As you might have seen, I spent some time in the kitchen before the lockdown, more specifically to understand how the Orbisk device is being used. I noticed that while the device was used correctly, it came to my attention that several students also struggled with following the correct procedures and thus e.g., Multiple pictures were taken, mixed ingredients were presented to Orbisk, no picture were taken but food was still discarded…. Why do you think that is? How do you think we can improve this?

MO7: I think this was caused because the MO's did not correctly explain to the PEs how the device works and how important it is. Maybe a class before beginning your first week as an MO can clarify more things and make the MO's more aware of how important it is.

Léa: As you have seen, Orbisk has a screen displaying neutral information including the latest picture taken and the total waste generated so far. What would you like to see displayed on this screen to enhance your performance in reducing food waste?

MO7: To be honest, I wasn't really looking at the screen as it doesn't display much. As I said more interaction, sometimes it was taking multiple picture so maybe we could choose the good one, a motivation quote after throwing food away.

Léa: Ok that is good insights. After analysing the Orbisk report displaying the Food waste flow of la Mangerie, it was shown that most waste happen in Thursday and Friday, what do you think causes this large amount of FW? In your opinion, what can be done about it?

MO7: Thursday is the end of a menu and Friday is about all the leftovers of the week are thrown away because the weekend starts and the Mangerie is closed then. I do not know how to exactly solve this, but maybe food take away bags on Friday with leftover.

Léa: The report I am talking about has not yet been shared with students. Do you feel that it would be helpful? in which way ?

MO7: Yes. To see why we did it, how to improve, show our improvement, and keep motivated about it. And also maybe show the next group of MO's who is going to work with it how efficient and important Orbisk is.

Léa: Ok perfect. More in details, The report can be either a dashboard with the major results or in detail. What would you find the most helpful and effective? How do you feel that this might help employees to reduce further food waste?

MO7: In detail. The reason for this is because I would like to see more details about what we throw away and when. The reason is also that one of my learning goals was about reducing food waste throughout my entire MO journey. In my opinion, right now we do not have any information on our food waste of the past week and if we improve on it or not. So I think sharing the report is the must to keep the motivation for both Mos and PEs.

Who?	Where?	When?
MO8	Online MS Team	13/01/2021

Léa: You worked in La Mangerie kitchen this block, right? How did you experience that?
MO8: It was a great experience but with a lot of pressure as well; So it involved a lot of planning and organization. But overall, It was a lot of fun.

Léa: Same for me I had an amazing experience as an MO in La Mangerie. But that was a long time ago. It was the first block we had the Orbisk device installed in La Mangerie kitchen. Why do you think it was installed?
MO8: In my opinion, It was installed to monitor our food waste in La Mangerie, and we could use that information to decrease future food waste and safe eventually cost of food.

Léa: Ok perfect, What is your opinion about a device like Orbisk in a kitchen?
MO8: I think it is a great start to track food waste, if we use it properly. But it was the first time I was seeing such technology in a kitchen, like an AI technology.

Léa: So on another topic, How do you actually feel about kitchen food waste in La Mangerie?
MO8: I think food waste is a big factor in the kitchen, especially when working with just students, there are not professional cooks. Teaching future leaders about that topic is an essential part of spreading awareness and making an impact on global scale. I think food waste is quite OK in the kitchen of La Mangerie, based on the fact that non-professional cooks are not trained to cut properly (in the most effective way) so the food waste is quite high- every day (except Friday) 200L bin that we had to bring down. On the other hand, important steps are being taken like a left-over day, which I think is a very important step.

Léa: One important question, Are you aware of the level and cause of food waste in La Mangerie?
MO8: I think I understand the system behind it, but nobody really informed me about it. We do not have much information on the level and cause of food waste. Also, we don't have accept to the report of the machine so how do you want use to be aware of it?

Léa: Yes, I agree with you. You should actually understand the actual situation to improve it. So, Would you like to be informed about it? why and how?-
MO8: Yes! Because then we can improve the situation. Monthly post in the Newsletter would be nice, not only to be informed but also to see the impact and to make a challenge out of it. It is always good to make things like that public.

Léa: Ok that are good ideas. How did you experience working with this device?
MO8: Well, you take a picture, the system categories the food waste, measures the weight and then, the amount of money will be calculated and historically stored. I thought it was easy but unfortunately to be honest I didn't use it much.

Léa: Did you easily adopt this device in the kitchen? What could make it difficult for you to adopt/ accept Orbisk?
MO8: I think a clear and open explanation would make it easier to adopt. Yeah that would be useful I think. Also the cause and effect of the machine would be nice to know. You need to understand what it is, why do you have it, how to use it correctly to actually adopt it. But, I adopted it easily since I am strongly advocate to systems like that. I love technology.

Léa: A bit more specific, What made your experience easy? What made it difficult? Why?
MO8: Well, I was missing a clear and in-depth explanation about how the system works and what is the impact the school wants to make. We did not have any information on that so it is nice to have a machine but you need to understand why to actually feel motivated to use it. Also it was not clear for me (as a non-Dutch student) to read the different buttons.

Léa: you mean the button on the screen?
MO8: yes it was in dutch and we are in an international school.

Léa: Ok, I do understand I am also international and do not speak dutch. I get understand that it could be frustrating using it if you do not understand. So, What could make your use of Orbisk easier?
MO8: So as I said, Buttons in English would make it easier for international students. The System is very easy and kind of self-explainable. Also we had some SOPs around the machine which helps.

Léa: Ok, good to hear that the sop were useful. Did Orbisk have an effect on you wasting less food? in which way?
MO8: Yes of course! Because it was standing at the opposite side of the kitchen, every time you have to through something away you have to go a long way, which has an psychological effect I think. Also the part of making a picture of the stuff you through away, is a psychological factor to think about food waste. You see what you waste, it is in front of you.

Léa: Yes, I understand what you mean you really see the results of your cutting or make you think twice before throwing the food. What would enable you to reduce food waste in La Mangerie? What is the role of Orbisk in this?
MO8: I think Orbisk is already a very good start. Cutting workshops for both MO`s and PE`s would be a good start to because I think we cut to much and it could be used for cooking dishes actually.

Léa: Would you say that the cooking knowledge plays a part in food waste?
MO8: yeah for sure! If you don't know what is good in an ingredients you could just throw everything away.

Léa: Ok, that is interesting. What could increase your motivation to use Orbisk to reducing food waste?
MO8: Mmmmh, I am already motivated to reduce the food waste. I think Orbisk is a very good thing.

Léa: More technics involved here, In your opinion, what are critical success factors of AI technology (like Orbisk) to reduce further kitchen FW?
MO8: To constantly use it! It can only become better by making more pictures and adding more items in the list. The more we use it the better it gets. So we need to keep our motivation and use it correctly.

Léa: Yes you are right Orbisk is a machine learning so learning with experience. As you can imagine, to gain the advantages of a device like Orbisk to reduce food waste, it is important that it is used correctly. Currently, we have a Green chef, a video SOP and a visual SOP to explain its usage. Are there other ways/modes of communication that you think would improve the correct use of this device?
MO8: Make a workshop out of it, make it public, and a competition for the MO's The MO-Team (A vs. B) with the lowest food waste wins a night in the other campuses Skotel. In Amsterdam is boring and makes no sense, the other campus, promotes going out and increases community building. I would like doing that! Make more interactive and interesting.

Léa: As you might have seen, I spent some time in the kitchen before the lockdown, more specifically to understand how the Orbisk device is being used. I noticed that while the device was used correctly, it came to my attention that several students also struggled with following the correct procedures and thus e.g., Multiple pictures were taken, mixed ingredients were presented to Orbisk, no picture were taken but food was still discarded…. Why do you think that is? How do you think we can improve this?

MO8: The System is not really introduced and has buggs, also working with a AI or also seen as computer, is often a mental border that people are scared off. I do think students were scared to use it incorrectly so they were trying to be at the machine as few minutes as possible. Maybe that is why they didn't use it correctly. It is a new device in an environment that normal do not have such technology.

Léa: Which buggs did you encounter?

MO8: The one that occurred quite often was multiple pictures taken for one tray thrown in the bin. So at one point you don't know if it worked or not. It doesn't say anything on the screen of the device.

Léa: Talking more about the design and features of the machine. As you have seen, Orbisk has a screen displaying neutral information including the latest picture taken and the total waste generated so far. What would you like to see displayed on this screen to enhance your performance in reducing food waste?

MO8: I think a picture or short movie of a big disgusting waste place. It needs to stop the student using it, to make him think about food waste twice.

Léa: So as the researcher I had access to the orbisk weekly report. After analysing the Orbisk report displaying the Food waste flow of la Mangerie, it was shown that most waste happen in Thursday and Friday, what do you think causes this large amount of FW? In your opinion, what can be done about it?

MO8: Because on Friday and Thursday all of the food, which is left from the week is thrown away. Like Thursday it is the end of the second menu of the week. So you throw away the food of Monday and Tuesday that you didn't use. And Friday, it is just throwing all the leftovers away. Because we start Monday with fresh food.

Léa: This report has not yet been shared with students. Do you feel that it would be helpful? in which way ?

MO8: Of course, like I mentioned before, make it public and share it with the students. Also, their waste should be tracked and not just thrown away by stewarding. And we don't have access to this report so we don't know how we are doing. If we should improve or just continue like this.

Léa: Talking about details, The report can be either a dashboard with the major results or in detail. What would you find the most helpful and effective? How do you feel that this might help employees to reduce further food waste?

MO8: I don't think that either more detailed or broad will change something now. Important is to share it within La Mangerie. We also need to know what do we want to achieve. Than the next step is to either go more in detail or to make it more broad depending on these goals.

Who?	Where?	When?
MO9	Online MS Team	13/01/2021

Léa: You worked in La Mangerie kitchen this block, right? How did you experience that?
MO9: Well, While it took some time to get comfortable and used to working in La Mangerie, after the third shift everything started to click together. Overall, I have learned a lot in my MO block relative to other blocks, so it has been a positive experience. Unfortunately, covid-19 outbreak happen and now it is online.

Léa: Yes, I can understand you disappointment. But I hope they make it fun for you online. Diving into our subject, It was the first block we had the Orbisk device installed in La Mangerie kitchen. Why do you think it was installed?
MO9: I think to monitor and reduce food waste in La mangerie kitchen.

Léa: First of all, What is your opinion about a device like Orbisk in a kitchen?
MO9: I think it is a great idea to reduce waste. On the other hand, I am unaware of what specific objectives we are trying to accomplish with the Orbisk. We don't have information on it. Don't know why we have it, what is our goal, what is it exactly.

Léa: How do you actually feel about kitchen food waste in La Mangerie?
MO9: Oh that is a good question! I feel like there is a lot of unnecessary waste, especially with products that require peeling or knife work like pumpkins, parmesan, etc., where we are sometimes lazy and end up wasting a lot of the product because we are not careful with peeling. There is also quite a bit of waste with leftovers, and sometimes whole trays of pasta/vegetables that are forgotten in an oven and overcooked that must then be thrown away. There is improvement to do for sure.

Léa: So if I understand correctly you really see a place for improment in La mangerie. But, are you actually aware of the level and cause of food waste in La Mangerie?
MO9: I mean that I see food being wasted and where but I don't have any numbers on it.

Léa: Ok, but Would you like to be informed about it? why and how?
MO9: Yes, receiving a weekly report with the Orbisk information would be interesting and useful to implement in my planning as an MO. Because we used the machine but we didn't know if we were good or not. If we were improving or not.

Léa: A bit more on your own experience, How did you experience working with this device?
MO9: It is straightforward and simple to use, but again, I am still unaware of the specifics of why we are using it. So you can kind of lose motivation if you don't know what you are doing.

Léa: Ok, I understand your point of view. Did you easily adopt this device in the kitchen? What could make it difficult for you to adopt/ accept Orbisk?
MO9: It is a very simple device so it was easy to adopt, and PEs had no trouble figuring out how to use the Orbisk either.

Léa: Did you presented to your PE how to use the machine?
MO9: to be honest sometimes I forgot but there were some SOPs next to the machine.

Léa: Ok so the SOPs were actually useful for the students. Now, What made your experience easy? What made it difficult? And Why?
MO9: It was nicely explained by Friso the green MO during one of our MO meetings, and the device itself is very straightforward. I don't think I had any difficulties to use it, PEs were the one mainly using it.

Léa: If you could be a bit more specific, What could make your use of Orbisk easier?
MO9: Oh yeah having Orbisks in more stations to avoid having to walk across Mangerie with trays waste, especially during service. People didn't like the smell of it, it is placed right next to the cashier where people wait to pay. So they could smell everything.

Léa: Did Orbisk have an effect on you wasting less food? in which way?
MO9: Yes, the fact that Orbisk is implemented made me a lot more conscious about my own food waste. You can actually see the waste in the tray, it is right in front of your eyes, you can't miss it.

Léa: Ok good to hear. What would enable you to reduce food waste in La Mangerie? What is the role of Orbisk in this?
MO9: Including food waste objectives in the MO rubric. Why not have a part of the rubric as part of our grade be directly tied to a specified food-waste limit. I think that could work.

Léa: The objectives is actually a good idea, I found this interesting. The next question is What could increase your motivation to use Orbisk to reducing food waste?
MO9: Making it easier to access by having at least 2-3 Orbisks spread around the kitchen. One in pastry, one in sandwich, and one in grill, for example. So you see it everywhere.

Léa: Regarding technical knowledge, In your opinion, what are critical success factors of AI technology (like Orbisk) to reduce further kitchen FW?
MO9: Ease of use, accessibility, direct tangible results in the workplace like seeing Orbisk numbers and objectives at the end of each shift. We are missing results.

Léa: As you can imagine, to gain the advantages of a device like Orbisk to reduce food waste, it is important that it is used correctly. Currently, we have a Green chef, a video SOP and a visual SOP to explain its usage. Are there other ways/modes of communication that you think would improve the correct use of this device?
MO9: I think it is sufficient otherwise I think student are gonna be overwhelmed with too many diverse explanation and get lost.

Léa: As you might have seen, I spent some time in the kitchen before the lockdown, more specifically to understand how the Orbisk device is being used. I noticed that while the device was used correctly, it came to my attention that several students also struggled with following the correct procedures and thus e.g., Multiple pictures were taken, mixed ingredients were presented to Orbisk, no picture were taken but food was still discarded…. Why do you think that is? How do you think we can improve this?
MO9: Mmmh maybe laziness. But I think giving each section a visual demonstration of how to use the Orbisk could resolve this. The green chef can take each section by groups to the Orbisk, and have each PE try out the device and ask any questions.

Léa: As you have seen, Orbisk has a screen displaying neutral information including the latest picture taken and the total waste generated so far. What would you like to see displayed on this screen to enhance your performance in reducing food waste?
MO9: Yeah I thought as well that there were not much on this screen. So I wasn't really looking at it at the end. But I would like to see how much food has already gone in the bin that day, how much was thrown away yesterday, the target amount (limit) of waste for that given today. I think we need goal to be motivated and use it correctly which is that to say.

Léa: As the researcher I had access to Orbisk report. After analysing the Orbisk report displaying the Food waste flow of la Mangerie, it was shown that most waste happen in Thursday and Friday, what do you think causes this large amount of FW? In your opinion, what can be done about it?
MO9: Thursday are usually quite busy, and the stressful shift often leads to cutting and food waste more. Also Thursday is the end of the second menu so the rest of the food is thrown away. Friday is leftovers day, so food from previous days that is still good is sometimes thrown away without real thought. And Monday it is another team so you need to clean and start with fresh ingredients.

Léa: This report has not yet been shared with students. Do you feel that it would be helpful? in which way ?
MO9: Yes, having more insight into Orbisk and food waste in general will make me more interested in thinking of ways I can reduce my own waste. And as I said we need objectives so numbers.

Léa: Yes I understand your point of view. The report can be either a dashboard with the major results or in detail. What would you find the most helpful and effective? How do you feel that this might help employees to reduce further food waste?
MO9: Why not both, Have a dashboard with easily-accessible information, and also the option to view detailed data. Then people can chose depending on their interest.

Appendix 10: Interview results

External variables

Variables influencing the efficient use of Orbisk

According to Burton-Jones et al (2006), External variables within the TAM model includes trainings and system experience. Regarding external variables influencing the efficient use of Orbisk, results shown that all interviewees agree on the lack of communication and trainings within La Mangerie with regards to Orbisk. In fact, they all mentioned that information such as how to use it and what you need to be careful about are missing *("But we didn't receive that much information about the machine itself.", Yes, we didn't really talk about the machine with MOs, instructors or PEs.").* It led to student making mistakes while using the machine. Interviewees emphasize on the need to share this information every Monday morning with the MOs and new PEs from both kitchen and service *("Explain more about it to the PE and mostly the Service team").* Solutions that come from their mind to be most efficient are workshop, personal demonstration, quizzes … every Monday *("I think every MO should just do a little tutorial on Monday morning. It should be quite straightforward.", "I think it would have been nice for the PE to have a presentation, maybe on Monday morning to explain why, how you use it instead of the MOs telling them.").* Furthermore, 2/9 interviewees express their need of a green chef more involved with Orbisk and food waste: *"the green chef's weren't always 100% motivated to execute their task", "there must be better communication with the green MO and the MO's".*

Perceived usefulness

Understanding of the purpose of Orbisk

Results shown that 7 out of 9 participants see Orbisk as a machine to track the food waste level within kitchens *("I believe to track the food waste in the restaurant, to just see how much we actually do waste or throw away", "I think to know how much food waste we are making and to be aware of it").* Only 5 out of 9 participants mentioned that the end goal of Orbisk is to reduce the food waste level *("where you can improve and reduce further our food waste", "I believe to reduce and control our food waste").* Furthermore, one interviewees mentioned that Orbisk is useful to improve the ordering process *("And then we can analyze: see what we order, how we can order better in the future. I think that the problem in La Mangerie is the ordering process and Orbisk could help to readjust that.").* To conclude, it shows that within La Mangerie individuals have a different perception on the purpose of Orbisk. The different purpose of Orbisk; monitor food waste, reducing food waste, improving ordering process and cutting cost hasn't been understood by everyone. It is of the utmost important for everyone to be align and move toward the same goal with Orbisk.

Awareness on the level and cause of food waste

Based on their personal judgement, 3/9 interviewees believe that they are aware of the food waste level and its cause within La Mangerie as they were green MOs *("from my position as I explained green chef position, this was something I really focused on. So I was aware of it.")* or focusing strongly on food waste within their section *("In the pastry section we made a list of what we threw away and how much kg's it was. At the end of the day, we counted the waste and we tried to reduce it de day after.").* Consequently, the majority of MOs, 6 out of 9 participants, were and are not aware of the food waste level and cause within their kitchen: *"we didn't get any information from instructor or from school on the food waste and the results of Orbisk.", I have no idea about the other sections. So to be honest I don't have much information on the level and cause in general in mangerie.", No, when I think about it actually we do not receive any*

information on that". It shows that most MOs were not aware of the food waste level and cause within La mangerie leading to PEs also being not aware *("especially PEs were not aware of it.")*. They mentioned that it is due to a lack of information from school and from instructors.

Furthermore, all interviewees confirmed that they would like to be aware and receive information concerning the level and cause of food waste within La Mangerie kitchen *("Yes, we must be informed to improve and stay motivated, yes, we need to know that in order to reduce our food waste., Yes I would like to know how much and of what we waste so we can reduce it.).*

Researcher proved that to reduce efficiently food waste, the origin and the cause of it need to be understood clearly. Therefore, information about the level and food waste within La Mangerie should be share as few of them are aware of it. Furthermore, they show that they would like to be aware of it as it could improve their work and the use of Orbisk.

Effect of Orbisk on wasting less food

Results shown that only 2 interviewees out of 9 wasn't affected by Orbisk to reduce their food waste. The reason is that they were not aware of any numbers and did not know what to do with their waste, thus, Orbisk did not have an effect on wasting less food for them. It is mainly due to a lack of information and knowledge. On the contrary, the majority of interviewee, 7 out of 9, mentioned that Orbisk had an effect on their food waste. 6 interviewees stated that seeing the FW in their tray had a psychological effect making them realize directly the amount of waste they were throwing away *("It does make you more aware of your waste as you see it in your tray, you kind of see how much it is in total at the end of your cooking process"," I looked at the different components on a tray (…) It made me reflect on food waste.")*. One interviewee also mentioned that it made him/her reflect on how to use this ingredients before throwing it away *("yes we see this now as waste what can we do with it, what can we do differently.")*.

To conclude, using a tray had, on the majority of interviewee, a psychological effect making them realized how much food waste they are doing and the composition of it. In fact, it is directly in front of them and taking a picture of these trays make them realize what is in it.

Screen Information

Only two interviewees said that the screen information should stay as it is right now, mentioning that it is simple and efficient *("Not too much information. So Leave it like this. It is structured and clear in this way.")*. On the contrary, the majority of interviewees, 7 out of 9, stated that the Orbisk screen should be use more efficiently in order to motivate them using the machine. 2 of them mentioned that they would like to have measuring references such as the waste of the previous day and/or the limit of waste they shouldn't go over for the day. Furthermore, 5 out of the 7, clearly explained that the screen could be used to enhance interaction with the user. They mostly mentioned to add on the screen advice on how to use it efficiently as well as animation and fun facts about food waste *("So maybe that's nice to also see like the grams, how much you throw away, and maybe make it more fun and interactive.*
Like a fun fact about food waste or something.", "you divide the screen into parts and then see like on the top part, the picture and on the bottom part something "be careful Don't put your tray on the green bin and throw it in like this" or something like that. You can use the screen for the a lot of purposes for extra interaction.").

Food waste occurring in La Mangerie

All interviewees were able to identify why the Thursdays and Fridays were the days of most food waste. It is due to the end of a menu on Thursdays and the last day of the kitchen being opened on Fridays *("Thursday makes sense. Because last day of a menu. And on Friday, it all the food leftover we tried to keep to re-used that we finally throw away.").* Solutions to reduce it were: better overview on the waste, workshop to know what to do with leftover, efficient ordering, workshop on cuttings.

Report

Regarding the weekly report generated by Orbisk and displaying valuable insight of the food waste level as well as its cause, all interviewees stated that the Orbisk report must be shared with the kitchen team in order to be aware of the waste and to reduce it *("Yes, Otherwise we there's no point in us doing it if we don't know what info is coming out of it. I would like to understand what is going in La Mangerie regarding food waste because we do waste a lot.", "I think if you do have the numbers, and you can kind of visualize it, and see how it goes down, or up", "So I think sharing the report is the must to keep the motivation for both Mos and PEs.").* Furthermore, only two interviewees would like to see the full and detailed report of Orbisk *("I would like to see both, so that if Im interested in a specific thing I can look further into it.", In detail. The reason for this is because I would like to see more details about what we throw away and when.").* Consequently, 7 out of 9 interviewees agreed that the detailed report should be shared with the green MO and the Executives chef *("Maybe green Mo and Executive can have the more detailed report.")* but that only the main numbers and information from the Orbisk report should be shared with the rest of the team *("I think for MOs it's good to have this easy overview to let them know what is happening.").* In majority, students are being afraid to be overwhelmed with information.

Perceived ease of use

Experience using the machine

Regarding the experience of using the machine, only two interviewees encountered no difficulties with the machine. The rest of the interviewees mentioned the easiness of using the device but encountered some difficulties with it. Difficulties that arose the most were; multiple pictures taken at the same time *("It sometimes took multiple photos like, if you put your hand over it or something."),* placed the tray on the green bin which lead to inaccuracy of data *("it's very common that they put the food waste tray on the green bean itself. (…) And then if you do that, the Orbisk registers the food waste twice, so the data is not correct anymore."),* closing the lid for the smell *("you couldn't just take it off or put the put a lid on it because It would change the food waste weight.").*

To conclude, they all mentioned the easiness of the machine, but some difficulties arose which is in line with the observation made by the researcher.

Critical success factor

Critical success factors are considered as factors that are vital for the success of a project or device. 6 out of 9 interviewee mentioned that the most important critical success factor for Orbisk is its User-friendly characteristic *("very easy to make use of, which is a factor that I really like. So user friendly"). Another factor mentioned was its design ("People were really attracted by the design as a state of the art technology(…) the green bin fits perfectly").* Furthermore, an interviewee mentioned that he/she put a lot of importance for an AI device about the accuracy of the machine *("if the results of the machine are accurate."" The accuracy of the tracking and what is this machine. ")* but that the information was missing with La Mangerie kitchen team.

Attitude toward using

Feeling about kitchen food waste in La Mangerie

All interviewees felt uncomfortable with the amount of food waste within La Mangerie (*"So, yeah, I think we have a lot of food waste, way too much food waste actually.", "It's a shame that on a school like hotelschool the hague were sustainability is a key aspect of our education we still have so much food waste. We throw a lot every day and I don't think we are doing a lot about it."*). All interviewees would like to see improvement within La mangerie. However, some interviewees, 2 out of 9, mentioned that instructors are helping to reduce this amount of food waste by re-using ingredients.

Experience having an AI technology in a kitchen

8 out of 9 interviewees expressed their positive experience with such an AI technology. They enjoyed having new technology in the kitchen which is an unusual environment for such device (*"And it's quite cool to see such device in a kitchen, how technology can help us to reduce food waste.", "I really think it's a good thing to have in the kitchen.", "it is a great device, it is easy and a new technology in a kitchen."* "And I also think it is nice to have technology in the kitchen, it's unusual."). However, one interviewee mentioned the fact that people could be scared of such device and technology which has an impact on their experience, behaviours and work toward the machine: *"working with a AI, is often a mental border that people are scared off. I do think students were scared to use it incorrectly so they were trying to be at the machine as few minutes as possible."*

Adopting the machine in their work environment

Results shown that all interviewees adopted the new technology easily (*"I didn't really see the difference in effort. It was easy to adapt not too many changes."*). 2 out of 9 also mentioned that it became an habit to use it: *"It was like becoming a habit, just to go there and throw the food waste.", "So you can adopt it pretty quickly, it is just a concern of getting used to put in the tray and go to the machine. But that is not a lot of effort."*. It shows that the easiness and efficiency of the machine make the adoption flawless.

Information and communication about food waste and Orbisk

All interviewees mentioned, couple of times, the lack of information and communication about Orbisk (*"we didn't really talk about the machine with MOs, intructors or PEs.", "I never really got any of the info, like the result I mean", "I do think we were missing information about it. I would have like to know more about it: how to use it, what it is, why do we have it."*). This lack of information includes how it works, why having this device in La Mangerie, what are the results of the machine, what is the goal for school with such device. Furthermore, all interviewees expressed their misunderstanding of not receiving any numbers or any information generated by Orbisk which impacted their motivation to use the device (*"We didn't know if we were doing good or not compare to the other week or the other group", "no one really knew how to use it, why we have it, the results of it, what it is exactly which made it sometimes easy to forget about it."*).

Solution to increase the motivation to use Orbisk

All interviewees are eager to increase their motivation to gradually and efficiently use the machine. 4 out of 9 participants expressed their need for goals (*"I think we need goal to be motivated and use it correctly which is that to say."*). 3 out of 9 stated that analyzing and having the Orbisk report would increase their motivation. Additionally, 2 out of 9 would be more motivation if a competition between MO group would occur (*"a competition for the MO's, The MO-Team (A vs. B) with the lowest food waste wins"*).

Main highlights:

External variables:
- All interviewees agree on the lack of communication and trainings within La Mangerie with regards to Orbisk. In fact, they all mentioned that information such as how to use it and what you need to be careful about are missing. Furthermore, 2/9 interviewees express their need of a green chef more involved with Orbisk and food waste.

Perceived usefulness:
- Within La Mangerie, individuals have a different perception on the purpose of Orbisk. The different purpose of Orbisk; monitor food waste, reducing food waste, improving ordering process and cutting cost hasn't been understood by everyone. The majority of interviewee, 7 out of 9, only see Orbisk has a machine tracking food waste.
- The majority of MOs, 6 out of 9 participants, were and are not aware of the food waste level and cause within their kitchen. Furthermore, all interviewees confirmed that they would like to be aware and receive information about it.
- 7 out of 9 interviewees mentioned that Orbisk had an effect on them wasting less food. They precised that using a tray had a psychological effect making them realized how much food waste they are doing and the composition of it
- The majority of interviewees, 7 out of 9, stated that the Orbisk screen should be use more efficiently in order to motivate them using the machine. They require more interaction such as: measurement references, steps to follow, fun facts…
- All interviewees were able to identify why the Thursdays and Fridays were the days of most food waste. It is due to the end of a menu on Thursdays and the last day of the kitchen being opened on Fridays
- Regarding the weekly report generated by Orbisk and displaying valuable insight of the food waste level as well as its cause, all interviewees stated that the Orbisk report must be shared with the kitchen team in order to be aware of the waste and to reduce it. 7 out of 9 interviewees agreed that the detailed report should be shared with the green MO and the Executives chef but that only the main numbers and information from the Orbisk report should be shared with the rest of the team.

Perceived ease of use:
- In line with the observation made by the researcher, 7 out of 9 interviewees mentioned the easiness of using the device but encountered some difficulties with it. Difficulties that arose the most were; multiple pictures taken at the same time placed the tray on the green bin which lead to inaccuracy of data and impossibility to close the lid to avoid the smell.
- 6 out of 9 interviewee mentioned that the most important critical success factor for Orbisk is its User-friendly characteristic followed by its design. Furthermore, an interviewee mentioned that he/she put a lot of importance for an AI device about the accuracy of the machine.

Attitude toward using:
- All interviewees felt uncomfortable with the amount of food waste within La Mangerie. All of them would like to see improvement within La mangerie. 2 out of 9, mentioned that instructors are helping to reduce this amount of food waste by re-using ingredients.
- 8 out of 9 interviewees expressed their positive experience with such an AI technology. They enjoyed having new technology in the kitchen which is an unusual environment for such device.
- Results shown that all interviewees adopted the new technology easily. 2 out of 9 also mentioned that it became an habit to use it

- All interviewees mentioned, couple of times, the lack of information and communication about Orbisk. This lack of information includes how it works, why having this device in La Mangerie, what are the results of the machine, what is the goal for school with such device. Furthermore, all interviewees expressed their misunderstanding of not receiving any numbers or any information generated by Orbisk which impacted their motivation to use the device
- All interviewees are eager to increase their motivation to gradually and efficiently use the machine. 4 out of 9 participants expressed their need for goals. 3 out of 9 stated that analyzing and having the Orbisk report would increase their motivation.

Appendix 11: Declaration of confidentiality

HOTELSCHOOL THE HAGUE

Declaration relating to confidentiality concerning research data in Launching Your CAReer (LYCar) programme

The undersigned, **Iacazzi Léa**..

(hereinafter referred to as: the Student), residing in **Amsterdam**............................

Conducting a (research)project for the company **Ms. Visser**..................................

(hereinafter referred to as: the Client), residing in: **Amsterdam**..............................

Whereas:

- the Student shall, in the context of his or her LYCAR research, gain access to confidential information;

- the Client shall, where appropriate, demand a signed declaration relating to secrecy and confidentiality concerning the information provided in this context;

- this non-disclosure agreement shall, in the event of any discrepancies, take precedence over other contracts or agreements which have been or will be concluded or made between the Student and the Client;

Declares as follows:

1. The Student shall keep confidential any information which the Client or any other party involved in the LYCAR research provides under this contract, and shall not further disclose such information in any way, except insofar as the Student is obliged to disclose it by virtue of any legal requirement or irrevocable decision of a judge.

2. Information, as referred to under 1, refers to all information, including written, verbal, graphic and digital information, or information in any other form, which comes to the knowledge of the Student during the research period and which the Student knows, or can reasonably be expected to know, is of a confidential nature.

3. The Student shall not, without the prior written consent of the Client, disclose any confidential information to third parties or contribute to the publication of confidential information. The Student shall submit the thesis to the supervisor for approval from the Client in respect of confidential information, before making such information available to his examinator(s) at Hotelschool The Hague.

4. This non-disclosure agreement shall be in force for an indefinite period / The Student shall be bound to this obligation of secrecy for five (5) years after signing this declaration.
   CHOOSE IN CONSULATION WITH CLIENT)

Thus declared and signed by:

Name: **Iacazzi Léa**.......................................Date: **13/11/2020**

Place: **Amsterdam**...Student number **671513**

Signature: **Iacazzi Léa**.................................

Appendix 12: Ethic Informed Consent Form

HTH and Orbisk, when food waste meets AI.

Hotelschool The Hague implemented a new device in La Mangerie kitchen, called Orbisk. Orbisk is an Artificial intelligence technology that aims to understand the restaurant's food waste flow, and thereafter reduce food waste. The research topic is "the impact of AI technology like Orbisk on kitchen employees' behaviour to reduce food waste". This research has been developed with the collaboration of Mrs. Visser, research fellow in Food Circularity at Hotelschool The Hague research center. It is considered as a qualitative research including observations and interviews. This Ethic Informed Consent Form ensure your acceptance to share your details and to participate into this research. The researcher, Mrs. Visser and lecturers grading this research will have access to the complete set of data.

I, the intended research participant, have read the information for this project. I was allowed to ask additional questions. If I had any questions these have been answered to my satisfaction. I have had enough time to decide whether or not I wish to participate.

I understand that my participation is completely voluntary. I understand that I am free to withdraw at any time, without giving any reason.

I understand that some people have access to my details. These people have been mentioned (in the information etc.).

I consent to the use of my details, for the purposes that have been mentioned in the information/information letter.

I consent to my details being kept for further analysis (if applicable) for a maximum of 15 years after this research project has ended.

I hereby give my informed consent to take part in this research project.

Name of participant:

Signature: Date : __ / __ / __

I, the researcher, confirm that I have fully informed this participant about the above research project.

If any new information arises in the duration of the research project that could potentially influence the participant's consent, I will inform the research participant.

IACAZZI Léa:

Signature: Date: 11 / 01 / 2021

Appendix 13: Strategic advice

Introduction:
Based on the research, it has been shown that the implementation of a new device such as Orbisk is difficult and need to be well-prepared. In fact, found on the observation, it has been seen that numerous individuals were using the machine incorrectly. To understand the cause of it, interviews have been conducted with the kitchen staff. The interviewees explained that they were lacking information about the device itself and how to use it. It had a strong impact on their experience, work, motivation and behaviours toward the machine. Therefore, the implementation of Orbisk within La Mangerie needs some improvement. After analyzing all data, it concluded that during the implementation of a new device and to ensure continuous efficient usage in such an unusual environment, **communication** between kitchen staff is vital.

Starting off, it has been proven that providing training and a mentor lead to successful technology implementation (Forbes, 2018). Hence, based on researches and the request of interviewees, a training (**External variable**) will be developed and will inform them on: what is the machine, its purposes and objectives, how to use it efficiently and which difficulties you can encounter. Furthermore, participants mentioned that this training should be done every Monday morning and designed as a workshop and demonstration to inform kitchen MOs and PEs. Additionally, some interviewees expressed their need for an individual responsible for the machine, such as the green MO, to whom questions and help could be asked. This training will be the base of the strategic advice and of efficient technology implementation.

When introducing a new technology in any type of organization, it is recommended to take small steps to ensure all employees understand the basics of the new technology (ibid). Thus, the strategic advice has been divided into five steps:

Step 1: Introduction to the machine

The first phase of the training will be an explanation of the nature of Orbisk, its purpose and objectives. More precisely, it will include a technical description of the machine, its different capacities as well as the objectives of HTH on acquiring such a device. It will ensure consistency, clarity and alignment among all kitchen staff. This first phase will be done through a workshop with a PowerPoint presentation and a quiz at the end to enhance motivation and focus. Data will be gathered from the literature review and Orbisk website. To conclude this phase will guarantee a successful **perceived usefulness** of the machine.

Step 2: Explanation of its usage

The second phase of the training will be an explanation of how to use efficiently the machine and possible difficulties rising. To ensure interaction, it will be presented as a video showing a real demonstration. Due to covid-19, the video of the demonstration couldn't be recorded. Therefore, only the instructions have been developed:

1) How to efficiently use Orbisk:

The observations helped to determine which elements must be shared to the kitchen staff to ensure proficient use of Orbisk:

Correctly used	*The tray needs to be placed close to the camera. The first picture will be taken, and subsequently, the food needs to be thrown away in the bin. Thereafter, the picture and grams are displayed on the screen.*
Tray below the camera	*The tray needs to be placed right below the camera, and not on the bin itself. Otherwise, it gives incorrect results.*
Use of medium tray	*The most efficient FW tray is a medium iron tray in which kitchen employees can organize and separate ingredients. While using a large tray, food is going next to the bin. While using bowls or hands, Food waste is displayed as a pile of ingredients hardly recognizable by Orbisk.*
A tray in section	*FW trays must be placed in every section. It will motivate and help kitchen employees to make it as a habit.*
Organized ingredients	*To ensure effective recognitions, ingredients need to be distinctively separated per type in the tray. Displayed as a pile or mixed ingredients lead to Orbisk unable to recognize and categories the ingredients.*

2) Difficulties encountered:

The following difficulties had the highest frequencies during the observations and were mentioned during interviews. For each difficulty, a correction will be presented:

Difficulties	Correction
Multiple pictures were taken for the same tray	*The first picture will be taken, and subsequently and quickly, the food needs to be thrown away in the bin.*
No picture was taken, food was still thrown in the bin	*Every time an ingredient needs to be discarded, a scan through Orbisk must be done.*
Tray placed on the bin while taking the picture	*The tray needs to be placed right below the camera, and not on the bin itself.*
Use of hands and bowls	*These two recipients can be used if the ingredients are the same as it can be recognized by Orbisk. On the contrary, if multiple ingredients are thrown away a tray should be used for more efficiency.*
Mixed ingredients	*Ingredients need to be distinctively separated per type in the tray*
FW Tray is not placed in the sections	*FW trays must be placed in every section.*

To conclude this phase will guarantee a successful **perceived ease of use** of the machine.

Step 3: Fostering an ongoing adoption/ Analysing Orbisk report as a team

To strengthen the adoption, employees need to be involved in every step of the implementation in the introduction, explanation, analysis of data, solution design and continuous usage. According to Forbes (2018), to ensure a constant engagement "a powerful way is to help employees understand the problem that the technology is trying to solve". Regarding Orbisk, its weekly report displaying the food waste level and why it is occurring will give valuable information to kitchen staff to understand the problem that the device is trying to solve. Furthermore, it will give opportunities to see the improvement or point of improvement of the kitchen staff with regards to food waste.

This report displays various information from the average kilo of waste per day divided by FW, cuttings and non-registered, type of meals discarded, type of ingredients discarded, average FW cost per day… It is extensively detailed. Consequently, the detailed report should be shared with the green MO and the Executives chef and only the main numbers and information should be shared with the rest of the team. The report will be analyzed on Monday to see the food waste flow and level of the previous week, on Wednesday to find points of improvement, and on Friday to evaluate the week. Based on this data, the team will work together to optimize the supply, the ordering process and menu planning. It will lower the purchasing costs, increase the profit margin and reduce the impact on the planet.

In conclusion, this step will enhance employees **attitude** toward the machine. It will give them the possibilities to demonstrate skills and behaviours towards the machine by finding solutions (Improving the ordering process and menu planning) to reduce further kitchen food waste and being aware of their actual waste.

Figure 9: Simplified Orbisk report displaying the most important data to be shared

Step 4: Reinforcement to make the changes stick/ Set objectives and celebrate success

This step consists of making sure people continue and feel motivated to use the new device. It is an ongoing process including feedback, set goals and celebration. Based on the ADKAR change model, providing recognition and compliment is as valuable as finding errors in individuals activities (Pearson, 2021). Additionally, it has been proven that employees value being aware of their achievement and if they reach the target set (ibid). Consequently, it is important to involve staff in the change process, mention how it is going and the final results of their actions and progress towards the objectives to which they are contributing (ibid).

With regards to feedback, the green MO will be responsible to give feedback to the MO kitchen team thanks to his observations and Orbisk report analysis. Furthermore, every beginning of a week, objectives toward reducing food waste will be set. Objectives could be *"By the end of the week, we will waste 5% less than the previous week by improving our ordering process such as bread and meat which were the most discarded ingredients last week", "By the end of the week, we will reduce by 10% our dinner food waste by optimizing our menu planning".* On Friday, the objectives will be reviewed and assessed. Thereafter, celebration or point of improvement will be shared.

In conclusion, this step will increase employees **intention** to use the machine.

Step 5: Actual usage

Finally, all these aforementioned steps will form habits which could stimulate further waste management behaviours. These habits will form the actual professional and successful usage of Orbisk. Every block, these five steps will start over again to ensure a flowless adoption of the device. Furthermore, as the green chef will be responsible for the Orbisk its job description has been re-designed for clarity and efficiency:

Figure 10: Redesigned Job description for the Green MOs.

Appendix 14: Presentation of the solution design (Strategic advice) to the commissioner

Step 1: Introduction to the machine

- Present a **technical description** of the machine, its different **capacities** as well as **the objectives of HTH** on acquiring such a device

Step 2: Explanation of its usage

Correctly used	The tray needs to be placed close to the camera. The first picture will be taken, and subsequently, the food needs to be thrown away in the bin. Thereafter, the picture and grams are displayed on the screen.
Tray below the camera	The tray needs to be placed right below the camera, and not on the bin itself. Otherwise, it gives incorrect results.
Use of medium tray	The most efficient FW tray is a medium iron tray in which kitchen employees can organize and separate ingredients. While using a large tray, food is going next to the bin. While using bowls or hands, Food waste is displayed as a pile of ingredients hardly recognizable by Orbisk.
A tray in section	FW trays must be placed in every section. It will motivate and help kitchen employees to make it as a habit.
Organized ingredients	To ensure effective recognitions, ingredients need to be distinctively separated per type in the tray. Displayed as a pile or mixed ingredients lead to Orbisk unable to recognize and categories the ingredients.

Step 3: Fostering an ongoing adoption

- Analyze as a team **the Orbisk report** to understand La Mangerie **food waste flow** and improving it

Step 4: Reinforcement to make changes stick

- an ongoing process including **set goals, feedback**, and **celebrations.**

"By the end of the week, we will waste 5% less than the previous week by improving our ordering process such as bread and meat which were the most discarded ingredients last week"

Step 5: Actual usage

- These four steps will form **habits** which is **the actual professional** and successful usage of Orbisk.

- Every block, these five steps will **start over again** to ensure a flowless adoption of the device.

JOB DESCRIPTION- GREEN CHEF LA MANGERIE

JOB SUMMARY

To ensure and improve sustainability in La Mangerie, the position of Green Chef has been created. This Chef is the designated MO responsible for minimizing food waste and responsible for Orbisk. This MO will guarantee the correct use of the device and ensure the use of the most local produce. Together with one PE, the green chef will be in La Mangerie every 'every' week to work on the sustainability of the kitchen and control HTH food waste level.

ACTIONS

JOB RESPONSABILITIES

- Ensure the use of the new food waste device 'Orbisk'. This device identifies food waste from taking a picture and is used to create an overview of how much food is wasted in La Mangerie. The Green Chef will ensure all MO's and PE's scan their waste by the Orbisk. To create awareness of separating waste, the Green chef will also perform waste-bag checks.
- Be available to offer help on how to use the machine and answer any questions related to it.
- Analyze the weekly report of Orbisk and create a simplified report for the rest of the team.
- Create awareness about the amount of food waste by sharing weekly the results of Orbisk with all MOs.
- Conduct every Monday morning the Orbisk training and demonstration to all kitchen staff.
- Work with the new F&B system Horeko. Within Horeko, the Green Chef will be responsible for analyzing data on the main dashboard and conclude from this dashboard. Working with Horeko includes: translating produce, searching for the most sustainable products and order them.
- Add nutrition information on produce and monitor the day-to-day operation (how sustainable are we working?)
- Order produces via InStock. InStock is a company supplying rescued food to restaurants (etc.). For an amount of 250,- the Green Chef can order every week via InStock. In discussion with fellow MO's, the Green Chef will order products needed for recipes via InStock, to increase sustainability.

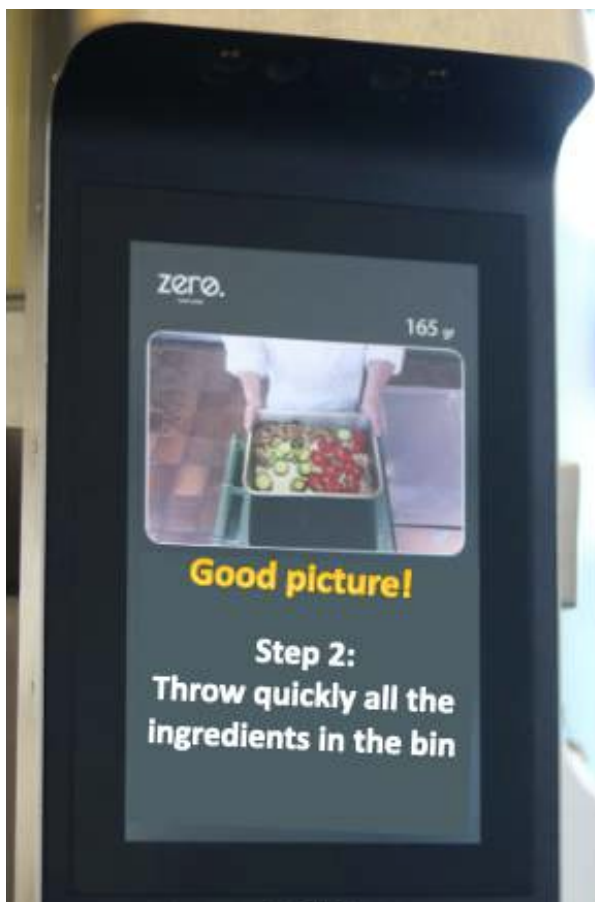**BECOME A ZERO WASTER WITH OUR GREEN CHEF AND ORBISK**

Appendix 15: Improvement for Orbisk

Recommendations:
- Orbisk website and report should be available in English.
- If multiple pictures were taken, it should allow choosing which one was correct.
- The Orbisk screen could be used more efficiently to interact and motivate users.

A solution:

During the research, numerous participants mentioned that Orbisk screen should be used more efficiently to motivate them using the machine. In fact, interaction and additional features could be added to the screen. Measuring references, the limit of waste, advice, steps to follow have been taken into consideration. Based on the idea from participants, the following examples have been developed:

A screen displaying instructions   A Screen displaying measur

Appendix 16: Overall and weekly timeline of the solution intervention
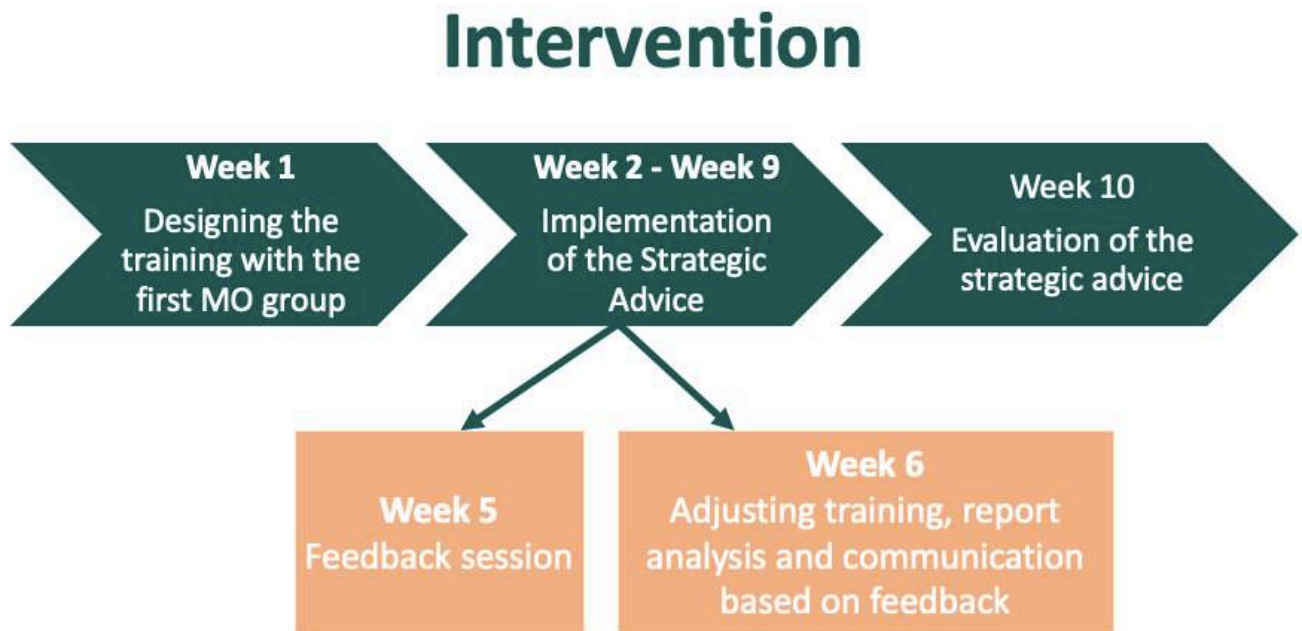

Figure 11 : General timeline

Figure 12 : Weekly timeline

Appendix 17 : Commissionner grade form

Evaluation Form Company Project/Research

(EVALUATION FORM OF ALL CLIENTS AND ON ALL DELIVERABLES IS COMPULSORY, FORMAT IS NOT)

HOTELSCHOOL THE HAGUE
Hospitality Business School

Name of student:	Iacazzi Léa	Student number:	671513
Name of company:	Hotelschool The Hague	Department:	Research center
Name of company tutor:	Ms. Anna De Visser Amundson	Position of company tutor:	Research fellow in food circularity
Project/Deliverable: (please specify)	A strategic advice on how to successfully implement and operate a new technology in a professional kitchen aimed at reducing kitchen FW. A report has been delivered covering all stages of the DBR research cycle.		

During the first evaluation the proposal for the project and end deliverable is discussed. For this final evaluation the project is evaluated. This is taken into consideration for the final assessment of the student.

CATEGORY 1: EXPERTISE/KNOWLEDGE OF THE FIELD

Rating	Excellent	Good	Room for improvement	Comments
85	In-depth use of relevant literature and knowledge of the field. The deliverable shows excellent thinking capacity of the student (taking into account all significant factors and looking from all different perspectives).	Use of relevant literature and knowledge of the field. The deliverable shows mostly intellectual depth (taking into account significant factors and looking from different perspectives).	No or incorrect use of literature and knowledge of the field. The deliverable lacks intellectual depth.	Very well done, concisely explained and use of relevant sources. Lea was able to fully 'dissect' was this technology is about and understand the core issues and opportunities in its implementation and use

CATEGORY 2: KNOWLEDGE APPLICATION/SOLVING PROBLEMS

Rating	Excellent	Good	Room for improvement	Comments
80	The theories and models are skillfully applied and the student can translate this in a unique solution action. The student can relate situations to concepts that results into a solution that adds great value to the company's overall strategy. The creative solution is/can be implemented and evaluated and is solving the problem.	The student uses theory and models and shows understanding of the issues at hand. The solution is realistic and implementable for the company. The solution is/can be implemented and evaluated.	Mentioning theory and models, but not using them in the correct way. The student cannot convince of the possibilities to implement and evaluate. It is not solving the problem.	Lea has made a great implementation plan which we will start using as of next academic year. It will certainly help us to implement and use Orbisk in a more efficient manner. I like the TAM model perspective but I think if you use it, it needs to be more comprehensively applied and tested rather that fitted in to the research which is a bit how it comes across now.

Page 1 of 3

CATEGORY 3: INFORMED JUDGEMENTS

Rating	Excellent	Good	Room for improvement	Comments
70	The research process is done and explained in an excellent way. All statements, conclusions and recommendations are underpinned with the data collected by the students and/or referencing. The analysis is very substantial.	The research process is done and explained well. Most statements, conclusions and recommendations are underpinned with the data collected by the student and/or referencing. The analysis is substantial.	Weak problem analysis, research question not clear enough. Data collection and/or methodology is insufficient. Weak analysis, use of data from one dimension and not backed up.	I think this is where Lea can improve the report for the final version. She leaves way too much (vital) information in the appendix so the current result reporting is too high level and the reader don't fully understand where the results are drawn from. Specifically, as she uses a multi method (data from the machine, observations and interviews) she should also report the specific finding this way. Then her recommendations will also come across more convincing.

CATEGORY 4: COMMUNICATION AND SHARING KNOWLEDGE

Rating	Excellent	Good	Room for improvement	Comments
85	Excellent ability to communicate information, ideas, problems and solutions to all stakeholders involved. The deliverable adds great value to the main stakeholders. Initial and creative channels have been actively used to share outputs and knowledge.	Good ability to communicate information, ideas, problems and solutions to stakeholders. The deliverable adds value to the company. Existing channels have been used to share knowledge	The deliverable could have been better delivered to the stakeholders. The deliverable could have added more value, if better delivered. No active communication of outputs and knowledge.	Yes, as I know the specific results and we have talked about these a lot, I fully understand and believe in Leas advice which we will certainly use!

CATEGORY 5: INTERCULTURAL HOSPITALITY LEADERSHIP

Rating	Excellent	Good	Room for improvement	Comments
90	Student is able to lead the project by themselves. Student is self-critical towards improvement and takes feedback to heart. Student deals with a diversity of stakeholders in an intercultural competent way. Hospitality mindset is seen in project or work in a very distinct way.	Student is able to lead the project with little help. Student is critical towards improvement and listens to feedback. Student deals with different stakeholders. Hospitality mindset can be seen.	Tasks performed are described and not critically analyzed. Student is not too critical towards own learning and can listen better to feedback. Student does not know how to deal with differences in stakeholders. Hospitality can be improved.	Lea is a dream to work with! Any task that you put in front of her she picks up and makes the most of it. She has a great work ethic and whether it is about talking to the Orbisk CEO, making observations in her chefs jacket in the restaurant or interviewing the MO's who worked with the machine, she does that in a professional manner with a clear goal in mind

OVERALL COMMENTS:

Thanks so much Lea for working with us on this project!! I'm very happy that you were the pioneer on the project "where food waste meets AI" I learned a lot and truly appreciate all the work and effort you put into this and also the presentations we did together to disseminate the knowledge your projects generated 😊

STUDENTS' COMMENTS:

Comments on evaluation:	Receiving feedback from Ms. Visser was highly gratifying. It help me to gain confidence in my research, improve certain aspect of it and keep the motivation to continuously share my knowledge with others. It was a real pleasure working with Ms. Visser. She is really passionate about what she is doing.

DATE & STUDENT'S SIGNATURE:

L. Iacazzi done on the 05/05/21

THE COMPLETED FORMS (ON ALL DELIVERABLES AND PERFORMANCE) NEED TO BE EMAILED TO THE LYCAR COACH AND PUT IN THE APPENDICES OF THE CAREER PORTFOLIO

Appendix 18: Example of a dissemination presentation (HTH dissemination event)

Introduction | Food waste & Orbisk

- 1/3 of the food produced for human consumption is discarded daily. It represents **1.3 billion tonnes** of food wasted per year

- Food Waste within the hospitality industry is significant with a contribution of **12% of the global Food Waste** in the previous years

- **Artificial intelligence** are tools used to measure and record food waste; and influence kitchen professionals behaviour towards **less FW.**

- Using image-tracking recognition technology and a connected scale, **Orbisk** recognises and quantifies which ingredients are thrown away.

Problem | Waste in hospitality industry

In the hospitality industry, the problem lies with a significant Food Waste occurring in kitchens due to overproduction and kitchen employees behaviour causing complex environmental, ethical and economic issues.

(Kilibarda et al., 2019), (Dhir et al, 2020), (Leverenz et al., 2020)

Cause of food waste

- Production process
- Kitchen employee behaviour
- Employee skills
- Menu planning
- Inventory management
- Environmental problem

70% of food waste occur in kitchens

Methodology

The goal of the research is to answer the main research question: *"What is the impact of AI technology (like Orbisk) on kitchen employees' behaviour to reduce food waste? "*

Results | Food waste management

Driven by:
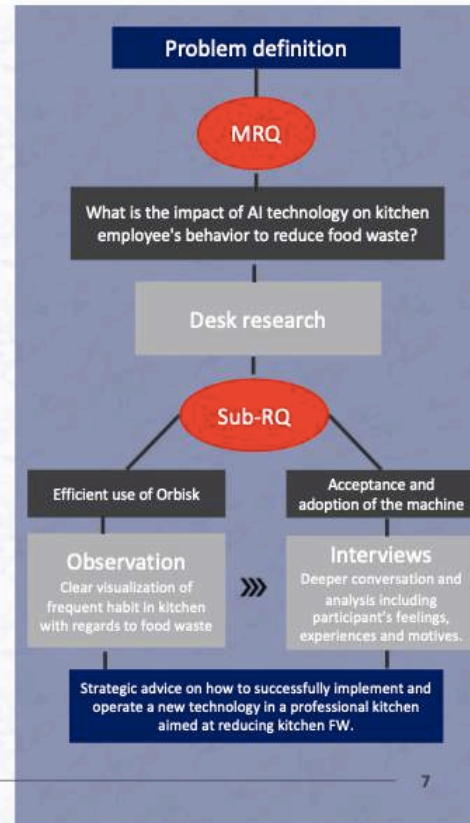
- **Morality**: Individual moral principles and self-image drive their FW level and is a crucial element shaping their comportment

- **Habit**: Waste comportments are formed regularly and automatically, thus, represent a habitual element done with less conscious than in the past

- **Knowledge**: Individual knowledge and experience on how to prepare and handle food impact their FW comportment considerably

Results | Highlights about Orbisk

It enhance task performance and reduce barriers:

- measuring and recording efficiently Food Waste

- interacting with users through its screen

- informing employees about their Food waste level

- reducing actively Food Waste by provoking psychological effect

9

Solution | Strategic advice

- A **strategic advice** on how to successfully implement and operate **a new technology like Orbisk** in a professional kitchen aimed at reducing kitchen waste

- **Step1:** Introduction to the machine
  Step2: Explanation of its usage
  Step3: Fostering an ongoing adoption
  Step4: Reinforcement to make the changes stick
  Step5: Actual usage

Evaluation | Quasi-experiment

- A **quasi-experiment** will be used, including a control group and before/after measurement.

Assessment criteria	KPIs
Efficient use of Orbisk	• % weight with photo • Average kilograms per day of non-registered FW • Numbers of difficulties encountered (gathered through observations)
Reduction of FW	• Average kilograms per day of FW
Costs saving	• Average price per day of FW
Environmental impact	• Average kilograms of CO_2 Emissions
Motivation/experience of employees	• Number of participants lacking information about Orbisk (gathered through interviews)

10

HOTELSCHOOL THE HAGUE

2020 Yearly overview

HOTELSCHOOL THE HAGUE · HOSPITALITY RESEARCH CENTRE

12. LYCar Proposal Grade and feedback

Grading rubric Lycar Proposal

Student Name:	Iacazzi Léa	Student No:	671513
LYCar Coach:	Mr. Schermer	Track:	2
Block:	20/21B	Primary PLO:	PLO 9

Preconditions (required for assessment)	Yes	No
Checks content and completeness		
Executive Summary is present, concise, can be read independently, contains information about process and content, focuses on results and outcomes	X	
LYCar Proposal meets formal reporting criteria (according to e.g. LYCar Reading & Writing Guide)		
LYCar Proposal is written in English and is professional, including common basic components such as Intro, ToC, Conclusion etc.- see Reading & Writing Guide	X	
LYCar Proposal is max. **5.000 words** (counting after Table of Content, incl. text in tables) **-** visual proof of wordcount is included in Appendices.	X	
Harvard Referencing Style is used consistently, referencing to primary sources only, List of References is well presented	X	
Check (technical) formalities and submissions		
Turnitin upload		
LYCar Proposal incl. Appendices are uploaded in Osiris	X	
Ethics and data management		
Ethical, integrity and data management requirements	X	
Entitled to assessment? (All yes above required):	*X*	

Assessment LYCar Proposal

	Excellent	Go	No Go
DD1: The student has demonstrated knowledge and understanding in a field of study that builds upon their general secondary education, and is typically at a level that is supported by advanced textbooks			
1.1 Use of literature and knowledge of the field	Student uses in-depth literature and knowledge of the field throughout the report. The report contains no mistakes and factual incorrectness.	Student uses in most cases literature and knowledge of the field in the report. The report contains some mistakes and factual incorrectness in a limited part of the report.	No sufficient or correct use of literature and knowledge of the field in the report. The report contains mistakes and factual incorrectness.
1.2 Intellectual depth and abstract thinking	Student takes all significant factors into account and looks from different perspectives, sees patterns, relates situations to concepts in order to solve larger problems. The reports shows excellent thinking capacity of the student. New unique insights presented in the topic and depth of understanding displayed. Excellent linking between the elements and the underlying issues within the case situation.	Student takes different perspectives into account. The report shows intellectual depth (taking into account all significant factors and looking from different perspectives) in most parts of the report. Some patterns are clear. Some links have been made.	The report lacks intellectual depth (superficial and merely descriptive) in some parts of the report. Patterns are not sufficiently made clear.
Students' arguments		Pass. During the entire research, an in-depth literature review has been conducted only using academic articles and researches, and including various topics such as Food waste, kitchen staff behaviour, technological implementtion, AI technology… It gave me valuable insight and knowledge into sustainability and digitalization, two important trends of the hospitality industy. I used this knowledge to conduct observations, a report analysis and interviews. Furthermore, i collaborated with Olaf, CEO of Orbisk, Mr. De Vos, Mrs. De Visser. Therefore, multiple perspectives were taken into account: experts, practitionners, reserchers and kitchen staff point of views. Additionnally, observations and the report analysis showed patterns which were used to make efficient and specific interview questions. This report answer the gap of "understanding the behaviors compelling FW and approaches aiming to reduce it" giving valuable and unique insight to Orbisk and HTH. In fact, Orbisk is considered as a young company that have never done such research.	

Assessors' feedback	Well done, the report shows a structured approach using relevant literature, the tecnical and behavourial aspects are all covered and all stakeholders have given their insights.		
	Excellent	**Go**	**No Go**
DD2: The student can apply their knowledge and understanding in a manner that indicates a professional approach to their work or vocation, and has competences typically demonstrated through devising and sustaining feedback and solving problems within their field of study			
2.1 Application of theories/models to situations at hand	Student uses a range of theories/models appropriate to the problems in the case skillfully and able to add their own unique perspective and insight. They own the model(s).	Student mentions a range of theories/models appropriate to the problems in the case and applying some of them in the correct way.	Mentioning models and theories but not using them in a correct way.
2.2 Possible impact and meaning of own work - dissemination of research	Student plans evaluation of impact and meaning of own work in relation to business and industry with sound underpinning. Identification of all stakeholders and acts of dissemination. Plan on how to effectively disseminate knowledge through different channels fitted for a variety of audiences is also presented.	Student formulates criteria for evaluation. Student describes possible impact and meaning of own work. Identification of stakeholders and planning of dissemination through at least one valuable channel with an audience is presented.	Student fails to describe criteria how to evaluate impact. No identification of stakeholders or realistic plan on dissemination of knowledge through at least one valuable channel with an audience.

Students' arguments	Excellent. The main model used within the research was the Technology acceptance model, it has been explained in depth, used to form sub-research questions, used to form interview questions, to answer the main research question. The TAM model was also appropriately adapted to the solution designed. In fact, the model relates well to the topic of "AI impact on employee in an organization" as it covers the attitude, the behavior, and reaction of individuals towards new technology in a company. Additionnaly, theories that were discussed in the literature review have been used to perform efficient observation and form the interviews question. Furthermore, various theories regarding the methodology of the research has been used: convenience sampling, accessible population, observations, semi-structured interviews... Furthermore, interventions and an evaluation have been developed and tailor made for the solution. The evaluation has been correctly chosen for this specific research and solution. Besides, the KPIs being assessed are automatically gather through Orbisk report. All stakeholders have been identified by using a model to know how to manage each of them and understand their power and interest in the project. Finally, three act of dissemination will take place. The report for Ms. Visser is already done as well as the presentation for Ms. De Vos. The blog post has been arranged with the company. These acts cover different channels but also different audience, research domain and industry domain (Hospitality but also kitchen professionals).		
Assessors' main feedback	I agree with students arguments. She is able to run this experiment with an helicopter view an she has not been frustrated by all practical problems that go along with such an implementation.		
	Excellent	**Go**	**No Go**
DD3: the student has the ability to devise data gathering events, gather and interpret relevant data (usually within their field of study) to inform judgements that include reflection on relevant social, scientific or ethical issues			
3.1 The Design Based Research Process	Student sets the research process up in a systematic and well organised way. Student makes sense of a problem mess, analyses a (complex) problem and formulates feasible solutions by using a design based research approach. Logical flow from Problem definition to Analysis to Solutions Design/methods are well choosen and motivated,	Student analyses the problem, and formulates possible solutions underpinned by literature using a design based research approach. Methods motivated and mostly logically chosen	Insufficient problem analysis and methodology, research cycle not used.

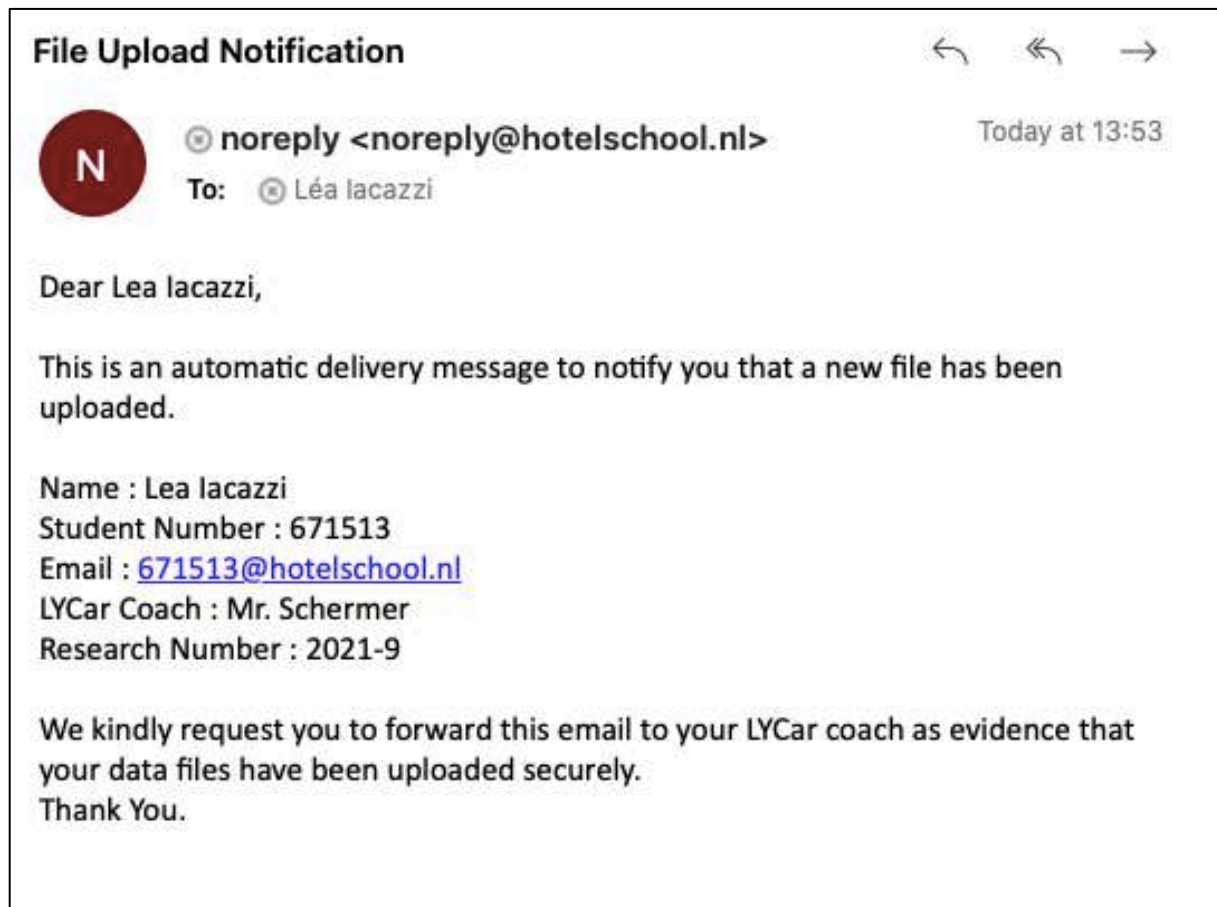|			
3.2 Analysis and evaluation of data	Student plans analysis and evaluation of data/information well using appropriate (digital) tools and makes data-driven decisions. All statements are underpinned with facts and figures and/or referencing. The appropiate tools are used in all steps. Analysis is sufficiently complex with use of information from more than 2 different dimensions (practioners, scientific literature, the organization and stakeholders).	Student plans analysis and evaluation of solutions clearly, with some flaws or unclarities. Some statements are underpinned with facts and figures and/or referencing, some lacking underpinning. Analysis is sufficiently complex using data from at least one dimension and sufficiently backed up with literature.	Plan of analysis and evaluation of solutions is not clear. Statements are mostly not underpinned with facts and figures and/or referencing; some are contradicting. No tools are used. Lacking or no analysis and not backed up with literature.
Students' arguments	Excellent. Throughout the entire research, the DBR cycle has been used as well as the evidence based management theory. Staring off, an explanatory research conducted, a problem definition, analyses of a complex problem, formulates feasible recommendation and solutions, developing efficient and appropriate interventions, ensure an evaluation of the findings. All the above-mentionned were done while considering all stakeholders involved that are presented in the dissemination. A logical flow is displayed as all part complete each other. Additionnaly, the analysis and evaluation of data have been done using tools and enhancing data driven decisions. The Orbisk report has been analysis with various graphs, number and data. The interviews were analyze using Nvivio, a specific software for thematic analysis. The analysis of the overall problem use different dimensions scientific literature (literature review), organization (Orbisk report) and stakeholders (MOs and PEs interviewed). Furthermore, all statement and important theory have been referenced from academic literature.		
Assessors' main feedback	Research is done with a broad scope, but by using specific methodologies and tools it stilll leads to a comprehensive and understandable report.		

	Excellent	**Go**	**No Go**
DD4: the student can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences			
4.1 Communication to audience making use of professional (business) English	Student divides information effectively in paragraphs/chapters. No noticeable errors in English usage and mechanics. Use of language enhances the argument and avoids abbreviations. Sentence structures are well varied and voice and tone are highly suitable for the specific audience/s. Style and content complement each other into an appealing, high quality story. Highly skillful organisational strategy. The logical sequence of ideas increases the effectiveness of the argument and transitions between paragraphs strengthen the relationship between ideas. Sub headings are employed effectively and the links between different sections are reinforced through linking expressions. Shows attention to detail in all parts of the report.	Student divides information in paragraphs/chapters. Errors in English usage and mechanics are present but they rarely impede understanding. Use of language supports the argument. Sentence structures are varied and voice and tone are generally appropriate for the intended audience/s. Generally a clear organisational strategy. The sequence of ideas in most cases supports the argument and transitions between paragraphs clarify the relationship between ideas. The report is mainly comprehensively written and lacks some attention to detail in some parts of the report.	Distracting errors in English usage are present and they impede understanding. Use of language is basic, only somewhat clear and does not support the argument. Word choice is general and imprecise. Voice and tone are not always appropriate for the intended audience/s. Basic organisational strategy, with most ideas logically grouped. Transitions between paragraphs sometimes clarify the relationship among ideas. The report is not comprehensively written and lacks attention to detail in most parts of the report.
Students' arguments	Pass. To make the report easily understandable, the report has been devided in chapters and sub-chapters. The entire report has been written in english, eventhough the Orbisk report is in dutch. I, the researcher, attended multiple classed on how to write an efficient research report with Mr. Talbot and Mr. Muentzer. Furthermore, a software called Grammarly, has been used to verify grammar error and sentence structure. Linking expressions, linking word and links between different sections have been made.		
Assessors' main feedback	Very well written, good overview.		
	Excellent	**Go**	**No Go**

DD5: the student has developed those learning skills necessary to continue to undertake further study with a high degree of autonomy			
5.1 Plan on IQ development in PLO: Reflection on product(s)	Student has clear plans on what will be delivered and uses different relevant theory to underpin own work and reflect on it.	Student has a plan on what will be delivered and uses theory to underpin planned own work and reflect on it.	No clear deliverables mentioned and almost no theory to underpin own work and reflection.
5.2 Plan on AQ & EQ Self development	Student divises excellent ability to critically reflect on own developmental goals and demonstrates real growth mindset for life-long learning. Student proposes a demonstration of being able to self-direct, taking initiative in unpredictable situations. Student shows different metrics that can demonstrate development in terms of their EQ/AQ.	Student shows developmental goals and demonstrates growth mindset. There is a plan on how to reflect on values, attitudes and behavior. Starting levels and desired end levels are described and measurements are provided.	Developmental goals are not concrete, there is no demonstration of growth mindset. Plan on how to reflect is vague and does not give enough substantiation to show growth.
5.3 Plan on EQ Social development	Student provides a plan on how to construct a multitude of proof that shows development as an Intercultural Hospitality Leader. Excellent ability to contribute to the global society/local community as a responsible citizen. Excellent analysis of diversity of people the student will deal with. Possible effective collaboration with all stakeholders in different cultural settings. Hospitality is key to the project or work the student does.	Student provides a plan on how to prove development as an Intercultural Hospitality Leader. Plan on how to contribute to the global society/local community as a reponsible citizen. Proposing ideas on how to collaborate with different stakeholders in different cultural settings. Hospitality is a differentiator in the students' project or work.	No clear plan on development as an Intercultural Hospitality Leader. Plan on how to contribute to global society/local community is missing. Ideas proposed on collaboration or hospitality are not sufficient.

Students' arguments	Pass. I will be working as a Hotel Analyst/ Marketing intern at HoCoSo, a hospitality consulting firm. During my first interview with Irene Zijlman, project manager, she presented me with details what type of tasks and responsabilities i could have during my internship. Furthermore, i had two video calls with interns that are currently doing their internship with them, Anke Wijkhuijs and Jan-Oscar Huges students from HTH, who explained their daily task and PPs. Besides, in order to enter the team i had to deliver an intern assignement which are taks i will have to deliver throughout my internship. Therefore, it gave me a first overview on what i will have to do and where i can improve. A theroy has been used to ensure an effective social development. The gibbs theory will help me to plan and reflect on my work as it will be remotely and need even more interaction with mentor and colleagues. Additionnally, from the start of my LYCar journey, development goals have been developped to help me maximize my learning and growth curve, and move towards objectives. Numerous EQ and AQ goals considers my feelings and relation with colleagues which is hard to be measured. The plan for EQ social developments is present in the chapter Intercultural Hospitality Leader. I considered in my analysis diversity of people, effective collaboration with all stakeholders, being a responsible citizen and contribute to the global society.
Assessors' main feedback	Lea covered it all-in her arguments. Even her her arguments are spot on and show a very stong ambition to grow.
Assessors' overall feedback	**Excellent job. See all my feedback. We can trust that Lea will develop herself further during her internship. Congratulations and keep on the good work during your internship and the implementation of the solutions in Block C.**
Excellent/Go/No Go Proposal	

13.   Data management

File Upload Notification

⊙ noreply <noreply@hotelschool.nl>   Today at 13:53

To: ⊙ Léa Iacazzi

Dear Lea Iacazzi,

This is an automatic delivery message to notify you that a new file has been uploaded.

Name : Lea Iacazzi
Student Number : 671513
Email : 671513@hotelschool.nl
LYCar Coach : Mr. Schermer
Research Number : 2021-9

We kindly request you to forward this email to your LYCar coach as evidence that your data files have been uploaded securely.
Thank You.

To respect the data management requirement, the complete company project report including all research data, interviews, report analysis and literature review have been upload on the data management website of Hotelschool The Hague. Furthermore, all presentation used for dissemination were uploaded as well.

Limitation: The original Nvivo data (included but transcribed in the complete report) couldn't be upload. In fact, this application is free of charge for two weeks. I could use this application for my data analysis for two weeks. However, when my subscription expired I couldn't save the original Nvivo files as my account was not accessible.

The main insights, data and analysis gathered thanks to Nvivo were implemented in the company report.

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16.   Proof of word count