



Index

- Appendix A: Graduation brief and planning..... 4
 - Appendix A1: Graduation brief 4
 - Appendix A2: Graduation planning.....10
- Appendix B: Interviews11
 - Appendix B1: Interview waste weighing 11
 - Appendix B2: Interviews public place 115
 - Appendix B2.1: Serving unit 115
 - Appendix B2.2: Serving unit 215
 - Appendix B2.3: Serving unit 316
 - Appendix B2.4: Serving unit 416
 - Appendix B2.5: Serving unit 517
 - Appendix B2.6: Cleaning company 1.....17
 - Appendix B2: Interviews public place 219
 - Appendix B2.1: Serving unit 119
 - Appendix B2.2: Serving unit 219
 - Appendix B2.3: Serving unit 320
 - Appendix B2.4: Serving unit 421
 - Appendix B2.5: Serving unit 521
 - Appendix B2.6: Serving unit 622
 - Appendix B3: Interviews public place 323
 - Appendix B3.1: Serving unit 123
 - Appendix B3.2: Serving unit 223
 - Appendix B3.3: Serving unit 324
 - Appendix B3.4: Serving unit 424
 - Appendix B4: Interviews public place 425
 - Appendix B4.1: Serving unit 125
 - Appendix B4.2: Serving unit 225
 - Appendix B4.3: Serving unit 325
 - Appendix B5: Interview F&B operator A27
 - Appendix B6: Interview F&B operator B46
 - Appendix B7: Interview guide.....59
 - Appendix B8: Interview Schiphol and CC Vest.....61
- Appendix C: Tenants at Oslo Airport insights65
 - Appendix C1: Mapping of waste practices of tenants65
 - Appendix C2: Additional notes waste practices mapping68
- Appendix D: Organisational structure of waste management at Oslo Airport71

Appendix E: Terminal structure	72
Appendix F: Stakeholder map	74
Appendix G: Co-creation workshop	75
Appendix G1: Co-creation workshop slide deck	75
Appendix G2: Templates for the walk in the shoes module	78
Appendix G3: Raw output of the co-creation workshop	79
Appendix G4: Outcomes of the co-creation workshop	89
Appendix H: Vacuum waste system at Oslo Airport	90
Appendix I: Overview of insights at Dutch public places.	94
Appendix J: Idea generation	95
Appendix K: C-box feasibility and user value	99
Appendix L: Morphological chart	100
Appendix M: Concept validations	101
Appendix M1: Interview Avinor	101
Appendix M2: Interview recycling company A	102
Appendix M3: Interview F&B operator B	102
Appendix M4: Interview F&B operator A.....	103
Appendix M5: Interview guide	103
Appendix M6: Harris profile concept evaluation	105
Appendix M7: Comparative assessment waste tracking	106
Appendix N: Information signs waste station	107
Appendix O: Final concept: overview of the service.....	110
Appendix P: Strategic Roadmap.....	111

Appendix A: Graduation brief and planning

Appendix A1: Graduation brief



IDE Master Graduation Project

Project team, procedural checks and Personal Project Brief

In this document the agreements made between student and supervisory team about the student's IDE Master Graduation Project are set out. This document may also include involvement of an external client, however does not cover any legal matters student and client (might) agree upon. Next to that, this document facilitates the required procedural checks:

- Student defines the team, what the student is going to do/deliver and how that will come about
- Chair of the supervisory team signs, to formally approve the project's setup / Project brief
- SSC E&SA (Shared Service Centre, Education & Student Affairs) report on the student's registration and study progress
- IDE's Board of Examiners confirms the proposed supervisory team on their eligibility, and whether the student is allowed to start the Graduation Project

STUDENT DATA & MASTER PROGRAMME

Complete all fields and indicate which master(s) you are in

Family name	<input type="text"/>	IDE master(s)	<input type="checkbox"/> IPD	<input type="checkbox"/> Dfi	<input checked="" type="checkbox"/> SPD
Initials	<input type="text"/>	2 nd non-IDE master	<input type="text"/>		
Given name	<input type="text"/>	Individual programme (date of approval)	<input type="text"/>		
Student number	<input type="text"/>	Medisign	<input type="checkbox"/>		
		HPM	<input type="checkbox"/>		

SUPERVISORY TEAM

Fill in the required information of supervisory team members. If applicable, company mentor is added as 2nd mentor

Chair	<input type="text" value="Dr. ir. S.S. van Dam"/>	dept./section	<input type="text" value="CPD"/>	<p>! Ensure a heterogeneous team. In case you wish to include team members from the same section, explain why.</p> <p>! Chair should request the IDE Board of Examiners for approval when a non-IDE mentor is proposed. Include CV and motivation letter.</p> <p>! 2nd mentor only applies when a client is involved.</p>
mentor	<input type="text" value="Ir. S.S. Mulder"/>	dept./section	<input type="text" value="MOD"/>	
2 nd mentor	<input type="text" value="Rita Jonyer"/>			
client:	<input type="text" value="Avinor Oslo Airport"/>			
city:	<input type="text" value="Oslo"/>	country:	<input type="text" value="Norway"/>	
optional comments:	<input type="text"/>			

APPROVAL OF CHAIR on PROJECT PROPOSAL / PROJECT BRIEF -> to be filled in by the Chair of the supervisory team

Sign for approval (Chair)

Sonja van Dam - IO

Digitally signed by Sonja van Dam - IO
Date: 2024.02.13 10:49:30 +01'00'

Name Sonja van Dam Date 13 Feb 2024 Signature _____

CHECK ON STUDY PROGRESS

To be filled in by **SSC E&SA** (Shared Service Centre, Education & Student Affairs), after approval of the project brief by the chair. The study progress will be checked for a 2nd time just before the green light meeting.

Master electives no. of EC accumulated in total _____ EC

Of which, taking conditional requirements into account, can be part of the exam programme _____ EC

★	YES	all 1 st year master courses passed
	NO	missing 1 st year courses

Comments:

Sign for approval (SSC E&SA)

Robin den Braber

Digitaal ondertekend door Robin den Braber
Datum: 2024.02.20 08:57:11 +01'00'

Name Robin den Braber

Date 20 feb 2024

Signature _____

APPROVAL OF BOARD OF EXAMINERS IDE on SUPERVISORY TEAM -> to be checked and filled in by IDE's Board of Examiners

Does the composition of the Supervisory Team comply with regulations?

YES	★	Supervisory Team approved
NO		Supervisory Team not approved

Comments:

Based on study progress, students is ...

★	ALLOWED to start the graduation project
	NOT allowed to start the graduation project

Comments:

Sign for approval (BoEx)

Monique von Morgen

Digitally signed by Monique von Morgen
Date: 2024.02.21 11:31:47 +01'00'

Name Monique von Morgen

Date 21 Feb 2024

Signature _____



Personal Project Brief – IDE Master Graduation Project

Name student

Student number

PROJECT TITLE, INTRODUCTION, PROBLEM DEFINITION and ASSIGNMENT

Complete all fields, keep information clear, specific and concise

Project title **Creating an efficient ecosystem for internal waste management at Oslo Airport**

Please state the title of your graduation project (above). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

Introduction

Describe the context of your project here; What is the domain in which your project takes place? Who are the main stakeholders and what interests are at stake? Describe the opportunities (and limitations) in this domain to better serve the stakeholder interests. (max 250 words)

Actions must be taken to reach the sustainability goals for 2030 and 2050, as outlined by the European Green Deal (2023). The aim is to set the EU on the path to a green transition and achieve climate neutrality by 2050. The EU funded TULIPS consortium contributes to this transition by developing and implementing innovative solutions on airports. TULIPS does this with so called workpackages. My project is in workpackage 6 (WP6). The main objective of WP6 "circular airports" is to reduce waste per passenger by 20% by 2024 in comparison with 2019 baseline (TULIPS, 2022). With my project, I will contribute to this workpackage by focussing on a case study about the research and design of a sustainable internal waste logistic system for Oslo Airport.

Oslo Airport, operated by Avinor, has 300 businesses and a workforce of 13.000 people. Their goal is to achieve a 50% reduction in waste by 2030, eliminating disposable items, food waste, incorrect sorting, and residual waste (Avinor Oslo Airport, 2023). The overarching ambition is to create a culture of waste prevention and reuse, envisioning a future where resources circulate without generating waste by 2030. A Waste Composition Analysis in 2022 at Oslo Airport and Schiphol Airport provides a baseline for comparison and reason for this graduation project. Internally, the waste logistics system at the terminal involves over 100 actors within more than 60 commercial units, leading to challenges such as frequent waste transporter changes, insufficient training, and high rates of faulty waste separation. Operational problems, including mess and overfilled containers, are additional burdens on waste handlers. Notably, some serving units have dedicated personnel for waste collection, while other teams lack this resource, emphasizing the need for a comprehensive and inclusive waste management solution.

This project involves multiple stakeholders, such as waste handlers, waste transporters, commercial units (shops & restaurants), suppliers and transporters and Avinor. The project may lead to more streamlined and efficient waste transportation processes, environmental impact and potential cost reduction, which can be beneficial for multiple stakeholders. However, it is possible that resistance is caused because this project may disrupt the current system.

→ space available for images / figures on next page

introduction (continued): space for images



image / figure 1 WCA at Schiphol, starting point for this project. 1/3 of the commercial waste at Oslo Airport is edible food.



image / figure 2 A waste pickup tool that is used at Oslo Airport.

Personal Project Brief – IDE Master Graduation Project

Problem Definition

*What problem do you want to solve in the context described in the introduction, and within the available time frame of 100 working days? (= Master Graduation Project of 30 EC). What opportunities do you see to create added value for the described stakeholders? Substantiate your choice.
(max 200 words)*

The current waste management system at Oslo Airport is marked by fragmentation, involving over 100 actors across 60+ companies. This leads to inefficiencies, frequent changes in transporters, and a lack of standardized procedures. And also the unequal distribution of waste collection personnel to collect the waste of the serving units. The challenge I want to take on is to unify these elements into a cohesive and streamlined waste logistics network. Furthermore, I want to seek opportunity to look where the system can be centralized if needed, so that the system as a whole gets simplified. But the focus extends beyond operational optimization. I am seeking to enhance the working conditions of waste handlers, increase appreciation for their job, reduce challenges in the work activities and establish a more standardized workflow.

This approach recognizes varying priorities at different levels within the system. For Avinor, the management layer, key concerns may be efficiency, cost reduction, and operational effectiveness. Simultaneously, for waste handlers, factors like well-being, recognition, and work efficiency may be the most important objectives. By addressing these diverse priorities, the solution seeks to create a human-centered and sustainable waste management system at Oslo Airport, ensuring the satisfaction and effectiveness of all stakeholders.

Assignment

This is the most important part of the project brief because it will give a clear direction of what you are heading for. Formulate an assignment to yourself regarding what you expect to deliver as result at the end of your project. (1 sentence) As you graduate as an industrial design engineer, your assignment will start with a verb (Design/Investigate/Validate/Create), and you may use the green text format:

Design a service blueprint to understand and create a sustainable and harmonized waste management system for the waste handlers, waste transporters, commercial units and other relevant stakeholders involved in the waste logistic system at Avinor Oslo Airport.

Then explain your project approach to carrying out your graduation project and what research and design methods you plan to use to generate your design solution (max 150 words)

In order to analyse and investigate the waste management I am planning on using the following methods:

- Literature review and case studies: I want to conduct a comprehensive literature review to gather insights from similar contexts, including sustainable waste handling methods, waste management practices at other airports, but also other industries. Furthermore, I want to look at similar case studies or pilot projects in waste logistics systems implemented in other industries. Or general logistics systems in a public environment setting that involves multiple, different stakeholders. Lastly, I want to look into public perception and psychology of environmental behaviour that comes with waste management.
- Field research at Avinor Oslo airport, which include observations and collecting relevant data.
- Stakeholder interviews: conduct in-depth interviews to understand the perspectives and pain points of waste handlers, waste transporters, and other stakeholders.
- Stakeholder workshops: facilitate co-creation workshops with stakeholders to gain user-centred and widely represented input for the service blueprint. I also want to use journey/empathy mapping as a method for this.
- Design service blueprint: I want to design the service blueprint iteratively by doing logistics flow analyses and by making quick prototypes, gather feedback and make iterations on the feedback.

Project planning and key moments

To make visible how you plan to spend your time, you must make a planning for the full project. You are advised to use a Gantt chart format to show the different phases of your project, deliverables you have in mind, meetings and in-between deadlines. Keep in mind that all activities should fit within the given run time of 100 working days. Your planning should include a **kick-off meeting**, **mid-term evaluation meeting**, **green light meeting** and **graduation ceremony**. Please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any (for instance because of holidays or parallel course activities).

Make sure to attach the full plan to this project brief.
The four key moment dates must be filled in below

Kick off meeting	9 Feb 2024
Mid-term evaluation	5 Apr 2024
Green light meeting	7 Jun 2024
Graduation ceremony	28 Jun 2024

In exceptional cases (part of) the Graduation Project may need to be scheduled part-time. Indicate here if such applies to your project

Part of project scheduled part-time	<input type="checkbox"/>
For how many project weeks	
Number of project days per week	

Comments:

Motivation and personal ambitions

Explain why you wish to start this project, what competencies you want to prove or develop (e.g. competencies acquired in your MSc programme, electives, extra-curricular activities or other).

Optionally, describe whether you have some personal learning ambitions which you explicitly want to address in this project, on top of the learning objectives of the Graduation Project itself. You might think of e.g. acquiring in depth knowledge on a specific subject, broadening your competencies or experimenting with a specific tool or methodology. Personal learning ambitions are limited to a maximum number of five.
(200 words max)

My motivation for this project originates from my enthusiasm for addressing complex, wicked challenges (focused on sustainability) and my ambition to evolve into an exemplary service designer. I see projects that involve multiple stakeholders (especially with different interests and priorities) as complex or wicked. "Wicked problems are problems with many interdependent factors making them seem impossible to solve" (*The Interaction Design Foundation, 2024*).

In past projects, I've applied design principles to complex issues, involving all stakeholders. This project provides me with the opportunity to further develop and apply these skills, specifically within the dynamic context of Oslo Airport. I see service design as a valuable skill in society nowadays as problems get more and more complex and I believe that entities that are connected and have interaction can gain value. I am determined to enhance my understanding and application of service design principles and this project serves as the ideal platform to realize this aspiration. Therefore, I want to try different tools and methods regarding service design.

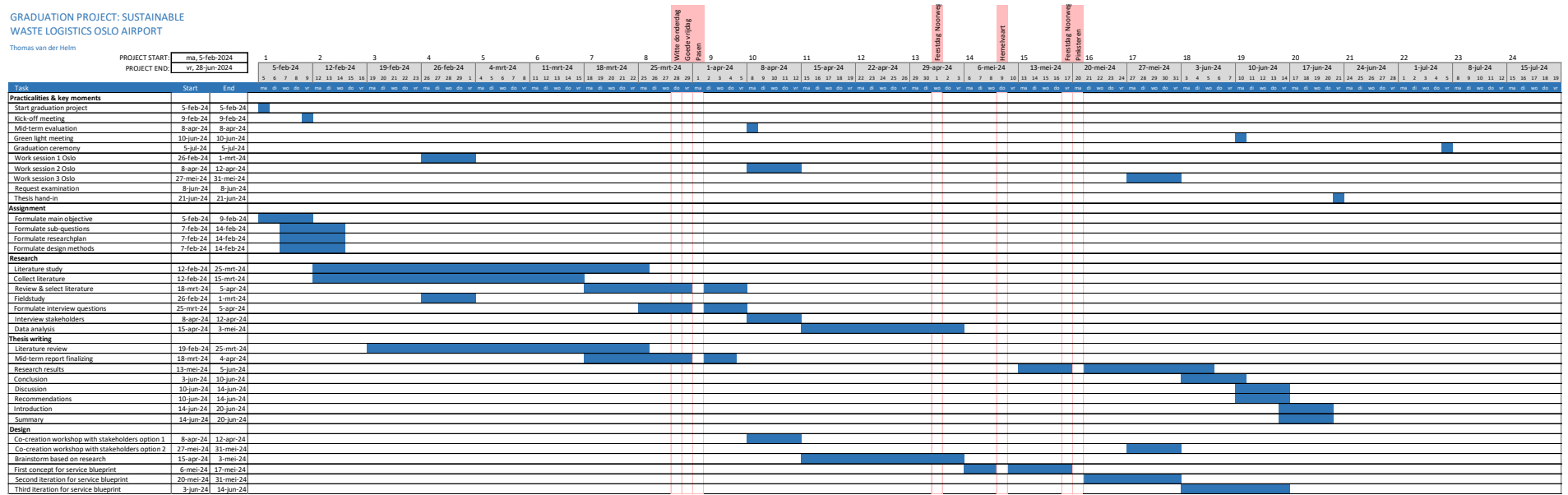
In addition to that I want to include co-creation workshops with stakeholders and try different techniques for this.

My overarching learning ambition is to emerge from this project not only with a good understanding of waste logistics but also equipped with a robust skill set in designing and implementing sustainable solutions that make a tangible impact in real-world, complex environments. Further, I want to equip myself with a good general understanding in logistical, system thinking and not only focussed on waste, airports or sustainability.

Appendix A2: Graduation planning

GRADUATION PROJECT: SUSTAINABLE WASTE LOGISTICS OSLO AIRPORT

Thomas van der Heide



Appendix B: Interviews

Appendix B1: Interview waste weighing

This chapter contains edited transcriptions of the conducted interview with Bjørn-Erik Nielsen accompanied by Lise Henriksen. Bjørn-Erik is sales manager at Waste processing company A and Lise is account manager at recycling company A. The transcriptions are edited and summarized versions of a verbatim transcript. These interviews are conducted on March 15, 2024.

Questions	
<p>Q1. Can you tell me something about waste management and legislation in Norway?</p>	<p>Response: For waste (weighing) the EU legislation is applied, not the Norwegian.</p> <p>There are changes in waste legislation every year, so we need to be prepared for the future.</p> <p>The best way to decrease emissions is to compact the waste and use less people for handling. Also sorting the waste properly reduces emissions. In municipalities in Norway they give citizens more bins or bags to sort their waste. They use different coloured bins like NL.</p>
<p>In the Netherlands municipalities use post separation. Is this something that can be applied in Norway?</p>	<p>Follow-up question and response: Post separation is not an option. This is being done in municipalities (same as NL), but there is not a post separation plant for company waste and companies need to weigh and register their waste for annual reporting</p>
<p>Q2. Can you tell me everything about waste weighing at Oslo Airport?</p>	<p>Response: We are looking at a solution like they do at municipalities. → a forklift or car that picks up waste at the tenants like a truck would pick up waste at citizens. This forklift should have something like a tablet to register which tenant, which kind of waste and the weight of it.</p> <p>Started this project only 2 months ago, so everything is still in progress.</p> <p>We want to use mobile compactors from Dutch company Meulenbroek. We want to place the mobile compactors on a forklift with a scale for weighing on the forks.</p> <p>Looking into 2 sorts: one compactor of 2,3 cubic metres and on compactor that is 3,5 cubic metres. Images below.</p> <p>The volumes of the compactors are not going to be a problem. The idea is that one type of waste is being picked up per round through the terminal. One type of waste should fit. However, weight can become a problem (especially for the 3,5 cubic meter compactor when fully filled, because the elevator can only handle up to 4 tons).</p> <p>Food waste is hard to compact. It's very dense and it becomes moist when compacting.</p>

	<p>Therefore, we are thinking about using the compactors mainly/only for cardboard/paper, plastics and residual waste.</p> <p>Also the compactors need to be waterproof. Because bottles for instance are not always fully empty</p> <p>Lise: In addition to this, paper recycling is challenging.</p>
<p>Why is paper recycling challenging?</p>	<p>Follow-up question and response: The recycling quality of paper has gone down. Because the composition of paper has changed, think of receipts and paper towels. It contains more fibres, which make it harder to recycle. → Therefore, focus should be more on PET bottles, plastics, food waste and residual.</p>
<p>Q3. What are the biggest challenges, problems or requirements for this project?</p>	<p>Response: There are several things to keep in mind I think. A forklift with a mobile compactor is quite big in size. This means that moving through a lot of people in the terminal (especially on busy moments like summer, Christmas and easter) can be dangerous.</p> <p>The sight of the operator is important and should be taken into consideration. Turning the compactor around so that the operator is at the front when driving would be beneficial for the sight of the operator.</p> <p>Learning to operate it safely is key. Bjorn: there are already (e)learnings for things like safety, I would suggest to just include this as new module.</p> <p>The compactor should contain sensors/alarming lights or something.</p> <p>A risk assessment is needed.</p> <p>People are not allowed to carry more than 25kg, according to the Norwegian ARBO.</p> <p>The total weight should not exceed 4 tons.</p> <p>The compactor takes around 20 seconds to compact when empty and around 30 seconds when almost full. To save time, it would be beneficial to drive the forklift to next tenant during compacting.</p>
<p>Q4. Is there any additional information to keep in mind regarding waste management or waste weighing?</p>	<p>Response: It is really interesting to weigh all the bins of the tenants to get insights on the totalities in the terminal.</p> <p>Waste of Norway is transported to Sweden for incineration, because Norway doesn't have the incineration capacity.</p> <p>Lise: the quality of sorting is higher when the staff does the separation instead of the guests. This is also due to culture differences at an airport. → this is in line with my own observations.</p>

In the current rental agreement of the tenants there is just one price including everything. So they don't pay per waste volumes or weight. However, Avinor do want this.

Lise and Bjorn mentioned something about a school/research project in the past about domestic waste or waste at from the planes/gates. Bjorn: it's smart to include this or ask Rita about it.

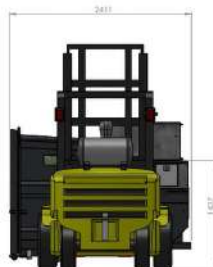
There are two types of compactors:


- Mobile compactors, they weigh 6 tons (Avinor has these).
- Static compactors, they weigh 8-10 tons. Bjorn says that these are better and Avinor should have invested in static compactors.

Q5. Can you show me what you are working on regarding the waste weighing solution?

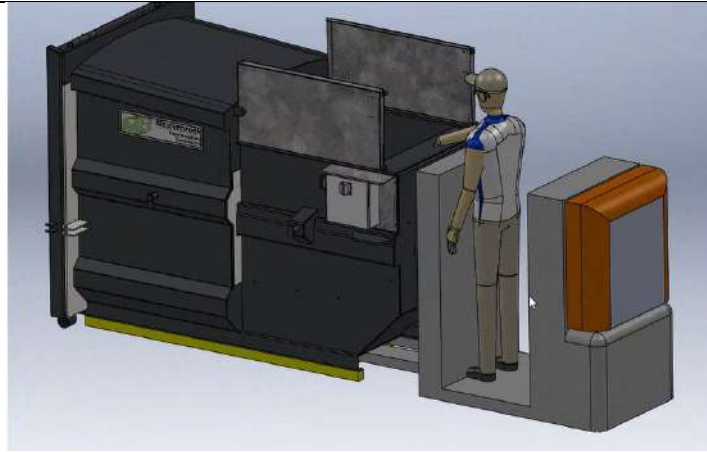


This is the 2,3 cubic meter compactor.



Project GEMOEN: ZWAARDIG Schaal: 1:25 Geplaatst: 2006 Datum: 06-03-06 Project: 30006 Drukking:	 Meulenbroek Perscontainers Compactors	Meulenbroek Onderneming BV Oudekerkeplein 10 1017 CA Amsterdam Tel: +31 (0)20 698 2000 Fax: +31 (0)20 698 2001 www.meulenbroek.nl
Project: 30006 Teken: M. van Frektoetsum: 20-0-2024 XX	Tekening: C130 A3.pdf	Blad: 1 of 2 Rev: A3

It can be placed on a forklift like this.



Or on a small forklift car like this. This is 2 tons of weight. So it needs hydraulics or a battery to ride it (orange part). This can be used by the forklift they are already using.

Appendix B2: Interviews public place 1

This chapter contains edited transcriptions of interviews conducted at Rotterdam Central Station. The transcriptions are translated, edited and summarized versions of a verbatim transcript. These interviews are conducted on March 15, 2024.

Appendix B2.1: Serving unit 1

Questions	
Q1. How is waste management currently integrated into your operations? Is it collected or do you take it somewhere?	Response: Garbage bags are placed at the back of the store and picked up by a cleaning company at the end of the day. This company collects waste for every store.
If yes, how often?	Follow-up question and response: Mostly at the end of the day. But the cleaning company walks by during the day to pick up waste.
Q2. Can you describe the different types of waste generated in a day?	Response: We have various types of waste: plastic, paper, residual organic.
Q3. Do you separate your waste?	Response: We have a compost bin for green waste at the back. We also separate residual waste and cardboard.
Q4. Do you pay for the amount of waste you generate?	Response: I am not sure if we pay more rent for more waste or if it's an all-in price.
Q5. Do you communicate with other shops or with facility management?	Response: Leon, Smullers, and Natoo are owned by the same owner. If they were to contact, it would only be between those stores. But there is no contact with other stores or waste management company.
If yes, how is communication about waste or with other shops conducted?	Follow-up question and response: We talk physically with them as they are basically neighbours.
Q6. Are there any challenges you are currently facing regarding waste?	Response: Currently, there are no problems with our waste.

Appendix B2.2: Serving unit 2

Questions	
Q1. How is waste management currently integrated into your operations? Is it collected or do you take it somewhere?	Response: We keep our waste in the back of the shop. Cleaning company comes by and collects our waste in the morning and evening. Sometimes they collect cardboard, and other times plastic.
If yes, how often?	Follow-up question and response: in the morning and evening.
Q2. Can you describe the different types of waste generated in a day?	Response: Types of waste mainly include general waste, cardboard, and some plastic.
Q3. Do you separate your waste?	Response: Yes in residual waste, cardboard and plastic.
Q4. Do you pay for the amount of waste you generate?	Response: I have no idea about the rent.
Q5. Do you communicate with other shops or with facility management?	Response: We have no contact with the cleaning company. It's not necessary, because they collect waste automatically.

Q6. Are there any challenges you are currently facing regarding waste?	Response: No actually not.
---	-----------------------------------

Appendix B2.3: Serving unit 3

Questions	
Q1. How is waste management currently integrated into your operations? Is it collected or do you take it somewhere?	Response: Waste is stored in the back of the shop in a container. The container is picked up by a cleaning company (not emptied in the shop).
If yes, how often?	Follow-up question and response: This happens daily.
Q2. Can you describe the different types of waste generated in a day?	Response: We have various waste types: plastic, paper, organic. There's quite a bit of food waste.
What do you do with the food waste?	Follow-up question and response: We need to throw it away due to regulations. In the past we tried Too good to go, but we received little response on that and nowadays we are not allowed to make deals with external parties.
Q3. Do you separate your waste?	Response: We separate in residual, paper and organic waste.
Q4. Do you pay for the amount of waste you generate?	Response: I think we pay the cleaning company a service fee for picking up the waste. Every little thing we do here costs money.
Q5. Do you communicate with other shops or with facility management?	Response: We communicate with other stores, mainly about collaborations or ongoing issues.
If yes, how is communication about waste or with other shops conducted?	Follow-up question and response: This happens both offline and online, mainly via WhatsApp.
Q6. Are there any challenges you are currently facing regarding waste?	Response: I feel that sorting could be improved because currently, everything is thrown into one bin. Ideally, they should separate, but it's just not being done.

Appendix B2.4: Serving unit 4

Questions	
Q1. How is waste management currently integrated into your operations? Is it collected or do you take it somewhere?	Response: Waste collection is centrally managed. It's mandated by the central station to separate it into cardboard, plastic, and general waste. They place waste bags in the corridor, and it's collected by a hired cleaning company. There's a large corridor behind the shops accessible only to staff.
If yes, how often?	Follow-up question and response: They always come by every 3 hours or so and take it.
Q2. Can you describe the different types of waste generated in a day?	Response: Cardboard, plastic and residual waste.
Q3. Do you separate your waste?	Response: Same as mentioned. The waste collectors get irritated if it's not separated properly.

Can you elaborate on that?	Follow-up question and response: In the past it happened that they refused to take a bag that was not sorted properly. Most of the times they gave a first warning and a second time refused to take it. Nowadays, it does not happen anymore, because we separate it properly.
Q4. Do you pay for the amount of waste you generate?	Response: I think we have just one price in our lease contract.
Q5. Do you communicate with other shops or with facility management?	Response: No. Only with our own office. If we want replacement for broken items (bins for example), we let our office know.
	Follow-up elaboration: The central station arranges big containers they place outside where large items like broken furniture can be disposed, this happens once per quarter. These announcements are communicated to all the stores through the station app. The app is called Station Connect.
Q6. Are there any challenges you are currently facing regarding waste?	Response: I don't think so.

Appendix B2.5: Serving unit 5

Questions	
Q1. How is waste management currently integrated into your operations? Is it collected or do you take it somewhere?	Response: We are on the first floor so are not connected to the corridor. But the cleaning company does pick up our waste. The people with the orange vests come here with a container to pick up our bags.
If yes, how often?	Follow-up question and response: Daily
Q2. Can you describe the different types of waste generated in a day?	Response: Organic, paper and residual.
Q3. Do you separate your waste?	Response: Same as above.
Q4. Are there any challenges you are currently facing regarding waste?	Response: No we don't face any challenges.

Appendix B2.6: Cleaning company 1

Questions	
Q1. Can you describe the role of ICS in the waste management process at the station and the scope of your responsibilities?	Response: ICS group collects the waste in the station hall and from every shop. We also clean the station hall. Behind the shops lies a long corridor on both sides of the station hall, that's connected to the back doors of the shops. Here, goods are delivered and waste is collected.
How often is the waste collected?	Follow-up question and response: All day, multiple times. We work in shifts from morning till evening. A round of waste pick-up takes around 60 to 90 minutes.
Q2. How is the staff/personnel composed?	Response: We work in shifts: 2 shifts per day. Shift 1 from 7:00 to 15:00 and shift 2 from 15:00 to 23:30. There are 5-7 people per shift. On busy days, 10 people. We have around 20 staff in total.

<p>Q3. What are the current processes involved in handling and disposing of waste at the station?</p>	<p>Response: The shops place their waste at the back of their shop in the corridor. The food waste or organic waste goes into a green container with a lock on it against animals. For residual waste we have roll containers where bags can be thrown into. For paper waste we have those roll containers with a big plastic bag, so that the paper doesn't fall out of the container. We bring these outside at the back of the station. There we have two large compactors, 1 for paper waste and 1 for residual waste. We use the medium-sized containers to go up the first floor with the elevators to pick-up waste from the living room and the kiosks. These containers can have blue lids for paper waste or black lids for residual waste.</p>
<p>How often are the compactor emptied?</p>	<p>Follow-up question and response: The residual waste compactor is collected on Tuesdays and Fridays. The cardboard compactor on Tuesdays. All other bins with organic waste are collected on Fridays.</p>
<p>Do they bring a new compactor if a truck picks up the full one?</p>	<p>Follow-up question and response: Yes they bring a new one. The compactor containers are from Renewi and have unique numbers that is traceable. If there's a malfunction, then Renewi knows to which station they have to go.</p>
<p>Q3. What challenges or difficulties do you encounter in your role in waste management?</p>	<p>Response: We address stores if waste isn't properly separated, but they don't encounter many problems. Also, in the hall for travellers, it generally goes well (there are only paper and general waste containers so that makes it easier). On busy days or when shops have a lot of waste, we come by extra to pick up the waste.</p>
<p>Q4. Do you have any training of safety regulations?</p>	<p>Response: At ICS, you need to get a RAZ diploma if you're new. Another certificate they need is the DVP pass. You need this to work on the train platforms, it's an annual training (1 at home and 1 on location). Eurostar is an international train, so we also have to deal with strict rules like at an airport.</p>

Appendix B2: Interviews public place 2

This chapter contains edited transcriptions of interviews conducted at the Westfield Mall of the Netherlands. The transcriptions are translated, edited and summarized versions of a verbatim transcript. These interviews are conducted on March 21, 2024.

Appendix B2.1: Serving unit 1

Questions	
Q1. How is waste management currently integrated into your operations? Is it collected or do you take it somewhere?	Response: We have two waste bins here. One for plastic and one for rest. Bags go into the wastebins. And a juicer that produces pulp. We have two large containers behind it. Also one for residual waste and one for paper. We take it to the large containers ourselves. The shopping centre consists of different parts, I'm guessing there are several waste points. But this is the one for us. It's about a 10 minute walk. We take away waste at the end of the day, sometimes more often during the weekend. They used to put it in the hallway, but that is no longer allowed due to an emergency exit blockage.
Q2. Can you describe the different types of waste generated in a day?	Response: Plastic, rest and juicer pulp
Q3. Do you separate your waste?	Response: Yes as mentioned above.
Q4. Do you pay for the amount of waste you generate?	Response: We have one fixed rental price.
Q5. Do you communicate with other shops or with facility management?	Response: No. We have a waste pass that allows us to open the door of the containers. We only ask neighbours if we have lost our card. We can buy a new one for 50 euros if we lose it, but a public transport card also works and is cheaper.
Is the use of the containers registered with those passes.	Follow-up question and response: No I don't think so, we can use it unlimited.
Q6. Are there any challenges you are currently facing regarding waste?	Response: It's pretty well organised. Containers are never completely full. The only thing is that we just don't know what to do with wooden crates, so we throw them in with residual waste.

Appendix B2.2: Serving unit 2

Questions	
Q1. How is waste management currently integrated into your operations? Is it collected or do you take it somewhere?	Response: We have waste from the kitchen that we throw in a waste bin. And we have cardboard and glass. We have a pass and then we walk to the back to the containers. We then take the waste away with a roll container. Often several times a day and once a day during quiet moments. Sometimes even 3x, mainly glass. The containers are located at the end of the street, the expedition street. About 100 meters from here.
Can it be challenging to bring away your waste 3 times per day?	Follow-up question and response: We work with a small team, so it is sometimes quite difficult to miss someone.

Is this roll container you own initiative?	Follow-up question and response: We arranged the roll container ourselves. So if it breaks, we have to fix it ourselves. When a delivery comes, we have a lot of cardboard waste, even too much for the roll container. Then we have to walk twice anyway and then an extra time for the glass.
Q2. Can you describe the different types of waste generated in a day?	Response: Glass, paper and residual waste. Food waste is thrown into residual waste container.
Q3. Do you separate your waste?	Response: See above.
Q4. Do you pay for the amount of waste you generate?	Response: We have one fixed rental agreement.
Q5. Do you communicate with other shops or with facility management?	Response: Not really for waste, only for marketing activities.
Q6. Are there any challenges you are currently facing regarding waste?	Response: Our glass bin is heavy and you have to tip it over. It's all manual work with a lot of lugging around. That's a hassle. And having the containers a little further away is not the most efficient.
Q7. How would you like it if there was a centralised team to collect the waste?	Response: It would be really, really convenient. But we would probably have to pay way too much money for that, which we don't want. We also do the cleaning ourselves for that reason.

Appendix B2.3: Serving unit 3

Questions	
Q1. How is waste management currently integrated into your operations? Is it collected or do you take it somewhere?	Response: The mall has a central location with containers. Glass, plastic, paper and metal. We take away waste ourselves. We can do that whenever we want with the pass. Sometimes 2 to 3 bags on busy days and sometimes only 1 bag on quiet days.
Q2. Can you describe the different types of waste generated in a day?	Response: Cardboard, food waste, plastic and residual waste.
Do you have a lot of food waste?	Follow-up question and response: Not really.
Q3. Do you separate your waste?	Response: Yes in cardboard, plastic and residual waste.
Q4. Do you pay for the amount of waste you generate?	Response: I think the rent price is including service fee.
Q5. Are there any challenges you are currently facing regarding waste?	Response: Sometimes the container is full. And then we can't get rid of our waste and birds start tearing open the bags when we put them next to the container. It also produces a stinky smell . But this only happens once a year at most.
Q6. How would you like it if there was a centralised team to collect the waste?	Response: A central team is really unnecessary, there is a waste bin on every corner. We can dispose our waste there easily.

Appendix B2.4: Serving unit 4

Questions	
Q1. How is waste management currently integrated into your operations? Is it collected or do you take it somewhere?	Response: We have a few trash cans. Here only two bins. At closing it's brought to the containers. But I never close, so I don't know the details. I think there is a storage upstairs for all the restaurants upstairs.
If yes, how often?	Follow-up question and response: One time per day when closing.
Q2. Can you describe the different types of waste generated in a day?	Response: Glass, food, paper, residual waste.
Do you have a lot of food waste?	Follow-up question and response: Not really, if there is food waste guests often want to take it with them.
Q3. Do you pay for the amount of waste you generate?	Response: I don't know.
Q4. Do you communicate with other shops or with facility management?	Response: Not really, only with our other restaurant upstairs.
Q5. Are there any challenges you are currently facing regarding waste?	Response: It would be better if we would have a plastic bin in our restaurant upstairs. Although we don't have really a lot of plastic.

Appendix B2.5: Serving unit 5

Questions	
Q1. How is waste management currently integrated into your operations? Is it collected or do you take it somewhere?	Response: The waste is taken to the back. There are two waste bins. One for rest (where we put our placemats in as well) and one for food. There are very large containers downstairs. We try to separate the rest and food, but it is actually useless because it is all thrown into 1 container. There is a corridor behind the restaurant with an elevator at the end of the corridor directly to containers, so the containers are relatively close.
If yes, how often?	Follow-up question and response: Twice on a busy day and otherwise once at the end of the day.
Q2. Do you separate your waste?	Response: Like I mentioned above.
Do you have a lot of food waste?	Follow-up question and response: Yes quite a lot. We serve large portions, so guests have some leftovers, but the kitchen is now more responsive to the amount of preparation. We do work with Too Good To Go, but it is actually hardly collected.
Q3. Do you pay for the amount of waste you generate?	Response: No that doesn't happen. Also, it's not registered.
Q4. Do you communicate with other shops or with facility management?	Response: No, not really actually
Q5. Are there any challenges you are currently facing regarding waste?	Response: It is an issue that food and residual waste are not separated. Bags are not opened by animals, because the container is properly closed.

Q6. How would you like it if there was a centralised team to collect the waste?	Response: It might work. Mainly to keep it cleaner and to combat pests, but there is nothing wrong with the containers.
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Appendix B2.6: Serving unit 6

Questions	
Q1. How is waste management currently integrated into your operations? Is it collected or do you take it somewhere? If yes, how often?	Response: There is a place downstairs with containers where we take our waste. We have a roll container that we have arranged ourselves or we use one that we take from the hallway. Follow-up question and response: Every day at the end of the day.
Q2. Can you describe the different types of waste generated in a day?	Response: Cardboard and residual waste.
Q3. Do you separate your waste? Do you have food waste?	Response: Yes in cardboard and residual waste. Follow-up question and response: We don't really have food waste.
Q4. Do you pay for the amount of waste you generate?	Response: Everyone has a card and it works indefinitely. And that's just one price.
Q5. Do you communicate with other shops or with facility management?	Response: I only ask immediate neighbours to take trash for them out of politeness.
Q6. Are there any challenges you are currently facing regarding waste?	Response: Only with those rolling containers to go down. Sometimes we don't have one available. Would be better if the mall arranged that.

Appendix B3: Interviews public place 3

This chapter contains edited transcriptions of interviews conducted at Zuidplein shopping mall. The transcriptions are translated, edited and summarized versions of a verbatim transcript. These interviews are conducted on March 22, 2024.

Appendix B3.1: Serving unit 1

Questions	
Q1. How is waste management currently integrated into your operations? Is it collected or do you take it somewhere?	Response: I actually want to refer you to management and you will probably find out more. There are several central places with containers. Shops have a pass to access the containers. We take away all the waste ourselves to these containers. There are containers for residual waste in various places, and for paper there are 2 places where a cardboard press is located. We have arranged a roll container ourselves. This roll container is used for taking away cardboard, we save this until the end of the day and then go to the cardboard press. A tube is used for residual waste, because we are on the second floor and the containers are at the ground level.
If yes, how often?	Follow-up question and response: Residual waste when we have a full bag and paper at the end of the day.
Q2. Can you describe the different types of waste generated in a day?	Response: Cardboard and residual waste.
Q3. Do you separate your waste?	Response: Cardboard and residual waste. Food waste is also thrown into residual waste.
Q4. Do you pay for the amount of waste you generate?	Response: It will be included in the service costs in your contract. The square meters of your store are taken into account. The total costs of the whole shopping mall are divided by the square meters per shop. So it will be distributed pro rata.
Q5. Do you communicate with other shops or with facility management?	Response: We can have contact with management and security via telephone number.
Q6. Are there any challenges you are currently facing regarding waste?	Response: No, I'm glad we can dispose our waste in the tube nearby. I actually think it's well organised. I can buy products (single-use items) from my supplier, but I am not allowed to sell them in my store. The legislation is currently quite crooked: 'I want to, but I can't play the game properly if you don't know the rules well'.

Appendix B3.2: Serving unit 2

Questions	
Q1. How is waste management currently integrated into your operations? Is it collected or do you take it somewhere?	Response: We'll keep our waste behind at the back. We will take it away after closing time. There is residual waste close to here (the tube) and I believe paper is outside.
If yes, how often?	Follow-up question and response: At the end of the day.

Q2. Can you describe the different types of waste generated in a day?	Response: Paper and residual waste.
Q3. Do you separate your waste?	Response: See above.
Q4. Do you pay for the amount of waste you generate?	Response: I don't know.
Q5. Do you communicate with other shops or with facility management?	Response: No
Q6. Are there any challenges you are currently facing regarding waste?	Response: It would be faster to have everything in one bag, but actually we don't have any problems.

Appendix B3.3: Serving unit 3

Questions	
Q1. How is waste management currently integrated into your operations? Is it collected or do you take it somewhere?	Response: We have this centralised waste disposal chute where waste and plastic goes into. It is located fairly close, in the hall of the service entrance. We dispose our cardboard outside. I have a cart that I put cardboard in and take the service elevator down to outside. We have a pass to get to the chute
If yes, how often?	Follow-up question and response: Once a day when we close. Cardboard may only be thrown away once every two weeks.
Q2. Can you describe the different types of waste generated in a day?	Response: Residual, plastic and cardboard.
Q3. Do you separate your waste?	Response: Residual, including plastic and cardboard.
Q4. Do you pay for the amount of waste you generate?	Response: I think we just pay one price, but I'm not sure.
Q6. Are there any challenges you are currently facing regarding waste?	Response: Yes, there is a lot of push from the management for less plastic, but at our store everything is delivered in large plastic containers and then products are individually packaged. Actually, no further problems for us.

Appendix B3.4: Serving unit 4

Questions	
Q1. How is waste management currently integrated into your operations? Is it collected or do you take it somewhere?	Response: We have our own supply delivery and waste collection. This is done together by HAVI and Pre-zero. HAVI for supplies and Pre-zero for waste. We bring down our bins with waste downstairs where a truck picks it up right away.
If yes, how often?	Follow-up question and response: Daily
Q2. Can you describe the different types of waste generated in a day?	Response: Rest waste, plastic, residual, paper and food waste.
Q3. Do you separate your waste?	Response: We separate into residual and paper waste.

Appendix B4: Interviews public place 4

This chapter contains edited transcriptions of interviews conducted at Utrecht Central Station. The transcriptions are translated, edited and summarized versions of a verbatim transcript. These interviews are conducted on March 28, 2024.

Appendix B4.1: Serving unit 1

Questions	
Q1. How is waste management currently integrated into your operations? Is it collected or do you take it somewhere? If yes, how often?	Response: We separate the waste. It is collected 3 to 4 times a day. Waste collectors from NS come by to ask if we have any waste and then it is collected. The waste exits through the front of the store. Follow-up question and response: Everyday multiple times
Q2. Can you describe the different types of waste generated in a day?	Response: Cardboard and residual waste.
Q3. Do you separate your waste?	Response: We separate into cardboard and residual waste.
Q4. Do you communicate with other shops or with facility management?	Response: We have more waste around the holidays and we can call a number then to come pick up waste.
Q5. Are there any challenges you are currently facing regarding waste?	Response: I would like it if the plastic was separated. We also take plastic bottles home with us to separate them ourselves.

Appendix B4.2: Serving unit 2

Questions	
Q1. How is waste management currently integrated into your operations? Is it collected or do you take it somewhere? So they are responsible for waste collection?	Response: I would actually like to refer you to NS, because they deal with the waste. Follow-up question and response: Yes, we offer our waste separately and NS waste collectors will collect it for us and handle it further.
Q2. Can you describe the different types of waste generated in a day?	Response: Mainly cardboard but also residual waste.
Q3. Do you separate your waste?	Response: Yes in cardboard and residual.
Q4. Are there any challenges you are currently facing regarding waste?	Response: No, not really actually.

Appendix B4.3: Serving unit 3

Questions	
Q1. How is waste management currently integrated into your operations? Is it collected or do you take it somewhere? If yes, how often?	Response: We separate into residual waste and paper. NS waste collectors will pick it up. NS recently also added glass containers I think. The waste collectors walk past several times a day. It will be collected from the front of the store. The paper and waste bin are in the store, they also have a bin at the back that they bring to the front when a waste collector comes by. Follow-up question and response: Multiple times per day.

Q2. Can you describe the different types of waste generated in a day?	Response: We actually want to separate into cardboard, plastic and residual waste. Because NS also wants to go there. But we're not quite doing that yet.
Q3. Do you separate your waste?	Response: Yes, we separate in cardboard and residual.
Q4. Do you pay for the amount of waste you generate?	Response: No we just have fixed contract with one prize.
Q5. Do you communicate with other shops or with facility management?	Response: We have no contact with other stores, but we can call NS if there are any problems.
Q6. Are there any challenges you are currently facing regarding waste?	Response: Actually, we don't have any problems. We now have more waste due to a new formula, but this does not cause any problems because NS visits often enough to pick up the waste.

Appendix B5: Interview F&B operator A

This chapter contains the verbatim transcriptions of the interview conducted by students Sophie Busch, Thomas van der Helm and Maria Gil Falcon with Rune Aasen-Vaksvang. Rune is food & beverage manager for operating company F&B operator A. This interview is conducted on March 19, 2024.

Food and Beverage Manager Company A – Rune Aasen-Vaksvang from F&B operator A

Avinor Representative - Rita

Student 1 - Sophie

Student 2 – Thomas

Student 3 – Maria

Unit 1 - Burger King

Unit 2 - Peppes' pizza

Supplier 1 - F&B supplier A

TRANSCRIPT

Food and Beverage Manager Company A

My name is Rune. I am a food and beverage manager. I've been in the company since 2016. Since we started at the airport. So yeah, I know a little bit of everything. Yeah, that's me.

Student 1

Great.

Avinor Representative

Hi Maria.

Avinor Representative

And just doing good introductions.

Student 1

Yeah, I can go now. My name is Student 1. I'm one of the graduating students working with Avinor on circularity. And for this project, I mainly look at looking into packaging circularity. So I'll be asking some questions about that because I already saw it on the HMS. Host website also that you're busy with packaging as well in some sort of way. So I'm very curious to that.

Student 2

Yeah. My name is Student 2 and also graduation student and my project focuses on centralising all waste management system, so to have a centralised system where all the tenants and the operators. That's the terminal can have one system to pick up the waste and bring it to the waste stations.

Student 3

And hello, my name is Student 3, also a graduation student. And in my case I'm working on developing A centralised dishwashing system, so focusing on the venues that doesn't have the capacity to wash everything they have or yeah, don't even have a dishwasher or. They reduce the packaging, well, the tableware that is disposable at the airport.

Avinor Representative

What I thought about is to start with a very, very short introduction on the background of these graduation projects in maximum 5 minutes and then give the word to the three Masters students to ask the questions. One second. As Rune, you have been to the circular solution meeting in February. You have heard some of this, so I will just quickly do a recap on the background, why we set this, this graduation projects in motion.

In the last two years, we did a lot of research on regarding waste in the in the terminal and what we found that. Ways the operations in in the terminal operations is suboptimal. It works, but there are a lot of improvement potential we found when we interviewed people who do work with the delivering waste that there is a lack of knowledge. They don't fully know why it is good, what they are doing, or how to best. What are the best practises? There is also a problem that there are hundreds of people who use the waste station under the terminal and we found it very difficult to pass through information when the information is going through 60 different businesses to hundreds of different people. And we got reported repeatedly from the securities that there are operational problems, especially when they are not in place. For example, the container is not run to compact, there is a mass and so on. And as the picture on the right shows that there's a high faulty throwing into the waist, everything gets thrown into the residual waste that there shouldn't be there. None of these are special to F&B operator A. We discovered that is a common problem across all actors. So that's why we are thinking about. Looking into centralised waste transportation service to make it reduce the amount of people who use the station and they have better information.

The other projects is this machine as a service and this came into our mind because we discovered that we throw away 180 tonnes of disposable serving items per year at the airport. Most of it is appears in the terminal operations. And what we also found that the takeaways are not used to takeaway over 90% of plates and cost there is and over 80% of cups are actually used up within serving units. Again, this is nothing specific to F&B operator A. This is a tendency we see all across the terminal. We would like to see if we provide the service for washing dishes, would it? Would it help?

The third project I'm saying 3rd but all of them are equally important is packaging food delivery and this came to our mind because our waste system down at the way station is reaching its limits. Regarding paper, we have two containers just to handle paper and even that is not enough. And the fire department is not happy with all the paper that comes into present polls into the station. And so on. So we would like to explore if there is any way to deliveries that uses less paper. Meanwhile, we want to sort out even more paper because a lot of them end up as. The residual waste. And we also have problems with the single-use pallets. Half of the food that we deliver are single-use pallets and we would like to see if there is any way. Stop using them. We'll get less, but at least we have a zero waste goal, so we work with the waste by 2030. That includes also source separated waste like paper and. And. And we know that there are a lot of good systems already in place for returning these return orders. Is it possible to have more of these? And are very, very interested if it is feasible or is it possible to introduce a refill system to reduce waste for goods that are often used, for example, milk boxes or other.

So when the opportunity came up through this EU project that we are participating in called Tulips, it works across Europe to accelerate sustainable aviation and it has one work package which is circularity. And we got the opportunity to have the master students and we grabbed the opportunity. And that's what we have now with us, Maria, Sophie and Thomas. And that was the last. Now I gave the word to them to ask away all the questions they have.

Student 2

Yes, thank you. Rita. I think it's maybe smart that I start since I have a centralised waste system and it's a bit more overarching topic maybe. What I'm really curious about because what we saw, we went to the terminal there physically one week a while ago and. What we saw is that you have the terminal as sort of the landlord, and you have some companies operating on their own, and you have companies like you like HMS, operating multiple brands from your portfolio. I'm curious, how do you see the responsibility? What do you feel responsible for and what do you think is part of your responsibility regarding waste? And regarding reducing waste or better proper recycling.

Food and Beverage Manager Company A

To be honest, I feel like we are. We are given all the responsibility, They don't give us a lot of. Options. They just it's your business. You handle your business and do what you think is the best. There are no. Before COVID, there was a waste handling system. You could put waste in some hatches in the wall and it went down to the delivery area, but they shut it down through the. COVID and after that it was just fix their own problems. So we have. Stuff handling waste for all our stores and several times a day. And we have been asking for. Some system that maybe could go pick up garbage or waste from all stores at the airport several days several times a day, but doesn't seem to. Yeah, do something about it. I see. That. A lot of operators use people to handle their own waste. There's a lot of people, there's a lot of. Hours. A lot of driving around the terminal to handle their waste. And they're a little they're a lot of ways to handle it more sustainable, I think. In the future.

Student 2

OK. Thank you. And then? Let's say for instance, you as a company as HMS you have, you can handle it yourself or you are free to do so from Avinor. But if Avinor has new policy or from Norwegian politics, there is new policy for reducing waste. Let's say you have X amount X amount of percentage. You need to reduce your waste by next year. How would you implement new strategies throughout all your serving units?

Food and Beverage Manager Company A

We always struggle to, you know, keep up with the new Guidelines or whatever it is, but we have we have contracts, we have a lot of things we have to do for, for example, now we are in the middle of a tender process with a lot of new concepts at the airport. And Avinor asks for a lot of takeout products. So we have to deliver it by contract. So we can't, we can't get rid of the, you know, the single-use products because they are asking for it and we have to deliver. If it was more up to us, we would maybe come up with other solutions. But you know, in a competition you have to deliver what they ask for. If not you. Lose. You are basically stuck with a little solution that you maybe not think are the best, but you have to do it because you win by doing it. So it's many of the solutions that you see today is based on the earlier tender processes. Because they asked for it, it was a part of the competition. Yeah. All right and.

Student 2

If it wasn't the competition, how would you see it working best? Or in this case as terminal regarding waste pickup or waste management, what do you think is? Challenging right now or what is causing problems? What is your opinion about that?

Food and Beverage Manager Company A

Uh. Yeah, there's many, many. Many reasons why we do what we do, but. Waste management is also issue because of the space we have. It's really small, small back of house. You have? Yeah. Maybe a room for two bins, maybe. And that's for food waste and. All other wastes it's difficult to, you know, to do this. Yeah. You don't have the space basically to. Do everything that you want to do. Because when it when it was built, it was. And. There wasn't so much, much focus on it. So it's hard to rebuild it within our contract period, for example, yeah, so. So if. If it if, if the new tender says that OK, you have to, you have to have 10 bins for all kind of waste products. You put it in in the contract and in the tender process. But there are no. There are no. They're not asking for it. They are asked for as much revenue as possible, as much shares in restaurant as possible. And you the back of house is as small as possible to yeah. OK, so you do what's? You have to do what you need to do to get. How much how much sale you need? That's it.

Student 2

Yeah. And regarding your, because you have your own people and stuff, collecting the waste for the different serving units, are there any challenges with that?

Student 2

With misalignment between the people picking up the waste and the people working in the serving units, the restaurants or the shops, or lack of information when they come down to the waste handling station that they don't know where to put the waste. Just some thoughts.

Food and Beverage Manager Company A

I think most of the people know where to put it, but the problem is that there are, you know, it's really busy, they throw everything in one bin. They don't have time to. To do things properly, you know putting plastic in one being on paper in another, they just you know. It's. It's a busy day, but I think that the problem is that. Not a problem, but the. The issue is that we have. Yeah. We don't have that, the. The staff to handle it like it should be handled.

Student 2

And why? Are there any other reasons you think besides that it's busy, or maybe not enough personnel?

Food and Beverage Manager Company A

The space and the personal. Yeah, that's. That's the two reasons. If he had, if he had the number, you know, just a lot of people and a lot of space, we would do everything by the book. Basically. OK. That's. Yeah.

Student 2

This space. Then I think I have one last question because. Of course you have different kind of brands in your portfolio operating in the terminal. Do you make sure that those different brands are aligned as well in their operations because some have more space, they can have five bins, some have less space and can only have two bins. So regarding waste, it can be different, but I can imagine other operations in the shop as well. Do you align those and if so, how?

Food and Beverage Manager Company A

Oh, there are, you know, there we have, for example, Unit 1. And there's a lot of waste handled by the guests. So when they have eaten their food, it's all paper and plastic. They put everything in just one box, basically. And. There's a lot of waste from that restaurant because of. You know, everything is just, it's not pressed together. It's just a lot of waste in our plastic. Like. So it produces a lot of waste on that, it's. A lot of. Air inside the bags is just a lot to handle. That's. Maybe the store that produce the most waste we have all the restaurants that almost have no waste at all. And use China from the restaurant we wash it, it's. More sustainable, but we can't change Unit 1 into something else because of the waste, that's. That's the brand and that's Unit 1. So we. We can't basically start to serve burgers. Portland it's, yeah.

Student 2

So impossible. What I understand from you saying this that. Maybe it can be difficult sometimes as. HMS so you have to balance the wishes from Avinor and the policy regarding waste, but also to keep up your brand image like Unit 1 and you cannot change their as well because maybe you want to reduce waste and you say hey Unit 1, let's change. To reusable porcelain plates. But that's not the image of Unit 1, is it? Is it like this do?

Food and Beverage Manager Company A

You. Yeah, that's yeah. Yeah. It's like that. And then in the in that in that tender we're asked for, for example, our International Burger brand. And they know what they want. So you have to give them what they want. If not, you lose. But we could basically say that, OK, we could produce our own Burger brand. We could make it more sustainable. We could serve the burgers in, in some kind of other packaging. We started to use something called Bradley. It's plastic. It's blood-based plastic. It's more sustainable. You could do other things if we had the if we own the brand and but it's difficult when you have to go in with a you know a big brand initial brand that. We don't have anything to say. They do what they do.

Student 1

So there's no way you can influence some of their operations at all. Or are there things that you ask from, for instance, Unit 1 or Wagamama that they do change for you or is there not an example of that?

Food and Beverage Manager Company A

We, we could ask them to change something, but it's easier with Wagamama because Wagamama is smaller than Unit 1.

Student 1

Yeah.

Food and Beverage Manager Company A

We changed the service model in Wagamama Norway because they have in all the restaurants they have on the table service that we changed it into to counter service to reduce the staff to be sustainable and to be able to make money.

Student 1

Yeah.

Food and Beverage Manager Company A

At all. But with Unit 1, it's almost impossible.

Student 1

Yeah.

Food and Beverage Manager Company A

To change something because they are so big.

Student 1

And with the like smaller brands, it might be possible to have an influence in some of their operations sustainability-wise.

Food and Beverage Manager Company A

Yeah, smaller brands, it's easier and even easier if it's if the brand comes from sales international or something. We have like 2 tigers for example. It's a, it's a brand in.

Student 1

Yeah, yeah.

Food and Beverage Manager Company A

Cost. So we can basically do whatever we want.

Student 1

OK.

Food and Beverage Manager Company A

We could, yeah.

Student 1

Yeah, OK. But that's good to know. That's when you have an influence.

Food and Beverage Manager Company A

So yeah, that's that's how it how it works. It's it's easier to. To change something with our brands or smaller brands than the big brands, they always win.

Student 1

Yeah. Yeah. And you talked about how it is super important to make a lot of revenue. Of course that does that like. Because you have, you have Avinor and the brand itself. I can imagine that you some sort of way work together and revenue gets like to one of the companies in some other way. Does the question for like more revenue versus sustainability mainly come from the brand itself or from are you also really focused as F&B operator A on sustainability or? Is do you still like, make sacrifices for sustainability? Quite a lot for revenue.

Food and Beverage Manager Company A

The revenue is the most important because it's when we when we get the contracts, it's something we call Mac. It's a minimum rent you have to pay. So even if you don't do the revenue, you have to pay the rent for.

Student 1

So they pay rent to you and. Then.

Food and Beverage Manager Company A

Yeah. Yeah. So, so basically you have. You have a number you have to deliver, so it's really important to have as much revenue as possible to even survive it's. It's the. It's the highest rent in Norway at the airport, so it's really, really hard to to make any money at all. So. That's why we have focus on the staff. It's a yeah, we we want to to give the guests as service as possible, but we also have to be really, really hard to.

Student 1

Yeah.

Food and Beverage Manager Company A

To reduce the amount of staff. And keep it as simple as possible. For the staff to to yeah, OK. So it's it's it's a lot if you had, if you had a restaurant in, in a, in a city or something, it's the rules are totally different. It's easier to operate.

Student 1

Yeah.

Food and Beverage Manager Company A

You could do more you. Yeah, it's a lot of.

Student 1

Yeah, I think we understand what you mean, yeah.

Food and Beverage Manager Company A

Yep.

Avinor Representative

I would like to have something connected to the centralised waste transport that I forgot to include in my slide is one of the things we would like to introduce in the future connected to centralised transport or waste transport is weighing the the waste that comes down to the waste station. Yourself today, everyone comes down and throw in the same container. We have no idea who generates how much waste. So to make it more fair for paying for for waste, the the idea is to that the serving units would pay only as much as they throw, but for that we need to wastethe waste per serving unit. But that would mean that those who deliver. Least would have one more thing to do routinely at every time they go to the waste station. And we are thinking of doing it only for a few fractions and not all the 15 different fractions that can be thrown. But my question is, would you do you have the capacity to take this on as an extra as an extra task routinely? To wasteyourself at the some kind of system.

Food and Beverage Manager Company A

I think we need. Then we need more, more, more people more or they have. Need more time through their days, but the the biggest issue with the with the waste is that many. Of our stores. They they have kiosk next to them. And people guests from the kiosks, they use our restaurants to eat and drink their things, and they throw their garbage in our bins. So we basically had if you start with our system that you have to weigh everything and get our bill based on the weight you pay for the costs, garbage. So then you start. Then we will start to say no to the guests. They can't sit in our restaurant. But our says everybody can sit where they want. So there will be, you know, really unfair situation. By doing that, so we will, we will be I guess we will start to find smart ways to to. Don't let the guests from the kiosks put garbage in our restaurants. There will be a war. Because we handle.

Avinor Representative

Thank you.

Food and Beverage Manager Company A

Yeah, because we have to handle their.

Avinor Representative

Garbage. Yeah, I understand the the problem here. This is yet another thing we need to take into consideration.

Food and Beverage Manager Company A

Yeah. The same the same with the with the, you know emptying the bins. There's a lot of garbage that don't belong to us. We have people, we pay people to to to go down with the garbage. If if it was only our garbage, maybe we could use just half the. Amount of people. So. We need to hire people to to, you know, do all these things because it's a lot of other things. So it's.

Student 1

Yeah, yeah.

Food and Beverage Manager Company A

It's it's the same if you have a house private house and your neighbour puts all the garbage in your bin. You get mad because you pay for the garbage and your neighbour don't pay anything.

Student 3

Yeah.

Food and Beverage Manager Company A

It's not there.

Student 1

Do you still have further questions, Thomas?

Student 2

No. You can take it over if you want.

Student 1

OK. Yeah, I'm Sophie, and I'm looking more into the packaging, but also during operations. So also PPT packaging, how stuff gets supplied to stores, pallets cardboards, but also things like milk cartons or packaging for coffee grounds. For instance, stuff like that. And we see that there's a lot of like also when we went there, a lot of cardboard being thrown away, single-use ballots, stuff like that. And I went through the HMO's websites and it talks about like. Nurture people care for the planet, sustainable food experiences, and there was also in the care for the planet. It mentions rethink if packaging is required and redesigned to reduce waste. And I was just wondering whether you're already working with that with F&B operator A at Oslo airports and if there are any initiatives going?

Food and Beverage Manager Company A

We always struggle to be sustainable and try to find sustainable solutions on everything basically, but it's.

Student 1

Yeah.

Food and Beverage Manager Company A

It's hard to to. To find solutions, especially with the products that are going inside the red zone.

Student 1

Yeah.

Food and Beverage Manager Company A

Because sometimes you have to split all products and it need to be packed single packed. For example you can't have bigger boxes with things. Because if you.

Student 1

Is that for security reasons?

Food and Beverage Manager Company A

About pizza. Yeah, that's for security reasons. So if you have, if you have one palette with one box filled with pizza dough for example. If you get a red light. You can't split it. Because it's just one box. You can't remove the products, it's it's complicated. So we need smaller boxes because you have to split them. If you get a red light. I think you maybe saw that and yeah.

Student 1

Yeah, I saw how they go through security. And I also saw that sometimes they have a sticker on them with, like, OK beforehand.

Food and Beverage Manager Company A

Yeah, the sticker is from Supplier 1, that's our supplier. They have secured the supplier, but some of the pallets were not secured. So you could get a red light, you have to take everything.

Student 1

Yeah.

Food and Beverage Manager Company A

Of the pallet.

Student 1

And then repackage it again. Yeah. Ah. OK. So that happens after security.

Food and Beverage Manager Company A

So so. Yeah, that's that's a spot check. So you never know what to split and what not to split.

Student 3

Hmm.

Food and Beverage Manager Company A

So if you have packed things in bigger boxes or something, you could basically get it, get it in that situation that you have to take everything out and yeah.

Student 1

Yeah. So it's hard then the like if you have it in the smaller boxes, you can easily identify which one to take out. OK, that's good to know because we couldn't go behind security. So I saw them going in but not going out. So that's a very nice thing to add and. What kind of reuse initiatives do you use? Like we have the the crates from Supplier 1 and milk that comes on reusable carriers, is there anything else that you're working with right now?

Food and Beverage Manager Company A

We are starting to use this product. It's a it's a plastic product made by. Wood.

Food and Beverage Manager Company A

So it's that's something we're going to start with now these days. That's a really sustainable product that looks like plastic. It's a plastic bag made of non-plastic products.

Student 1

Hmm.

Food and Beverage Manager Company A

I don't know the English words, but it is a is a little they do something with good products and make plastic.

Student 1

They make bags from. Wood. Yeah, you mean. And are those transport bags like bigger bags or for people? To.

Food and Beverage Manager Company A

Not that that's that's bags for products like you put a baguette or s focaccia

Student 1

OK. Oh yeah, I know what you mean.

Food and Beverage Manager Company A

Yeah, that's for the. That's for the guests, not for the products into the restaurant. It's yeah for takeaway.

Student 1

Yeah. Yeah. Yeah and.

Avinor Representative

Is it reusable?

Food and Beverage Manager Company A

Not not reusable.

Student 1

They're just made from wood instead of plastic, right? Yeah.

Food and Beverage Manager Company A

That's it's to get rid of the plastic.

Student 1

Yeah. And just looking at my questions. And if you're choosing suppliers for, like your units? Do you prefer like local suppliers? Because they're usually that's usually more sustainable? Or is it just almost always cost related the supplier you choose?

Food and Beverage Manager Company A

It's both. It's we have some volume products. That's really important that our have a nice price of course, but we also support local suppliers as much as possible, but it's, you know, if it's local, if they're small, it's more expensive normally. And if it's big and. Big volumes. It's cheaper that's.

Student 1

Yeah.

Food and Beverage Manager Company A

Normally the yeah.

Student 1

And do you still have? Ohh you can finish. Sorry.

Food and Beverage Manager Company A

Yeah, but it depends on what's local. Is it from Norway? Is it from from Oslo? Is it from?

Student 1

Yeah, yeah, yeah. But are there a lot of products you still get from outside of the EU?

Food and Beverage Manager Company A

Because it is. We don't. It's almost no import products and all meat in Norway comes from Norway because we are not allowed to import. We are allowed but it. You pay a lot of taxes to get meat into the country so. So for example, Unit 1, we produce all burgers in Norway on their recipe.

Student 1

Yeah.

Food and Beverage Manager Company A

Because they are not, they are so expensive to buy them from the United States.

Student 1

Ah, OK.

Food and Beverage Manager Company A

So. Yeah. So we we are more sustainable than a lot of other countries because of this rule.

Student 1

Yeah.

Food and Beverage Manager Company A

You don't. You don't buy. There's a lot of products, cheese, meat, a lot of things that we don't buy from other countries. We produce it in.

Student 1

Norway, so mostly animal related products you you only get from Norway probably, right?

Food and Beverage Manager Company A

Yeah, you can. Of course. If you buy Parmesan cheese from Italy, it's from Italy. It is really expensive.

Student 1

Yeah, yeah. Yeah. And UM. Things like the packaging for the burgers is that also from Europe or does that come from somewhere else?

Food and Beverage Manager Company A

And it's it's something comes from other countries. Something is produced in Norway.

Student 1

Yeah. OK. And do you still see some products coming in on like single-use ballots?

Food and Beverage Manager Company A

What do you mean from?

Student 1

The not recyclable wood pallets like, do you still see them coming in? Because I did see them being thrown away while at the airport.

Food and Beverage Manager Company A

That little there's. Sometimes you get this smaller pallets, but not often.

Student 1

OK, OK. And do you imposed like packaging regulations on your tenants as well or are they free to do with packaging what they want?

Food and Beverage Manager Company A

We, our suppliers, they have to deliver sustainability report. We are part of a, a big, a big group that makes deals with a lot of suppliers and they promise and they.

Student 1

Yeah.

Food and Beverage Manager Company A

Are supposed to deliver as much. In our sustainable products packaging as possible. So we.

Student 1

Yeah, but it is because I read your supplier code of conduct and it says that you have to comply with industry standards, law and regulations to the environment. So that's just the industry standards. And it also says that they have. To includes the goal of decreasing its environmental impacts, including in its own supply chain. But there are no mess like there's no concrete measure that you put on there from F&B operator A. Your tendons or like is it just that they have to have their own goal of the creasing their waste? But there are no percentages or a percentage of having to have reusable items.

Food and Beverage Manager Company A

No, we don't. We don't operate with our percentage because it's really. You know, we change products all the time we, it's. Unit 1 could this week have our campaign burger, and it's called next week and it's another project from another. It's it's hard to, you know, tell you.

Student 1

Yeah. It would be different. Yeah. Yeah, that's OK. Yeah.

Food and Beverage Manager Company A

With a number on it.

Student 1

Yeah. And there's no like, how do you check whether they are busy with this? Is that something that management, maybe even higher up cheques with like Unit 1 as an industry or? Do you also go around looking what is happening to the at the tenants themselves?

Food and Beverage Manager Company A

Yeah, we we try to to, you know, keep track of what they do and how they do things, but. Sometimes with big brands you just have to trust them and. Yeah, hope they deliver what they are promising.

Student 1

Yeah. And how do you check up on it? Is it just a chats or also looking at our operations and supply?

Food and Beverage Manager Company A

That said. No, the the, the, the, the we have this the I don't know the English word but we have this group with that we are buying from suppliers.

Food and Beverage Manager Company A

And the the the people that work on the top in that group, they are keeping track on all these contracts, this sustainability promises everything. So it's not. And if if a supplier don't deliver what they have promised, they change the supplier. Am I basically?

Student 1

OK.

Food and Beverage Manager Company A

Get informed that they they have a new supplier based on price and quality and sustainability, and I start buying from them instead. So I trust the system. It's it's really big, it's it's the, it's the biggest, it's the biggest operators in Norway. We have a lot of hotel groups. It's yeah.

Student 1

OK. Yeah, yeah, yeah. Yeah. OK. Yes. So you as F&B operator A can also like? If there's another supplier, that's more. Like that's more cost efficient, more sustainable. The brands just have to use that supplier if you're willing to change to another supplier. Basically.

Food and Beverage Manager Company A

It's It's it's complicated, but for example we have eggs and the eggs comes from a big supplier. It comes with the rest of the vegetables from our supplier local supplier that delivers eggs so we don't start buying eggs from him. He delivers eggs from a local farm.

Student 1

Yeah.

Food and Beverage Manager Company A

It's a small, small farm and he's competitive on price and in return, when he delivers eggs, he he brings our coffee brands for his farm.

Student 1

Ah, for the chickens. Yeah. Yeah. OK.

Food and Beverage Manager Company A

So it's it's a, it's a sustainable story and we're going to do it, you're going to use the eggs for all concepts because egg is egg.

Student 1

Yeah. Yes, OK.

Food and Beverage Manager Company A

So we do, we do things like that to to impact the local.

Student 1

Great. Yeah, yeah. But that's very good to hear that if the that the brands then just use the other eggs.

Food and Beverage Manager Company A

Yeah. So it doesn't matter. For example Wagamama, if you use eggs from notera or from a local farm it's it's eggies egg and he delivers also to big companies. So it's. Yeah.

Student 1

That's nice, yeah. Yes. Well, thank you very much. I don't have other questions right now. So I think Maria can take over. Times the question.

Avinor Representative

Can I just ask one? Because it's connected to this. Also very interesting. So if I understand why so you have, there are a lot of different products coming in and they are always changing. So it's always changing. Products are understandably very difficult to set up any. Reusable packaging like read to your ordering can only work on products that are regularly coming in, so there is a continuous flow. Is there anything you could identify any type of products on which that would be possible to set up? Rreturn ordering

Food and Beverage Manager Company A

We have a lot of.

Avinor Representative

Like for instance.

Food and Beverage Manager Company A

There are a lot of products that we, you know, like Coca-Cola. We have a deal with Coca-Cola. That's the product that we. We use it the same way, year after year until the the contract is changed or or if it if it changed to Pepsi we will do something else but not. Coca-Cola is a is a long term contract and it's a international deal, so I guess stay on the stick with us for a long time and. When we have these kind of products and these kind of contracts, it's possible to make things more sustainable, of course, because it's the the same things happen day after day and it's.

Student 1

Yeah.

Food and Beverage Manager Company A

We could easily. Improve what we are doing the same with a lot of other suppliers that delivers burgers, for example. They. They could maybe make bigger boxes. Now they deliver 5K boxes. Maybe they could deliver 10K boxes. Then I think you will will reduce the the cardboard use. Maybe so there's there's always. Products and suppliers that you could. Work with and do changes, but a lot of smaller products like.

Student 1

Yeah.

Food and Beverage Manager Company A

For example, tomatoes, they changed through the the week and through the year. In the summer we get Norwegian tomatoes in, in the winter time we get from Spain, from Italy, from. And they come in different kind of boxes, different kind of some include plastic, some include only paper, some there's there's different kind of boxes.

Student 1

Yeah.

Avinor Representative

And.

Student 1

Would you be open to me sending you an e-mail after this meeting where you could maybe tell me which products are more local and whether I could, for instance, have contact with a few of them, ask whether they would be open to delivering stuff like that, because I think we can do that. For. E-mail.

Food and Beverage Manager Company A

Yeah.

Student 1

OK, that would be great.

Food and Beverage Manager Company A

Yeah, that's that's that's that's that's a problem. It's not a problem, but that's how it works in orbit, because in Norway produce a lot of vegetables, for example, is in summer, so we get it from from May, June to September. Maybe all products are Norwegian.

Student 1

Yeah.

Food and Beverage Manager Company A

And then the winter comes and we start importing and things change. Everything comes in. Other types of boxes and yeah.

Student 1

Yeah. Yeah. Yeah, but I also saw the a lot of lot of milk gardens and I was thinking for a refill system there. But it's been very hard to get into contact with Tina. But maybe if you have a contact that you could connect me with that would be very useful.

Food and Beverage Manager Company A

Yeah, I think they are. They are not easy to get in contact with these days because they are struggling with a lot of issues themselves.

Student 1

Quickly. Hmm.

Food and Beverage Manager Company A

Yeah, the the milk are not from not all the milk are from Norway anymore. They they buy some milk powder or something that they use in their products. There has been a lot of media situations with the last.

Student 1

Oh. Oh, OK. OK.

Food and Beverage Manager Company A

Months.

Student 1

OK, good to know.

Food and Beverage Manager Company A

So yeah.

Student 1

But if it's OK, I'll send you an e-mail somewhere somewhere that would be perfect. Thank you very much.

Food and Beverage Manager Company A

Yeah.

Student 3

And from my part I was wondering, do you have any sustainability measurements related to single-use items that all the venues should like? Yeah, don't do or not because I know some. For example of the venues at the airport has this policy of asking customers if they want for takeaway or for dining in. Or you don't have this.

Food and Beverage Manager Company A

I don't have any number. We don't measure it, but we offer. We offer most of the places we offer. If you buy a Caesar salad, you can get it in house or you can get it in a takeaway box. It's your you can choose.

Student 3

Yeah. OK.

Food and Beverage Manager Company A

So we try to let the guests choose if they want to be sustainable or but a lot of people they want to take it to the plane or so it's. Yeah, yeah, they need it in a takeaway box, but yeah, but we we don't have any numbers. We don't know. Yeah.

Student 3

That's OK. And then at the beginning of the meeting, you mentioned that Avinor because of the tender competition they asked you to have like a number of takeaway. Options. I don't know if you can give.

Food and Beverage Manager Company A

Yeah.

Student 3

Not like they do. They ask like we have this available for passengers in case they want, or a number that you need to at the end of the year has sold.

Food and Beverage Manager Company A

They they want, they want a they want a concept and they want it to have this, that kind of food and they want it to have. It should be easy to bring, you know, food outside the restaurant today. So it has to be a lot of takeaway products. Yeah, for us. Fast self-service model or something? I don't know, but they ask for different kind of. Things so yeah. They they, you know, they make the rules and we have to follow them basically.

Student 3

Of course, yes. And are you the ones in charge of providing the unit, like the cleaning equipment such as dishwashers?

Food and Beverage Manager Company A

Yeah.

Food and Beverage Manager Company A

Yeah, yeah, yeah. We are more people working on that. But yeah, I'm one of those. Yeah.

Student 3

Yeah. And I don't know if do you know how do you make the decision of how many dishwasher does that you need need or if they don't need one, how does this process work?

Food and Beverage Manager Company A

They all. All units have dishwashers, some have several. Depends on the the what kind of concept and. And how big it is? What kind of machine some are? Really big and automatically and some are manual machines. It depends on the size and and what we expect to have in revenue.

Student 3

So I guess for example, Unit 1 that is more of a concept for takeaway that they don't have reusable options, they will have like less dishwashing equipment compared to Wagamama that is more for staying at the venue.

Food and Beverage Manager Company A

Yeah, they're breaking. They don't have dishwashers for plates, and they had just have for for equipment, kitchen equipment.

Student 3

Yeah, I remember.

Food and Beverage Manager Company A

So Wagamama have have for. You know, they have their own glass washer for beer glasses. They have plates. They have also equipment machines. So it's different kind of solutions.

Student 3

Yeah. And are you also the ones responsible of providing the tableware to the units, like the porcelain plates? And also the takeaway? Articles. Yeah. And is it that? Because, for example, the design of the tableware that each unit has is that a decision that you make or is it based on? If it is a franchise or?

Food and Beverage Manager Company A

If it's a brand or brand franchise, it's they they picked. You know they deliver a equipment list and we just buy what they tell us to buy. If it's our own concept, we. We do, we pick our own? Yeah, everything we use. What we.

Food and Beverage Manager Company A

These are the best and the nicest.

Student 3

Yeah. And also you mentioned that for example, in the case of worker game, it will be really, really difficult to make them use like porcelain tissue use. But I was wondering if, for example, if the train was smaller, like for example only change the gaps that they have reusable. cups will that make it easier or would also not be possible?

Food and Beverage Manager Company A

If it's. If it's a small, small brand, it's easier to to change those kind of things. And. If you compare it to the to our own smaller brands, we do. What we think are the best solutions and it's easy to implement it.

Student 3

Yeah.

Food and Beverage Manager Company A

We could basically do what we what we want.

Student 3

And then when we visit the the units in Oslo, we talked with unit 1. I think it's one of your units. Yeah. And I remember that they told that they couldn't wash all the glasses that they. Had. Like they didn't have capacity for that. Are you aware of that problem or?

Food and Beverage Manager Company A

They didn't have capacity to wash their glasses.

Student 3

Because they use single-use cups for soft drinks. Like cola and these kind of things and they mentioned that, yeah, because they have so many like passengers going and going out, sometimes it's really difficult to keep up with the capacity that they have. So they prefer to use the single-use.

Food and Beverage Manager Company A

I think that's they are lazy, it's easier for them to give the the passenger a paper cup than a real glass.

Student 3

OK.

Food and Beverage Manager Company A

And yeah, and that's because like I said earlier, they have really much to do and they find easier solutions for themselves. They don't care about sustainability or they don't want to, you know, they want to have a easy day..

Student 3

Yeah. So.

Food and Beverage Manager Company A

So, they do. They make easier solutions for themselves. But they have a lot of capacity to to wash glasses, there's just a. Silly comment from them to yeah.

Avinor Representative

Is this something you influence? Is it something you HMS which can influence like that requirement on your needs to, for example, only serve reusable for dining in guests?

Food and Beverage Manager Company A

I wasn't aware. Yeah, of course. And it's it's more expensive for us than if they give out the paper every time they sell soft drink. Because the glasses are free and we wash it almost for free, though, it's we earn more money if they use loss, so I wasn't aware. I I know that they sometimes don't ask the guest and everything but. I didn't know that they would answer you when you asked them that they don't have capacity. That's just a silly reason. So that's something I want to I will. I will handle it today. Actually it it. This shouldn't happen.

Student 2

Can you explain one more time why do you earn more money when they use glass? I missed the last part.

Food and Beverage Manager Company A

Yeah

Food and Beverage Manager Company A

The glass comes from Coca-Cola. It's it's free.

Student 2

OK.

Food and Beverage Manager Company A

And they wash it with a lot of other glasses are I don't know what the what we pay for one wash but it's some soap and it's almost nothing, a but for a paper cup you pay almost one NOK. Yeah. So.

Student 2

I'm saying.

Food and Beverage Manager Company A

If you, yeah, and you get, you get maybe 20 glasses in one cage for the washing machine. So every time you wash glasses you save 20 NOK.

Food and Beverage Manager Company A

Is A is A, is a. Calculation so they are not allowed to use paper as long as the guests are taking it out. It's a takeaway code.

Avinor Representative

We saw it across many. I don't have the in in front of me, but many serving units this this practise is the right practise that that for example food is served on porcelain but drinks are in plastic cups even for guests who are sitting inside. And this is a very widespread.

Avinor Representative

Practise. So I'm not. I don't think it was only unit 2, I think. There are many.

Food and Beverage Manager Company A

No, it's a big problem and we see it on many, many stores and I have an example One of the biggest restaurants in the on the red side, we have a coffee machine, our self-serve coffee machine and there are paper cups and porcelain. And guests, they go to the machine and they take the paper and they sit. Down in the restaurant. So people don't care. It's we make it possible for the guests to make a sustainable choice and they choose and then the things that are not sustainable. Maybe I think that, OK, maybe I drink half the cup when I sit down and take it with me to the plate, I don't know, but. We see it all the time. They don't. They don't care. We try to make an easy solution that they can choose, but it's not. Yeah, the guests are making that choice.

Student 3

Yeah. And I don't know if maybe you have think about strategies to promote that. Users like passengers use more reusable options, like maybe put signs or like "take The reusable option" or these kind of things or. You think that it should be? More. From an inside passenger behaviour that they. Use the most sustainable one.

Food and Beverage Manager Company A

Both we expect people to be more sustainable, to be more, more aware of. Things like that. Of course we could put out, put up a poster that says or is sitting down use our. Porcelain cups for your coffee. But you know, if you, if you have, if you have to put the posters on all these kind of things. They don't see it because there will be posters of people are travelling. They have, they are busy, they don't read, they just. They are coming into our restaurants. They are just thinking about where which gate to go to you know, all these things they have to remember when they travel. So they don't. It's easier to do these things in our in a restaurant downtown because people have more time, they are relaxed, they have all the things to to focus on. Yeah. So we we see that if we compare it to to concepts downtown, we see that people are more sustainable. Our more sustainable mindset and they are, you know, relaxed than when they are busy travelling.

Student 3

Makes. Sense.

Food and Beverage Manager Company A

Yeah.

Student 3

Yeah, I don't think I have more questions. I don't know if you want to add some last questions, **Student 1** or **Student 2** or **Avinor Representative**. So thank you very much for your time. It has been really useful.

Food and Beverage Manager Company A

You're you're. You're welcome. Yeah, hope. I hope I had some interesting comments. And and as I said, we we always try to to be sustainable and do the you know the. The best things, but we feel often that we are. You know, we're meeting the wall because there are there could be security reasons. There could be capacity reasons. There are always something you have to struggle against because there are obviously environments in the airport so.

Student 1

Yeah. Thank you very much. If it was very nice to see like how HMS works with all the attendants and how it works with Avi. And yesterday, because we're doing this also in collaboration with you delve, I emailed you with a consent form. It's a formality. So we can mention that we talked to someone from F&B operator A and I just send it to you. It's it's OK if we get it after, but if you would be OK with it, it would be perfect if you could sign that.

Food and Beverage Manager Company A

Yeah, I will do it. I was travelling yesterday so.

Student 3

Everything.

Food and Beverage Manager Company A

I was able to sign this.

Student 1

Yeah. No hurry. It was just I was like, I might as well still mention it, but it was very nice to talk to you and hear all about your operations at the airport.

Food and Beverage Manager Company A

Yes. Yeah.

Avinor Representative

Yeah. Thank you so much. It gave a lot to think about and consider for us too. There are so many, so many sides of this that need to be taken into consideration and so many interests within.

Food and Beverage Manager Company A

Yeah, there's. Yeah, I know it's it's. It's a big operation and it's always some someone who will not be satisfied or happy if you do something. So it's there's, yeah, who who will be your friends who will be your enemies. In the end, it's yes.

Avinor Representative

Well, I hope no enemies of course.

Student 1

Yes.

Avinor Representative

Let's see how what we can do, and it would be great if we can figure out something how to support our tenants to create less waste or operate more sustainably.

Food and Beverage Manager Company A

Yeah. And I think I think that's like you have done now you have made a group talking about these things and with with operators, it's it's really important because we see that. That we see that we are more struggling with the same things and we we didn't know that before the meeting, so maybe OK we are we are competitors but but we could we could maybe do something together to to solve our problems that maybe OK. We do the the waste handling in the morning and maybe our. F&B operator B do it in the afternoon to reduce the staff or something. It could be we could find solutions and we all we all already do it in the receiving area that we work together with our enemies we transport.

Food and Beverage Manager Company A

Each other's palettes and we help each other. And so there's possible to find solutions even if we are enemies.

Avinor Representative

It is. It's very great to hear that there is a room for collaboration across competitors because the services we thought of dishwashing as a service or waste transport or reducing packaging is a is a common problem across all of the actors. So it will definitely we can solve it on an individual level for 67. Different shops since the serving units.

Food and Beverage Manager Company A

Yeah.

Avinor Representative

Yep, thank you so much. Anyone everyone asked the way their questions. Yeah, I also learned a lot. Thank you. So. Much thank you. OK.

Student 3

Yes, OK. Bye. Bye. Bye. Thank you so much.

Student 2

All right. Have a good day. You too. Bye. Bye bye.

Student 1

Rita. She's gone. We can just.

Student 3

He was really nice.

Student 1

Be more. Yeah, it was really nice. Super useful.

Student 3

Yes, it was really nice. Super used at the beginning. I was like, I think he struggles a bit with the English, so maybe it will be difficult, but at the end he was more fluent I think.

Student 1

Yeah, but he struggled in the beginning with England.

Student 3

Yeah, yeah, yeah, yeah. But it makes sense. Like, if you have not been talking English for a while.

Student 1

Makes sense. I can e-mail read that as we have gotten.

Student 3

OK.

Student 1

You know, we can. I can wait till so much replies. Whether he also got it.

Student 3

Perfect.

Appendix B6: Interview F&B operator B

This chapter contains the verbatim transcriptions of the interview conducted by students Sophie Busch, Thomas van der Helm and Maria Gil Falcon with Lars Thoresen. Lars is quality and sustainability manager for operating company F&B operator B. This interview is conducted on March 22, 2024.

Quality and sustainability Manager Company B – Lars Thoresen, F&B operator B

Avinor Representative – Rita

Student 1 – Thomas

Student 2 – Sophie

Student 3 – Maria

TRANSCRIPT

Avinor Representative

You have been with us at the circular solutions summit. So you know some of the background information on this. But I thought to start with very shortly to introducing what is why we are doing this master's programs, what is the background and a little bit about the project that stands behind this, the EU project we are working on. So it will be very short, only about 5 minutes just to clarify it. OK, so you should be able to all see my opening screen, the graduation projects background, right?

Quality and sustainability Manager Company B

My screen is black.

Student 2

Yeah.

Avinor Representative

It's coming.

Avinor Representative

So in the in the recent two years we have done a lot of research on waste and waste management in the airport in all areas. Why we thought that we would like to have someone studying centralized waste transport is it's because we have waste operations and terminal that works. But there are a lot of improvement potential when we talk to people who deliver waste across all companies. We found that there is a lack of knowledge. People don't always know all the routines and why it is important to separate properly when they come to the weigh station and so on. And we also see that there are hundreds of people who come to the weigh stations in over 100 different companies too, which makes information flow really difficult. Like, if you have a change in the waste station, we find it really difficult to communicate it to those who actually use the waste station.

We also get reported continuously operational problems, especially when Security company A is not present, like overflow in the waste containers. The compacting complemented is not run, there is mess and so on and as you see in the picture on the right, there is a high error separating, as everything is thrown into residual waste, including things that shouldn't, and there are bags in the glass and metal packaging, and so on.

None of this is specific to F&B operator B. We can't pinpoint any specific actors. It's an observation across all actors. And that's also that we would like to introduce eventually a more fair pricing of waste. Invoicing based on the amount you of waste you produce, which means the less residual waste the units produce the less they would pay. But that is really complicated system to introduce. It need to be studied through this centralized waste transport. So this is the reason why we would like to look into centralized waste transport.

Another project is dishwashing as a service, we are looking into it because a waste composition analysis that we did in 2022 showed what we throw away. There is thrown away 180 plus tons of

disposable serving items every year at the airport and most of it, almost all of it, is from terminal operations. And what we have seen, surprisingly, is that this take away serving is not used for take away. So over 80% of cups and over 90% of these plates and coteries are used within the premises of serving units. So that's why we're looking into if it is possible to help our partners. By offering a service centralized dishwashing to reduce the amount of this 180 tons of disposable serving items.

Packaging, free delivery and operations grew out of the observation that our waste system is reaching its limits regarding paper and carton, we have to complement our containers and need to use two of two containers to be able to handle all the waste. And there are a lot of paper press balls. The fire department is not happy about this because it increases the fire coefficient of the waste station. So we'd like to really reduce the paper that is flowing in. Meanwhile, we actually want to sort out even more paper, because there's, as you remember, a lot of paper in the residual ways that shouldn't be there. That puts extra strain on the system. We also see that the woodwork consist of mostly single use pallets that connected to goods deliveries in the terminal, and we will be interested in if there are ways to reduce or stop using them at all. And of course you have heard before of a zero waste project and if you have a waste reduction goal which also includes source separated waste.

And then the picture on the right shows some of the return systems that we already have in place that we're really happy to see. But we are interested in if there is possibility to introduce more such return systems for packaging. And another interesting prospect is refill systems. We would be interested in if it is possible to reduce waste to through introducing refill of commonly used goods, for example milk. But there are a lot of other examples.

All this that we are working on is centred around within the frames of tulips, which is an EU financed project that is set in motion a few years ago to accelerate sustainable aviation and it has a lot of different focus areas. One of the work packages within this project is about circular airports, it looks at operational waste and construction waste and operational waste within the terminal. So that's how we get the opportunity to work with the three master students through the Technical University of Delft. And with that quick introduction, I would give the world over to the students. They can ask all the questions they have.

Quality and sustainability Manager Company B

I try to answer us good as I can.

00:07:59 Student 2

You're still muted Tomas.

Student 1

I was thanking Rita for the introduction and I wanted to start off with the waste management, like a bit overarching, who do you think is responsible for waste sorting, waste recycling, Avinor or F&B operator B operators? How do you see those responsibilities?

Quality and sustainability Manager Company B

All over, we are responsible for the sorting in our units and since we are operating in avenues and operated airports, they are the ones or they are doing the OR making the contract with which operator? The garbage is delivered to and so on, so we are not... We have to play within their rules. But at the end we our it's our responsibility to do it right.

Student 1

OK. And do you then as a F&B operator B implement your own strategies or systems or tools or anything for your waste management?

Quality and sustainability Manager Company B

And yes, we are. We are doing or having our system or segregating and managing the garbage but we are doing it according to how often the world wants us to sort it.

Student 1

And how do you know what is the way Avinor wants it? Is it based on the contracts or are there other influences on that?

Quality and sustainability Manager Company B

It's based on contracts and on understanding between parties and of in the way it's doing the control on it so they see that we are delivering on what we have agreed and we are also, ourselves, doing controls for check out that checks that we are good enough.

Student 1

OK. And do you align your controls or systems between your units because you have a lot?

Quality and sustainability Manager Company B

It's the same the same system in all our units, yes.

Student 1

So even for, let's say I know you have the big Jamie, the Jamies Italian. It's a big restaurant, but you have also smaller kiosks, but those operate the same regarding waste.

Quality and sustainability Manager Company B

Yes.

Student 1

OK.

Quality and sustainability Manager Company B

Because this is for the terminal, we do also operate air for our flight catering inflight catering, and there are some other rules because of garbage that comes from third countries have to be burned and destroyed, so there are some other rules and legislation that comes in with this kind of garbage. But for the terminals, it's 100% the same for every 14 airports. They are in Norway.

Student 1

Yeah, it's good to know. The focus is indeed on the terminal.

Student 1

OK, let me see what kind of strategies or systems have you introduced in your units to ensure that there's waste reduction or better sorting. Can you name a specific example?

Quality and sustainability Manager Company B

We are sorting at the moment. Basically in the our units on food, plastic cartons and everything else. To call it in English...

Student 1

Yeah. Residual waste?

Quality and sustainability Manager Company B

Yes, thank you.

Quality and sustainability Manager Company B

And then we are at the moment member of Too good to go to reduce food waste. So we are working on reducing food waste. Selling the food as or selling it cheaper at the end of the day, and also that we are donating food to a local Health Centre.

Student 1

And do you think those initiatives help already for reducing waste or?

Quality and sustainability Manager Company B

Yes

Student 1

OK.

Student 1

And I can understand that it's going to be quite challenging to be sort of in a in a middle position because you have those rules and rules and contracts from Avinor, but also brands from your portfolio and you want to brand image to keep in place to maintain it. How do you see this, how do you manage that?

Quality and sustainability Manager Company B

I'm not sure if I understood your question.

Student 1

Well you as F&B operator B, you are an operating company who has several brands in your portfolio like Starbucks or Jimmy, Jamie's Italian and they those brands, they have a certain brand. Image they want to operate in their way. I can imagine that Starbucks also have their yeah ways of operating and Avinor has their rules and you are like in between those two. Do you see it that way or?

Quality and sustainability Manager Company B

We are, as we are trying to operate as we want us to operate. Because this is the system which are on the place we are, so this is what matters the most and this is the system we have to follow. But of course, for example, we have a brand in this airport called... Everything we serve in is disposable. We don't have any plates that are to be washed off and or dishwasher and things like that. So this is one of the things we have to look into for, to reduce garbage and not used too much disposal cutleries and things like that, yeah.

Student 1

Yeah. All right. Because do does units do they pay rent to you SP or how does this work?

Quality and sustainability Manager Company B

You know the units are operated by us. So for example, some of these are our own brands. But James is the franchise. So we pay James to operate it.

Student 1

By you mean you pay Jamies so they can operate it? Are the people working in, for instance, Jamies, are they working for Jamies or for F&B operator B?

Quality and sustainability Manager Company B

They are for us, so and you set the routines so you can tell them like. This is how we pick up waste, for example. So tell them who decide, correct. Yeah.

Student 1

OK, let me see. If, for instance, Avinor wants to introduce a new policy or new rules like Rita already mentioned, the weighing system, for instance, that's a good example. How would you manage that or deal with it? How would you approach that?

Quality and sustainability Manager Company B

We would try to accommodate it and follow it. We are doing a project now in begin as far as I know where we are weighing our food waste.

Student 1

OK.

Quality and sustainability Manager Company B

Yeah.

Student 1

And how's that?

Quality and sustainability Manager Company B

Going as far as I know it's been doing this for 2 1/2 months or something now and the reaction from our my colleagues in Bergen is very positive.

Student 1

OK.

Quality and sustainability Manager Company B

I can tell you in a separate occasion on that maybe I can set up with you because we are also very interested in how is that going because they set up a very weighing system for all ways. It's a test project, but do not use too much time on it right now. We can set up a different session. Because I haven't seen it or seen how it's been done. So I'm going down to Bergen on the 9th and the 10th next month and I will look into the system when I'm there.

Student 1

OK, then I have for me a final question for right now, because you operate a lot of units in the airport and big player. Have you identified any real big problems or challenges, or maybe improvements or room for improvement?

Quality and sustainability Manager Company B

Our biggest challenge is space. Our units are very small, kitchens are very small. Our the place that we are operating is very small. So it's a challenge to have enough space for segregating. And there is also that it is a long way from where we are to where we throw the garbage so the logistic around the getting the garbage from our sites and down to the garbage or sorting area is challenging and some of the some of the plastic bags goes, for example, a hole in it. So we, It's...

Student 1

Sometimes it can get a little messy?

Quality and sustainability Manager Company B

That's one thing. Another challenge is that, we have a big or, we o□en get new people into our working places, so the challenge is teaching. Everyone knew how to do it and all the routines and how to segregate and things like that?

Student 1

Do you have any specific rules for that or how do you how do you manage that all?

Quality and sustainability Manager Company B

Well, our segregation rate is not that good. I can see. So we are have to, we have to concentrate more on this. Because they just learn it from the workers, their colleagues that are already working there. But it's not sort of booklets they follow or something. They learn from each other mainly and I have to find a better solution for how to teach them this routine, so I'm now taking out the new segregation tablets and trying to do oppression or oppression, of course. So we are getting better.

Student 1

Yeah. All right, good to hear. Well, thank you. That's it for me for now. Thank you very much.

Student 2

OK, I guess I will continue about packaging. So zooming out a little bit, it was more about B2B packaging, pallets wood cardboards during operations. So that is what I'm most interested in, and as I of course went to the F&B operator B website and you're a very big operator, not only in Norway, but also in other areas. And you say a little bit about caring for the planet and reducing packaging or making packaging less single use. But what I see on the website is mostly consumer packaging like the cutlery. So I was just wondering whether you are also busy with eliminating packaging or decreasing packaging during your operations.

Quality and sustainability Manager Company B

Yes, we are we are changing our patching over to more.. That... Or...

Student 2

You can take your time.

Quality and sustainability Manager Company B

I'm sorry, more.

Student 2

It's OK.

Quality and sustainability Manager Company B

Eco friendly packaging and it's a very large we have a lot of different packaging. There is a lot of new packaging coming. So we have a project on it and it's not finished. So there is a big job to for to change it.

Student 2

But, if I understand correctly, you have with F&B operator B your own project going in the in the direction of packaging? Umm ah, OK. And what is their main focus? Is that on making the materials more ecofriendly or also eliminating packaging and using?

Quality and sustainability Manager Company B

Mainly making the packaging more ecofriendly and, or this is for all the take away. So that's for the consumers that they get, yeah, more ecofriendly packaging when they take stuff away with.

But for example, we have here in Oslo we have a catering unit or a production unit that makes our baguettes and salads and things like that.

Student 2

Yeah.

Quality and sustainability Manager Company B

And here we use plastic boxes which are washed and reused.

Student 2

Yeah. Are those the big plastic boxes that fit in their cupboards? Because I think I saw them because they delivered from the kitchen and like the black reusable crates sometimes as well, that the like, you have deliveries from Osco and from Bama and they use reuse solutions and I think you use bigger plastic ones?

Quality and sustainability Manager Company B

Yes, we do. Yeah, yeah.

Student 2

OK, so you use those reuse solutions as well, but when you for instance also choose suppliers like I can imagine products still come on pallets and a lot of products are wrapped in plastic foil. Are you working on that as well or choosing suppliers based on how much packaging they use? Or is it mostly competitive pricing?

Quality and sustainability Manager Company B

We are using on or we are working on using lesser plastic lesser or recyclable plastic and things like that. This is not my, not my strongest field as you probably have noticed.

Student 2

That is OK.

Student 2

If there are people working in this project, would it also be possible for me to contact them?

Quality and sustainability Manager Company B

Let's see.

Student 2

I can e-mail you later as well, OK.

Quality and sustainability Manager Company B

Please and I will give you some emails for to so you can have some questions according this, yes.

Student 2

Yeah, that would be great. Thank you. And I'm also of course thinking about options like refill solutions or just ordering products more in bulk to decrease packaging from suppliers. So we talked to other people and there were things like, yeah, we get quite a lot of products locally and they have shorter supply chains. We saw the milk ourselves that are used in large quantities. Do you have any areas in this that in your operations where you're like I would see a reuse or refill solution would be applicable or this is a problem area? If you look at it from your view.

Quality and sustainability Manager Company B

I think this is a problem area and you have always to you know it's. It's the reason why plastic is so much used. For example gland pack and things like that. And this is for food safety quite difficult.

Student 2

Yes.

Quality and sustainability Manager Company B

What we now are doing is working on making more products ourselves in our biggest airports we have catering unit for in flight train, we are trying to make more of our products in these production units. This will make it easier for us to buy in bulk. So this will in a way take care of this part problem, yes.

Student 2

Yeah, because if you make it in catering units, you probably don't have to split it up. And then it's easier with foods and healthy relations, right? If I understand correctly. OK. (F&B operator B nods) Yeah. OK. And there are no products like for instance, mailboxes or meat where you're like, you could do bulk packaging that for this kind of product.

Quality and sustainability Manager Company B

One more time please.

Student 2

If you have a concrete example of a product that could be made into bulk or refill.

Quality and sustainability Manager Company B

What I was thinking about that is that, for example, then we can get bigger or... One of our problems is that we have one big suppliers called F&B supplier A.

Student 2

Yeah.

Quality and sustainability Manager Company B

And they have a lot of, or everything they deliver is... They don't believe deliver so much in bulk and everything is wrapped and packed. So what we have to do is or. In a way that, for example if F&B supplier A is working on being more ecofriendly themselves that make it easier for us.

Quality and sustainability Manager Company B

I don't have any good examples for to say that this is something we're working on or this is where we can.

Student 2

OK. Yeah. I can imagine also that it's a big hassle with suppliers and you choose your suppliers based on local products freshness and of course price. So if they are the best.

Quality and sustainability Manager Company B

Yes, and that they are big enough so they can supply.

Student 2

Is it hard for you to demand changes from your suppliers? Sometimes you can demand things from your suppliers, but I can imagine if F&B supplier A is the only one big enough, then it's quite hard to demand change in packaging from your side from them.

Quality and sustainability Manager Company B

Yeah, is another example. For example, there is that we would for example like to use slow growing chickens for our units, but we are too big, so we have to wait until the EU has this chicken committee in 2026, I think where, yeah, so we have to follow this because we are too big. Other smaller companies can go to local suppliers that have this. But for us, since we are so big, we have to wait.

Student 2

Yeah, yeah, I've read it on your website as well. Specifically about chickens. Yes. So that's interesting to know.

And I emailed AKSO, but I'm having a hard time. I'm having a hard time getting contact with them and I was just wondering whether I if I send you an e-mail afterwards as well I could maybe ask you whether you have a contact person at Osco I can e-mail.

Quality and sustainability Manager Company B

Yes, please do and I will set you in contact with our employees that are dealing with this so they can send you on to the right person.

Student 2

Oh, that would be perfect. Thank you very much. Yeah, that would be really nice. Thank you very much. And I think those are for now the questions from my side. If you don't have any other remarks, then I think we can move on.

Avinor Representative

Can I also ask regarding packaging and the buying in? So F&B operator B is quite a big actor in the market. That means that your procurement process is a way to put pressure on delivery companies like suppliers like AKSO, like how can you use your procurement power to press them to find better solutions like demand for example, that instead of paper the goods that are delivered every week should come in some foldable, reusable box or something like that. Was just an example.

Quality and sustainability Manager Company B

Probably we could always try. We are, but... Yes, we have the possibility to do that and but I'm not 100% sure, I can't give you an example for that, I'm sorry.

Avinor Representative

OK, that's interesting. Thank you.

Student 3

Then I will take over. So this is a bit related with what you have been talking with, Sophie, but I was wondering if your unit at the airport have any specific measurements that they should take in order to reduce the single use tableware that they have?

Quality and sustainability Manager Company B

Yes, we have or many of our units have, what you call that? The disposable paper cups and the one the ceramic ones.

We use it. They are only to use paper cups and things like that for take away. So mainly where we're using this is in our kiosk point. And as I mentioned, we have this paper and its recyclable and things like that. When this concept was made 7-8 years ago everything a lot of things have changed since that time, so this concept is actually outdated. So we are working on it to make it more ecofriendly.

Student 3

And have you faced any challenges already in trying to change this?

Quality and sustainability Manager Company B

One of the biggest changes was because of the coronavirus that everything was to be paper and then we have made ourselves a habit of just taking a paper cup, and that's one of the reasons why Oslo Airport has so much single use cups and things like that because I can see now, for example, in my office where I'm sitting now we have normal cups to drink. But many are using paper cups because it's habits, so I am always going around taking away the things and it takes about two hours and they are back on the table. So have they would have been. It takes time to turn it back, I think, yeah.

Student 3

Yeah. I know that some of the units at the airport, for example, have the policy of asking the customer always if they want to dine in or take away. Is that also a policy that you have in all your units or?

Quality and sustainability Manager Company B

Yeah.

Avinor Representative

It is good to have that policy, but we observe that it's not necessarily practiced in the day-to-day business like I'm as a customer almost never asked. If I if I want a coffee to take away I or sitting in, I always get automatically in paper. And I discovered I have to ask it for myself, but I'm not. I'm not get asked from the staff.

Quality and sustainability Manager Company B

OK. Because then I'll check that one out to write it down. So yeah. The last time we noticed that sometimes because especially during the peak hours, the stuff is like really busy, let's say, and then if they give paper cups, it's easier for them also to do another task.

Student 3

And is F&B operator B responsible to provide the cleaning equipment to the units, like for example the dishwashers and based on what do you decide how many dishwashers should they have?

Quality and sustainability Manager Company B

Yes, and all our units have a dishwasher except one and they are using the one which is from the unit next to them. And the number of dishwashers in the area is mainly, it depends on how much space they have. And also for example if the unit is busy and have a lot of seats and things like that, we try to put in efficient amount of machines so they have enough... How do you call that... So they can wash the quantity that they need.

Student 3

Yeah, according to the capacity that they have?

Quality and sustainability Manager Company B

Yeah. Their capacity. Thank you. That's just it. And also for example, under one of our units, which is called Everyday Kitchen, you have washing room, which are bigger and is more like a central washing area for us.

Student 3

So is it that like for us you mean that all the units could use that space for washing or the ones which are close to this place?

Quality and sustainability Manager Company B

The ones that are close.

Student 3

OK. And is also F&B operator B responsible for providing the table where that all the units have. Like the dishes, the cutlery. And I noticed that the design of the table were changed from unit to unit?

Quality and sustainability Manager Company B

Yes we provide that. For example, we have all units which have kind of the same stuff and like some like Jamies and things like that they have their own design yes. One of the things this or the reason this is done is to separate them, separate them so they look different from other shops.

Student 3

OK.

Quality and sustainability Manager Company B

Uh. And it gives or for a normal person which are walking through the terminal the impression that these are different units. They don't know that it's the same.

Student 3

Then I was wondering for example, you said that there's one of the units that doesn't have a dishwasher and they use the dishwasher of other units.

Do you think it will be valuable or beneficial for them to be part of a centralized this washing system that will wash for example, the dishes that they send to the other units or if having needs to change to ceramic cups Avinor will do that for them. Do you think that will be beneficial?

Quality and sustainability Manager Company B

One of the reasons that also all the units have their own washing machines, even if they for example, if you go to the kiosks and things like that they need the possibility to wash everything which they are using as tools and things like that... If it's beneficial to have a central dishwashing area. I'm not sure.

Because it means that we need to have a lot more tongues and equipment and things like that, where if you send it away, you need to be sure that you have always enough clean equipment at our place.

And I can see advantages and disadvantages with central washing, yes.

Student 3

What about for example, if Avinor will provide the tableware that is needed to have this enough equipment instead of you providing it, do you think that will be like kind of a solution?

Quality and sustainability Manager Company B

What might be a problem here is that for example as because of money and all different places want their own, they want to look special and apart, so it will be a big job for Avinor to sort and make sure that all factory and cups and plates and things like that ends up at the same place or right place, or else every restaurant will have design same white plates and the same glasses and things like that. And I don't think this is... Something that the units which are operating on a big airport would like.

Student 3

Yeah, makes sense. What about, for example, if the centralized option focussed on one thing. For example, on the cups. The main problem is the paper cups, so all the units will have like a shared design for the paper cups, but the rest will be unique. Would your units be more open to be part of the system, or will we have the same problem?

Quality and sustainability Manager Company B

Probably the same. I think for example, all the paper cups and things like that are they are different also because there are commercial or how do you call that....

For example, we get.

Cheaper paper plates, paper cups because there's a label on it, says coffee brands and the coffee brands are paying us money or for to use their brands. So it's commercially beneficial for us to have this deal. So that's why it's also different lookouts and things like that.

Is this an answer on your question?

Student 3

Yes, it's a perfect answer. Perfect, I think.

Let me see. I don't have more questions. I don't know if maybe Thomas or if you want to add something else. Or maybe Rita?

Student 1

Yeah, I have one, not really a interview question, but I have a follow up question because. I'm travelling to Oslo again in the first week of April, so that's in two weeks and I wanted to organize sort of, yeah, Co creation, Co design

session and that's basically a sort of one to two hour workshop where all relevant stakeholders are involved. To talk about the challenges and to yeah make a fundament towards the solution into the waste management. So I was wondering if it's possible to invite one person or some persons from the waste pickup team from F&B operator B and some people from the employees working in the units. I can also send an e-mail if that's maybe better but it would be really nice to see if that's possible to organise, but I can send an e-mail afterwards to.

Quality and sustainability Manager Company B

Yeah, sent me an email.

One thing I would like to ask you about is that have you heard about a system called MUUSE it's a kind of rental cup. Where you rent a cup, drink your coffee, take it or take away coffee cup or mug, and you drink your thing and then you deliver it back. And it washed and used again. And you can do the same with the meal box. They have the both systems. So this is a way to reduce paper and or paper cups, paper plates and things like that.

Avinor Representative

We have been, yeah, we have been looking into similar systems with Avinor. I just checked out the one you mentioned. I'm not sure if you looked into this or something similar and it all goes back to how will all this be washed? Because these actors usually offer the technical solution like the app or QR code and some of them also offers. We looked into one Norwegian company who offers also the plates and food plates rewash rewatchable food plates with QR code written on it.

So people don't have to download an app for that, which is something you really would like to make it easy, but they have no idea how all this will be, where they watched. They can offer a collection point, the QR code and the tracking system or payment system. But they don't offer dishwashing. So how will this be washed? Because you're talking about literally millions of cups a year.

Quality and sustainability Manager Company B

Because then you have central dishwashing solution. All units more or less in the Gardermoen, for example, do have a dishwasher. So at smaller places it would be also possible and one of the things which I've been playing with is that what if you rent a meal box at a place in Gardermoen, you go on the plane, eat, sit on the plane, and then you land in Bergen and you deliver it in Bergen and it will be re washed and sent around. It's a cool system or a cool thought, but if it's possible, I don't know.

Student 3

And if I can add something that in this case I didn't know this specific initiative, but I know many that are kind of like similar idea and in these cases the cups that all the restaurant hubs have are the same. They are not branded by anything, so this is again kind of one of the problems that you mentioned me that to implement this all the units must agree to have a share cup.

Quality and sustainability Manager Company B

Yes, but then it will not be. Then we can or as a brand, we could always have our cup, but then as a customer you make this decision. You decide that you want to use a reusable cup and rent it and take the responsibility to deliver it back, so it will be their own decision, yeah. So has like both options.

Student 3

OK, nice. Good to know.

Avinor Representative

We told us that with the central sustainability team in Avinor and we get a tentative yes to such ideas that you mentioned, like across reusable serving across airports across all Norwegian airports.

But so it is not impossible. It's just we think that it is good to start at one place like how would it work in one airport and then we can scale it up to more airports because the more airports are more, the more difficult it gets. So you figure out in one airport then we can think about scaling it up for for more.

But it's not out of question. It's just, it takes some steps to figure out. Let's figure it one and then see for more.

Quality and sustainability Manager Company B

This is one idea I have given to my company a SSD and they're not interested so. I don't know why but nice to know that somebody else is working on it because I think it's a good. And it will reduce paper cup usage.

Student 3

Good to have it into consideration.

Avinor Representative

Thanks everyone.

Quality and sustainability Manager Company B

Do you have my e-mail address if you want to send me emails.

Student 2

Yeah. Yeah, we can see your e-mail address in the insights of this meeting. So that is perfect. And I think a very big thank you from all of us for your time and your good ideas, because we can see that you're very involved, which is very nice to hear about it. So thank you very much.

Quality and sustainability Manager Company B

Yeah. When are your papers to be sent in?

Student 2

In July, Maria and Thomas, somewhere in the beginning and mine in the middle because I'm taking one week off, but all sort of in the same time periods, yeah.

Quality and sustainability Manager Company B

Good luck and thank you.

Student 1

Thank you too very much. You have a nice last work day and Easter weekend.

Appendix B7: Interview guide

The semi-structured interview questions that served as guideline when talking to tenants and waste handlers.

For tenants / account managers commercial units

1. General Understanding:

- Can you describe the type of business you operate at the airport and the nature of waste generated?
- How does waste management currently fit into your daily operations?
- How is the staff/personnel composed? How many (temporary) people, do you work in shifts and how often new joiners?

2. Current Practices:

- What are your current practices for waste separation and disposal within your business?
- Are there any specific challenges you face regarding waste management in your unit?
 - If this question is hard, please think about the most recent event/happening where you faced a certain challenge.
- During a year, are there peak moments where there is significantly more volume in waste or other contents?
 - How do you deal with these moments?

3. Collaboration and Communication:

- Do you coordinate with other commercial units regarding waste management?
 - If so, how?
- Is there a communication process in place to ensure everyone is aligned with waste reduction goals?

4. Suggestions for Improvement:

- In your opinion, what improvements could be made in the waste management process within your unit?
- Are there any specific measures you think would enhance sustainability in waste management?

5. Awareness and Training:

- How are your staff members trained or made aware of sustainable waste management practices?
- Do you think there is room for improvement in terms of employee awareness and training?

6. Future Commitments:

- What support or resources would be helpful for you to enhance your waste management practices?

For waste handlers

1. General Understanding:

- Can you describe your role in the waste management process at the airport and the scope of your responsibilities?
- How long have you been involved in waste management at the airport?
- How is the staff/personnel composed? How many (temporary) people, do you work in shifts and how often new joiners?

2. Current Processes and Challenges:

- What are the current processes involved in handling and disposing of waste at the airport?
- What challenges or difficulties do you encounter in your role in waste management?
 - If this question is hard, please think about the most recent event/happening where you faced a certain challenge.
- During a year, are there peak moments where there is significantly more volume in waste or other contents?
 - How do you deal with these moments?

3. Collaboration and Coordination:

- Do you coordinate with commercial units and other stakeholders in the waste management process?
 - If so, how?
- Are there any coordination issues or bottlenecks in the current system?

4. Technology and Infrastructure:

- What technologies or tools are currently utilized in waste management, and are there any limitations?
- Are there any infrastructure challenges that impact the efficiency of waste handling?

5. Opportunities for Improvement:

- In your opinion, what areas of the waste management process could be improved or optimized from a handler's perspective?
- Are there any innovative solutions or best practices you think could enhance waste handling efficiency?

6. Future Commitments:

- What support or resources would be helpful for you to enhance your waste management practices?

Appendix B8: Interview Schiphol and CC Vest

These are the notes from conducted interviews with Royal Schiphol Airport and shopping centre CC Vest in Oslo about a centralised waste service. These interviews were conducted in the past and are not part of this graduation project, but insights were used.

INTERVJU

To those who have such as a service already (CC vest shopping center, Schiphol Airport)

How many units (shops, restaurants, etc.) do you collect waste from? How many of the units are catering establishments?

CC Vest: 80 units, 10 serving units,
Schiphol: 125-150 units

How big is the amount of waste? How many customers do they have per day on average and at peak?

CC Vest: 1000 ton pr year
Schiphol: <not provided>

How many people do you use for this service?

CC Vest: 5 Varetilrettelagt arbeidstaker (VTA) & 1 work leader
Schiphol: 7 pr day aprx on the Terminal. 30 personer in total

Is there 0-24 service? Or which time windows and days of the week?

CC Vest: 08-15 Monday-Friday. Afterwards and on Saturdays, the units throw themselves

Schiphol: Available 27-7, but mostly 05 - 23:00

How were the pick-up times determined?

CC Vest: Mustad eiendom got in touch with a broad request including building material recycling

Schiphol: They have traffic at night, also want to make sure that there is no organic waste over night (pest control)

How was waste transport before introducing this service, and how did the transition go?

CC Vest: the units throw themselves

Schiphol: It is in place for 7-8 years now. Niels doesn't know how it was before.

What does the service consist of other than waste transport and sorting?

Feedback on faulty sorting? Weighing waste? Shipping of goods upwards?

CC Vest:

- They provide guidance to store employees and cleaners
- They address the operations manager with deviations
- Speaks verbally to units about faulty sorting

- Does not have registration of waste quantities per unit. It was talked about, but found out that it is very time consuming. Only the supervisor could register, which makes it cumbersome.

Schiphol:

- It is not part of the service to transport goods upwards. Commercial units pick up goods when they deliver residuals.
- They do give immediate feedback if they see something wrongly separated

Are commercial entities billed for quantities of waste (ie: do they pay per kilo)?

CC Vest: They split renovation costs with a key. They pay the price per kilo and service costs

Schiphol: no. Planned from q1 in 2024. Solve it by qr codes on the standard boxes.

How commercial relates to the service?

CC Vest:

- Almost exclusively positive. A win-win. Positive for society and sustainability.
- Pickups go around all day. The Team has a phone that can be called.

Schiphol: they are positive. Better source separating align with their own sustainability goals. They experience feedbacks as support

How much does this service cost?

CC Vest:

- CcVEST covers salary costs for the supervisor
- Not subsidized by the state
- 5 VTA is paid a low wage (30 NOK per hour) and receives social security benefits

Schiphol: a LOT

What kind of equipment do you use for collection and shipping? Is there any standardization in collection equipment at commercial companies?

CC Vest:

- Trolleys with boxes where they collect sacks and cardboard boxes
- Special equipment for pallets

Schiphol:

- Indoor driving cars
- Standard hard plastic boxes that are washed in a waste room in a special dishwasher

How do you cooperate with the waste handlers?

CC West:

- Quarterly meetings regarding collection, operation, logistics, sorting degree with Norsk Gjenvinning, Mustad property and several stakeholders
- They have close contact with NG

Schiphol: Waste handler owns the collection

What was the reason why you have chosen to have this service?

CCvest: The desire to optimize and streamline operations. Tenants spend a lot of time transporting waste

Schiphol: provide a service to commercial so they can focus on sales; also increase waste sorting

What are the reasons for buying this in as a service and not employing your own staff to perform it?

CCvest: Wants to do good for society. Do not necessarily want to employ so many more (employer liability etc.). Is also significantly cheaper with OPT.

Schiphol: The waste handler is best equipped to do it: all the specialists in one place, connection to waste transport. IT is also a routine left over from the previous contractor

How is this financed?

CCvest: Through common costs that are roughly the same for everyone, but anchored in the contract. They increased joint costs when the service was introduced. Freedom to operate is important, they do not go into detail about the operating costs, only large cost items are explained.

Schiphol: square meter prices per day.

Other notes CCvest:

- 75% is the sorting rate as of today. That is 20% higher than before
- started up before 2020
- Also works in Mustad's commercial property
- Has a re-use warehouse and for various re-use goods (building materials, office cleaning, etc.). Collaborates with Loopfront
- The model:
 - o Hybrid model: 5 VTA which requires close follow-up
 - o They can deliver the service stably

- There are so many contracts that go in and out that the introduction of the service was not linked to contract periods
- Trolley: "we work for sustainable waste management" and styled
- Frees up the operations manager's time at the return point, container exchange, etc. because the team solves a lot
- They are thinking of motivating tenants through building regulations (for example, non-compliance fees for incorrect sorting). Handle as a separate document from the contract.

- Problem: The shops put garbage bags in the hallway because they know OPT is coming

Other notes Schiphol

- They are employing a waste coach to help commercials
- Waste collector gives immediate feedback on faulty source separation
- They do spot checks to see if there is any faulty source separation
- They collect only food, plastic, orange peels, bottles, but not f.eks farlig avfall

Appendix C: Tenants at Oslo Airport insights

Appendix C1: Mapping of waste practices of tenants

	Where	Source separation possibilities									Stock in another location?	Delivery yourself or collected?	By who?	How often do they pick up/deliver waste?	Notes	Category	Sorting without downstream	
		Residual	Food	Pant/bottles	Paper	Plastic	Glass	Metal	Hazardous	Other								
WHITE ZONE																		
Point Kiosk Departure hall	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x	x		x						No	Collected	SSP	2 times per day	Uses too good to go to reduce food waste.	Kiosk	
WHSmith	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x			x	x			Only receipts				Collected	WHSmith	2 times per day	New joiners are sent to the waste station to experience it once.	Kiosk	
Peppes Pizza	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x	x	x		x	x		porcelain		No	Collected	HMS host	2 times per day		Restaurant	
Joe & the Juice	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x	x	x	x						Yes	Self	Independent	5 times per day	up waste for them because it takes a lot of time to go down 5 times per day	Restaurant	Plastic cups and coffee cups
Starbucks	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x	x	x							Yes	Collected	SSP	3 times per day		Restaurant	No
Burger King	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x		x							Yes	Collected	HMS host	Collected 3 times before 5, after self-delivered		Restaurant	No
La Baguette	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x	x		x		x					Collected	HMS host	Together with Burger King 3-4 times per day	Glass and metal is combined, but planning on separate bins	Restaurant	No
W.B Samson	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x	x	x	x	x	x				Yes	Collected	SSP	2 times per day	Cold storage. They throw away porcelain in residual waste bin, because they are not aware.	Restaurant	No
Wagamama	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x	x	x		x			plates		Yes	Both	HMS host	3 times per day		Restaurant	
Narvesen	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x	x	x	x						Yes	Self	Not via Avinor, but via BaneNor	2 times per day	Not part of Avinor, BaneNor. There is a lot of packing away in the warehouse.	Kiosk	
Cutters	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x			x								Self	Independent	1 time per day	Knives and scissors are collected in a white box and send to supplier for repair or renewal.		
Xchange	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x	x	x													
RED ZONE - INLAND																		
Ritazza Domestic 1 - V gate A8	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x		x		x	x		porcelain & coffee grou		No	Collected	SSP	4-5 times per day		Restaurant	
Ritazza Domestic 2 - V gate c	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x		x								Collected	SSP	2 to 4 times per day		Restaurant	
Jamies Deli Oslo Lufthavn - Inland	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x	x	x		x					Yes	Collected	SSP	2 times per day	Common stock. They use too good to go to reduce food waste.	Restaurant	
WHSmith A2	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x	x	x	x	x						Collected	WHSmith		Have a lot of food waste. Asked their manager to reduce prices before closing or to use too good	Kiosk	
Fiskebaren Oslo Lufthavn Inland	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x	x	x	x						Yes	Collected	SSP	4-5 times per day	Cold storage	Restaurant	
Point Domestic 2 Oslo Inland - V / Gate A10	Kitchen/stockroom/staff room Serving desk/cash desk Guest area												Collected	SSP			Kiosk	
Norgesglasset	Kitchen/stockroom/staff room Serving desk/cash desk Guest area											Yes	Collected	SSP	1 time per day		Restaurant	
Point Dom 3 OSL P1r Nord - V Gate C2	Kitchen/stockroom/staff room Serving desk/cash desk Guest area											Yes	Collected	SSP			Kiosk	
Twottgers Sushi and Noodles	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x	x		x	x						Collected	HMS host		They have a lot of food waste. At the end of the day, they throw away waste themselves.	Restaurant	
Belgen og Mol Food Garage	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x	x	x	x	x					Yes	Collected	HMS host	2 times per day	They say they bring down waste themselves	Restaurant	
TGI Friday	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x	x	x	x						Yes	Collected	HMS host	2 times per day	They say they bring down waste themselves	Restaurant	
Humble & Malt	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x	x	x							Yes	Collected	HMS host	2 times per day	They are not aware of the different kind of containers in the waste station.	Restaurant	
News bar kiosk Mellom gate B1 og B2	Kitchen/stockroom/staff room Serving desk/cash desk Guest area												Collected	SSP			Kiosk	
Northland Inland A10	Kitchen/stockroom/staff room Serving desk/cash desk Guest area Kitchen/stockroom/staff room	x	x	x	x	x	x						Collected	Reltan	At least 1 time per day	They swap out food with other Northlands to reduce food waste.	Restaurant	

Parlen	Serving desk/cash desk Guest area	x x	x	x	x	x	x		No	Collected	SSP	2 times per day	They don't have a kitchen	Restaurant
Lounge SAS (Innland ved Balgen&mol/TCI)	Kitchen/stockroom/staff room Serving desk/cash desk Guest area								Yes	Collected	-			Lounge
OSL lounge inland	Kitchen/stockroom/staff room Serving desk/cash desk Guest area										-			Lounge
Ark Inland - A10	Kitchen/stockroom/staff room Serving desk/cash desk Guest area								Yes	Both, self and cleaning	Ark		Unpacked in storage. Almost nothing here in the little shop	Shop
Capi Electronics - Innland	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x x				x			x	Self	Capi	1-2 times per day	Tiny area for employees. Source sorters in stock.	Shop
ARK - Innland sentral	Kitchen/stockroom/staff room Serving desk/cash desk Guest area						x	x	Yes	Housekeeping occasionally picks up, but otherwise they take it down at the end of the	Ark		Unpacked in storage. Almost nothing here in the little shop	Shop
Æra Dame	Kitchen/stockroom/staff room Serving desk/cash desk Guest area									Collected	Æra	1 time per day	Unpacked in storage. Almost nothing here in the little shop. Source sorters in stock.	Shop
Travel Value inland	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x x x		x		x	x				TRN			Shop
Æra Mann/Æra Active	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x					x			Collected	Æra	1 time per day	Unpacked in storage. Almost nothing here in the little shop	Shop
Cutters	Kitchen/stockroom/staff room Serving desk/cash desk Guest area									Self	Independent		Don't get to talk to staff or carry out a thorough check as they were busy with customers	
RED ZONE - INTERNATIONAL														
Northland D5	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x	x			x		Yes	Varies. Occasionally drives down to stock when the driver takes it.	Reitan	2 times per day	They swap out food with other Northlands to reduce foodwaste.	Restaurant
BIT	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x x	x	Use the public bin	x		x	x	Yes	Self	Independent	2 times per day	closed there was a residual waste container placed down the elevator close by BIT as	Restaurant
HAVEN	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x x	x	x		x	x	x	Yes	Collected	SSP	2 times per day	They use too good to go for soups and baguettes to reduce foodwaste.	Restaurant
Hunter Bar	Kitchen/stockroom/staff room Serving desk/cash desk Guest area								Yes	Collected	SSP	3 times per day		Restaurant
O'Learys	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x	x		x				Collected	SSP		They often go down with the waste to a place where SSP picks up the waste (in front of every day)	Restaurant
Fiskeriet	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x x	x	x		x		x	Yes	Frying oil	HMS boat	1-2 times warehouse, 1 time in the evening buffet	They have a 'showroom' baguettes that they throw away every day.	Restaurant
Fjela	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x	x		x	x	x	Yes	Collected	SSP	3-4 times per day		Restaurant
Bar Oslo	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x x	x	x		x	x		No	Collected	SSP	2-3 times per day		Restaurant
WHSmith D1	Kitchen/stockroom/staff room Serving desk/cash desk Guest area									Collected	WHSmith			Kiosk
Starbucks Int OSL w/ Gate E2 Utland	Kitchen/stockroom/staff room Serving desk/cash desk Guest area								Yes	Collected	SSP	3-4 times per day		Restaurant
WHSmith D5-7	Kitchen/stockroom/staff room Serving desk/cash desk Guest area									Collected	WHSmith			Kiosk
Northland Utland E10	Kitchen/stockroom/staff room Serving desk/cash desk Guest area									Collected	Reitan		They swap out food with other Northlands to reduce foodwaste.	Restaurant
Jamie's Italian	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x	x		x	x	x	Yes	Collected	SSP	2 times per day		Restaurant
FoodBar	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x x	x	x		x		x	Yes	Collected	SSP	1-2 times per day	In summer waste is picked up 3-4 times per day.	Restaurant
Produktionkitchen SSP	Kitchen/stockroom/staff room Serving desk/cash desk Guest area									Self	SSP	1 time per day	Production kitchen, in the Terminal, one floor under the passenger area	
Aquavit bar	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x x	x	x		x		x	No. SSP main stock is used	Collected	SSP	1 time per day	They bring waste to everyday kitchen, then SSP collects the waste.	Restaurant
Point	Kitchen/stockroom/staff room Serving desk/cash desk Guest area									Collected	SSP			Kiosk
Lounge SAS (Utland, Salmon House)	Kitchen/stockroom/staff room Serving desk/cash desk Guest area									Collected	SSP		They bring waste to a point themselves (in front of everyday kitchen). Then SSP takes it.	Lounge
Lounge OSL (Salmon House)	Kitchen/stockroom/staff room Serving desk/cash desk Guest area									Collected	-	2 times		Lounge
	Kitchen/stockroom/staff room													

Fine Food - Salmon House	Serving desk/cash desk Guest area								Yes	Collected	-	2-3 times per day	Tiny space. Can be unpacked both in warehouse and shop	Shop
Travel Value EB	Kitchen/stockroom/staff room Serving desk/cash desk Guest area									TRN				Shop
LETT	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x	x						Self	Independent			Restaurant
Tax Free - F12-17	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x	x		x	x		Yes	Collected	TRN	1 time per day	Unpacked in storage. Almost nothing here in the little shop	Shop
Capi Electronics - utland nord	Kitchen/stockroom/staff room Serving desk/cash desk Guest area								Yes	Self	Capi	1-2 times per day	Unpacked in storage. Almost nothing here in the little shop	Shop
Ting	Kitchen/stockroom/staff room Serving desk/cash desk Guest area								Yes		-		Unpacked in storage. Almost nothing here in the little shop	Shop
Travel Value Fashion	Kitchen/stockroom/staff room Serving desk/cash desk Guest area								Yes	Collected	TRN	2 times a month	Sends down large cardboard boxes to warehouse. When the plastic arrives, it sorts the plastic	Shop
Æra Utland D1 / active	Kitchen/stockroom/staff room Serving desk/cash desk Guest area								Yes	Collected	Æra	1 time per day	Unpacked in storage. Almost nothing here in the little shop	Shop
Suvenir - North	Kitchen/stockroom/staff room Serving desk/cash desk Guest area									Self	-	Depending on goods receipt, because waste is reduced when goods arrive. 0-2 times per day	They get down paper right away. Unpacked in storage. Almost nothing here in the little shop.	Shop
Moomin shop	Kitchen/stockroom/staff room Serving desk/cash desk Guest area								Yes	Self	-	1 time per day	Tiny shop. Unpacked in storage	Shop
TAX free rett etter utlandgate	Kitchen/stockroom/staff room Serving desk/cash desk Guest area									Collected	TRN	10, at the same time as goods	Unpacked in storage	Shop
Christiania Glassmagasin utland	Kitchen/stockroom/staff room Serving desk/cash desk Guest area								Yes	Self	-	Repeatedly	Unpacked in storage	Shop
ARK - EB	Kitchen/stockroom/staff room Serving desk/cash desk Guest area								Yes	Self	Ark		Unpacked in storage	Shop
Everyday Kitchen DSL Utland NB: innenfor sikkerhetskontroll	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x	x		x	x	x		Collected	SSP	4 times per day		Restaurant
W.B. Samson Oslo Lufthavn Utland	Kitchen/stockroom/staff room Serving desk/cash desk Guest area									Collected	SSP			Restaurant
Point International 1 Oslo Utland - w/ Gate F15-17	Kitchen/stockroom/staff room Serving desk/cash desk Guest area									Collected	SSP			Kiosk
Havsalt International Oslo Utland	Kitchen/stockroom/staff room Serving desk/cash desk Guest area	x	x	x				x	Yes	Collected	SSP	3 times per day		Restaurant

Collected	49	SSP	28
Self	13	HMS heat	9
Both	2	WH Smith	4
Other	9	Reitan	3
		ARK bookstore	3
		Capi Electronics	2
		Æra	3
		TRN	5
		Independent	5
		Unknown	9
		Total commercial units	71

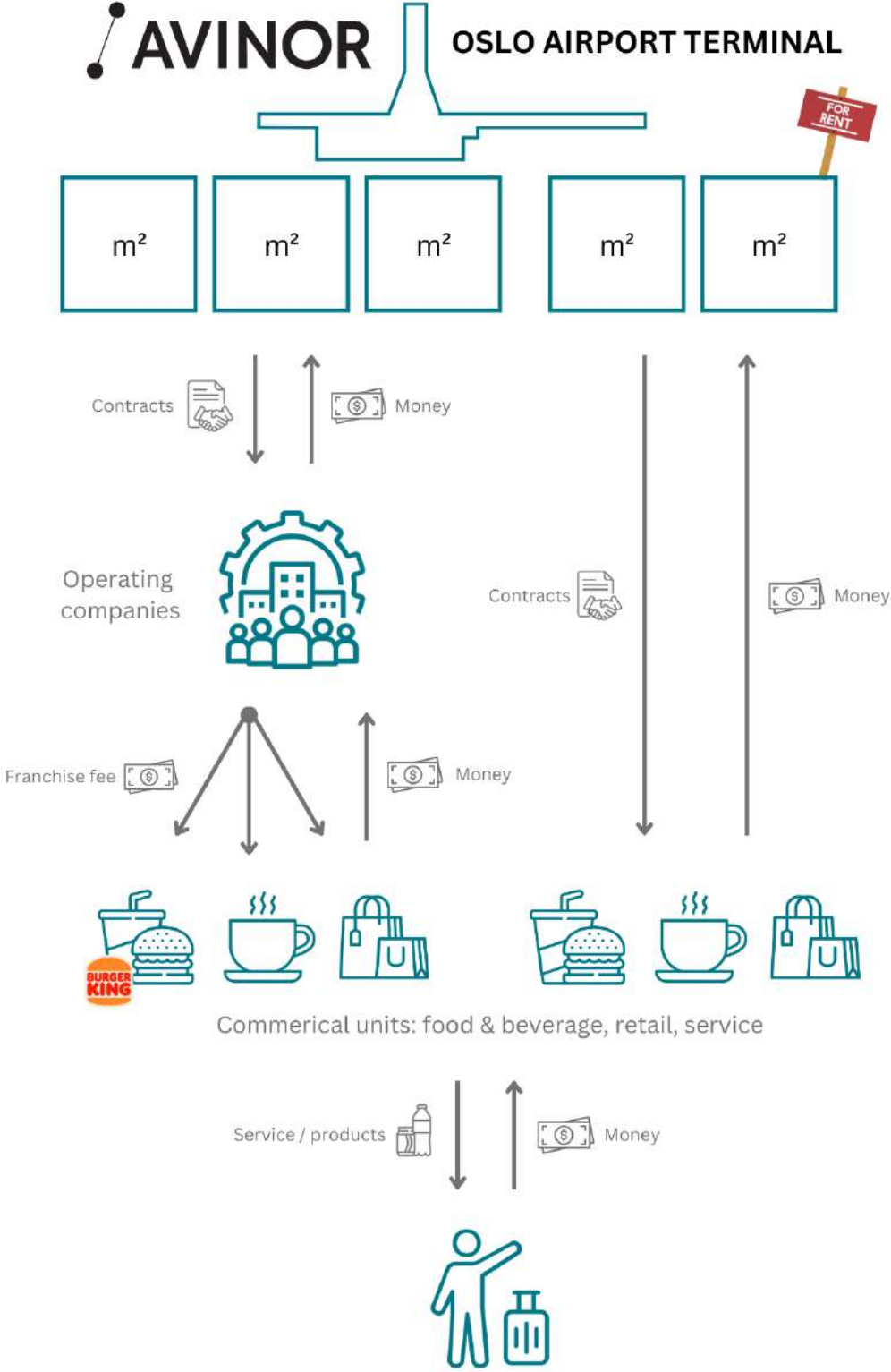
Appendix C2: Additional notes waste practices mapping

1. Serving unit 1: waste personnel pick up the waste, mostly 3 times a day. But if there are too many people sick, then the own staff need to do it.
2. Serving unit 2 departure hall: they use a too good to go concept for leftovers.
3. Serving unit 3: throw away waste themselves.
4. Serving unit 4: only hair and paper basically, not much. Go to waste stations themselves approx. 1x per week. They are planning on having a plastic bin. If they have scissors or blades, they collect them in a white box to send to supplier (for repair or renewal), but they don't throw them into residual waste.
5. Serving unit 5: uses F&B operator B for waste collection and bringing goods. Throws porcelain at residual, because they are unaware. **Space and lack of information are problems!**
6. Serving group A: they throw food waste into one big plastic bag and throw it into residual waste. They have people collect waste for them 2x per day, but the staff has done it once before to experience where the waste station is. When the car is full of waste, they send a picture to the collectors and they pick it up.
7. Serving unit 6: has a really critical opinion. He states that it is way to busy and he washes hundreds of glasses every day and everything is about money.
8. Serving unit 7: biggest challenge is that guests don't separate their waste properly. So often the staff needs to throw everything together in a residual waste bin. The staff brings waste 5x per day to the waste station and does it by themselves. They have a lot of food waste.
Interesting thing: eating in is more expensive than take away -> this is not encouraging in using less packaging material (take away materials).
9. Serving unit 8: F&B operator B collects waste 2x per day. Uses too good to go.
10. Serving unit 9: residual waste bins for passengers. Rita: 'that's something we really don't want, because now everything ends up in the same container'. They have a lot of waste separation possibilities, but they would like a solution for the plastics. They had a plastic bin in the past, but it's so much and different. Waste gets collected 2x per day. If it's a lot then they call downstairs to get it collected.
11. Serving group B: waste gets collected and brought downstairs. Often when closing they do it themselves. Have a lot of Chinese production (with lots of packaging), this is something to fix higher up in the chain. They bring the cardboard immediately downstairs when new products are delivered, not much space for storage.
12. Serving group C: brings down waste themselves 1x per day, sometimes 2x per day.

13. Serving unit 10: waste is collected 2x per day. Don't have a lot of food waste. They just buy less, when they're sold out, it's sold out. Sometimes too good to go, mostly personnel buys it.
14. Serving unit 11: have a lot of food waste. Wraps food in plastics. They collect waste in a car and throw it away when they are closing.
15. Serving unit 12: picks up goods themselves. They have 3 shops, so when they have too much food, they swap it out with the others if they have too less. In the past they tried too good to go, but it did not really work, because only employees use it.
16. Serving unit 13: they don't have a lot of foodwaste, when they do they mostly throw it away. Sometimes uses too good to go. 'I think downstairs they have different kind of containers for plastic, paper, pant etc, but not sure.' -> there is lack of information about the waste separation downstairs. Terminal and waste station is not aligned.
17. Serving unit 14: they mainly have cardboard and plastic from packaging. They don't have real problems with waste management.
18. Serving group D: they are rebuilding, so now they only have residual. Normally also plastic and cardboard. There waste is collected 1x per day, but if it's a lot then they just ask a supplier. Because the supplier is walking around the terminal very often (at least 5x per day) and they can just ask them to take it downstairs.
19. Serving group A: have a lot of foodwaste, asked their manager to have discounts the last hour to sell everything or to work with too good to go, but not yet implemented. There waste is brought to the station at the end of the day. Have a lot of room with a lot of stock and waste bins.
20. Serving unit 16: have every source separation and also have the space for it. Only a bit messy due to missing of signs. They bring down waste themselves at least 2x per day. Not a lot of foodwaste, one bin per day (but big restaurant).
21. Serving unit 17: they bring down waste themselves, sometimes when a waste station staff is walking by he/she can take it. They don't have a lot of foodwaste (also one bin per day). They don't experience any problems.
22. Serving unit 9 (2): they have around 15-18 baguettes of foodwaste per day. They think it's not a lot.
23. Serving unit 18: they mainly have cardboard and plastic. They stack it up, make it small and then it's collected and brought to waste stations. They are a bit annoyed that they bring nice boxes that can be reused to the basement, but then it ends up in the carton press. They swap boxes with lost and found, because they need it. Also Heineman the supplier could even take it back. She demonstrates how the boxes and the lids can be flattened and returned. It would be nice to have stickers on the bins, because the staff knows what bin it is but the passengers not.
24. Serving unit 19: F&B operator B collects their waste. Not a lot of food waste, because they only make what the guests order. F&B operator B also has a production kitchen that deliver the ingredients for Jamie Italian.

25. Serving unit 20: they don't have any food waste. Waste gets collected for them in a shared service with other restaurants, around 3x per day. Don't experience any problem with the waste management.
26. Serving unit 21: part of F&B operator B. Substantial amount of foodwaste; soups and baguettes are going with too good to go, but the salad bar's expiry dates are short so they have to throw that away. To calculate this better, they weigh everything themselves, so they can make good predictions.
27. Serving unit 22: part of F&B operator B. All different source separation. They collect paper in a plastic bag, so that it can easily be thrown into the container. They don't have food waste and also don't have any problems with waste management.
28. Serving unit 23: they have every waste separation. It gets picked up 4x per day. On quiet days they sometimes have significant foodwaste. But overall it's okay. They don't experience any problems with their waste.
29. Serving unit 24: don't have a bin for clear plastic, it ends up at residual waste. On quiet days have a lot of foodwaste, but they can't take it themselves or give it away so they throw it away.
30. Serving unit 25: part of F&B operator B.
31. Serving unit 26: part of F&B operator B. Waste gets collected between 13:00 and 14:00. At end of day they do it themselves. Everything that's for show needs to be thrown away (6 recipes) and reported to the boss. Every evening they close the frying pans to cool down, in the morning they collect the oil in plastic bottles and bring it to the waste stations. Replace metal waste receptacles everyday for clean ones.
32. Serving unit 27: have several waste separation possibilities, but does not work. In PANT and food waste bins there is residual waste.
33. Serving unit 28: part of F&B operator B. They have a lot of food waste. They do work with too good to go, but that doesn't solve everything.
34. Serving unit 29: part of F&B operator B. Waste gets picked up 1 to 2 times per day, in summer or other peak moments such as Christmas 3 to 4 times. They don't have any troubles with the waste management.
35. Serving unit 30: they are independent, so they bring the waste to the stations themselves. On average they do it 2x per day. Not really a problem for them. They throw away PANT bottles in the public bin, because they don't have their own. After the vacuum waste system closed there was a residual waste container placed down the elevator close by BIT as compensation. Rita finds this really annoying. BIT collects their waste at this container and drives it 2x per week to the waste station when it full.

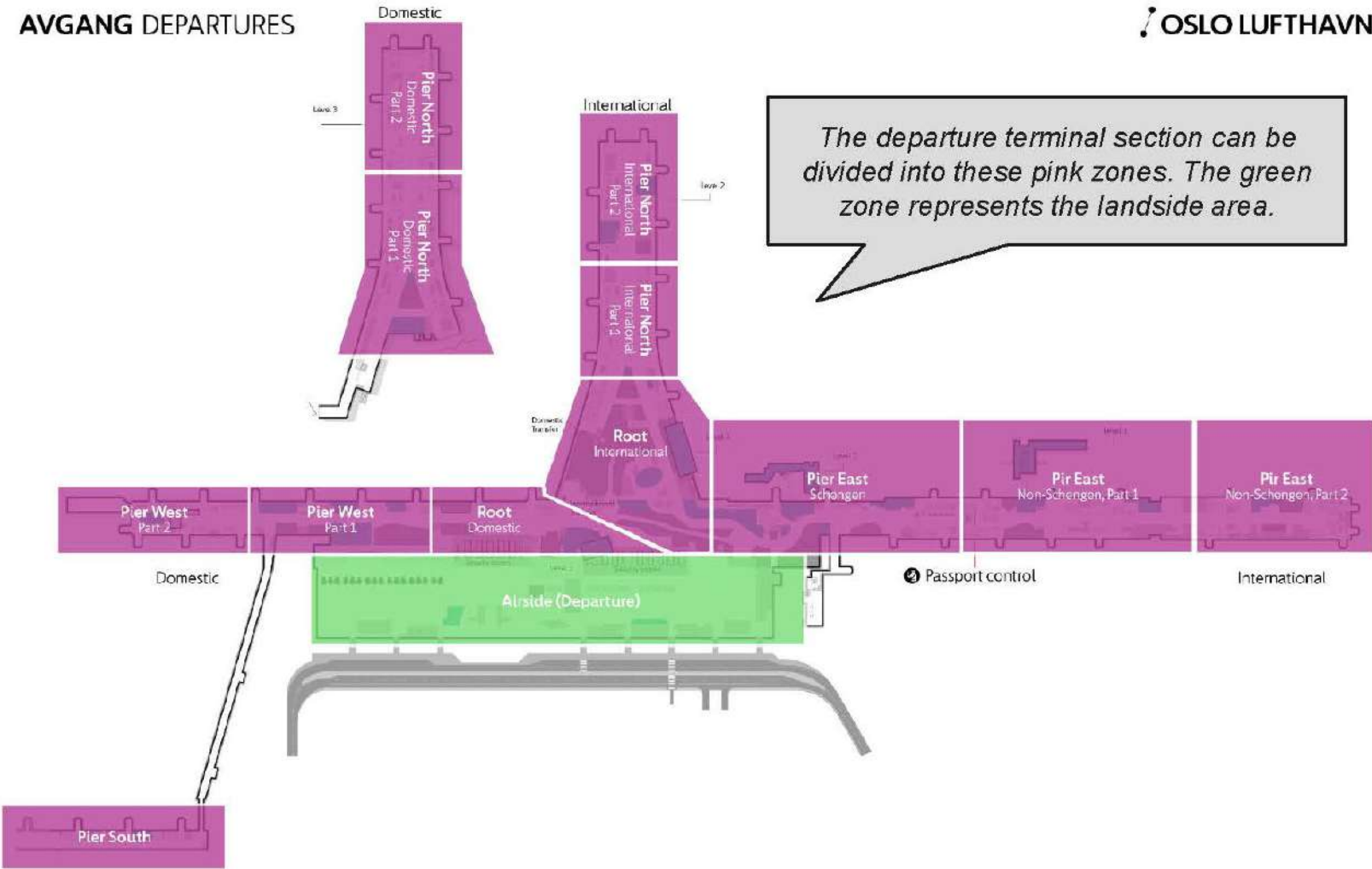
Appendix D: Organisational structure of waste management at Oslo Airport



Appendix E: Terminal structure

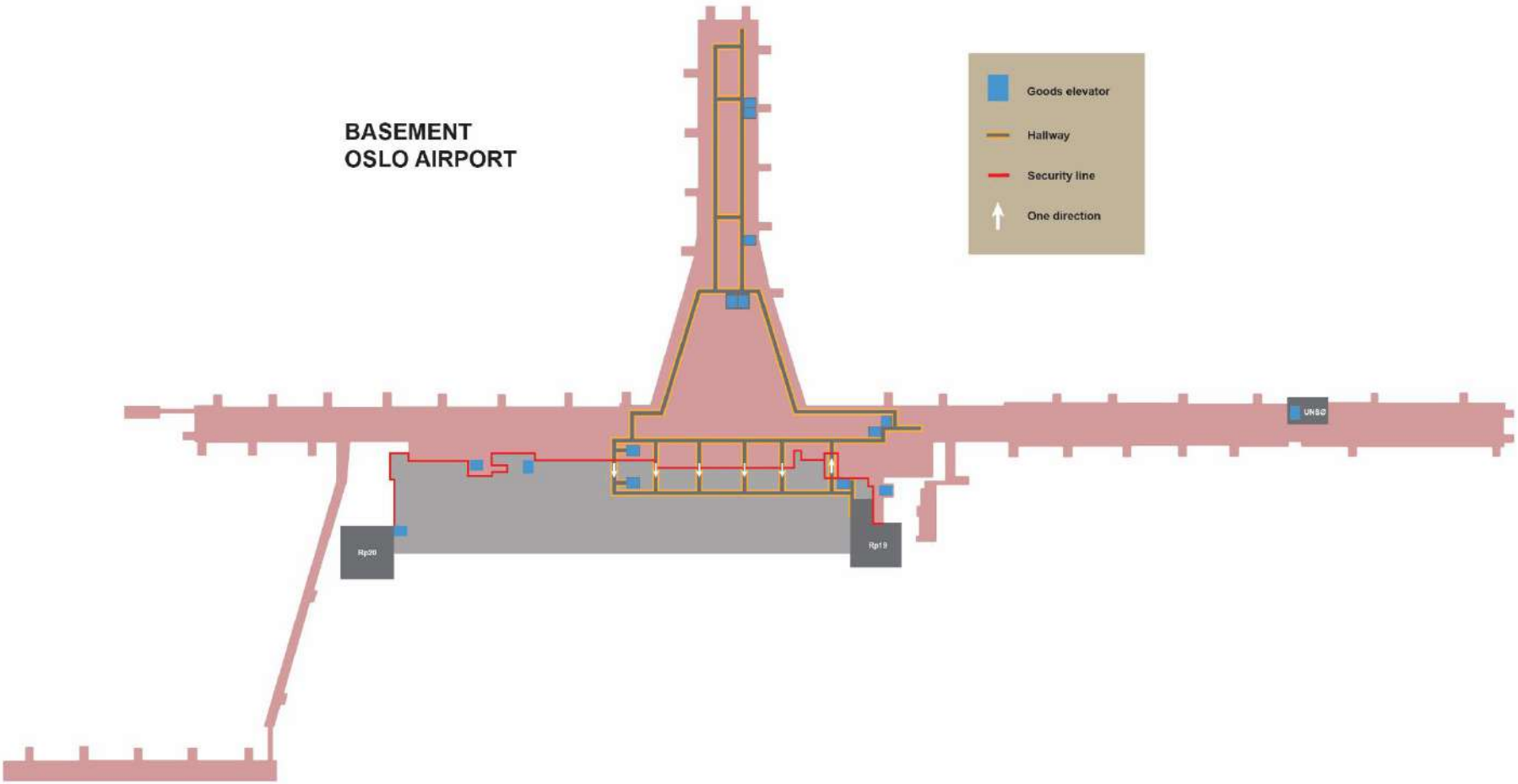
AVGANG DEPARTURES

OSLO LUFTHAVN

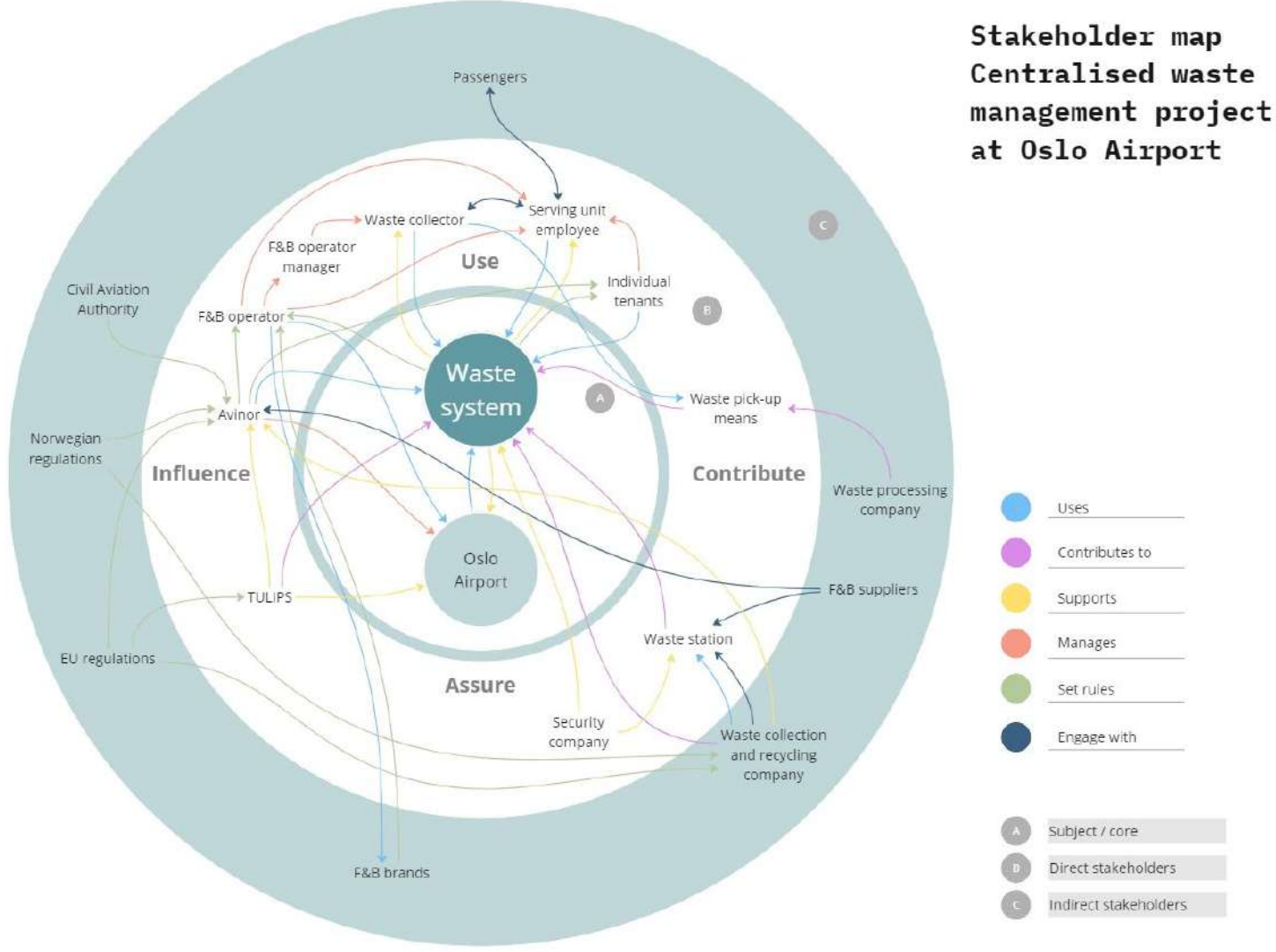


**BASEMENT
OSLO AIRPORT**

-  Goods elevator
-  Hallway
-  Security line
-  One direction



Appendix F: Stakeholder map



Appendix G: Co-creation workshop

Appendix G1: Co-creation workshop slide deck



CO-CREATION WORKSHOP
Centralised waste management service at Oslo Airport

AVINOR
TU Delft

AVINOR

TU Delft

Agenda

Introductions	5 min
Why are we here?	15 min
Scan the problem	25 min
Focus on the problem	10 min
Brainstorm	30 min
Vote	5 min

Why are we here?

AVINOR

TU Delft

AVINOR

"If you can't have fun with the problem, you can't solve it"

Walk in the shoes of...

± 15 minutes



TU Delft

Walk In The Shoes Of...

Function

Job description



Description of work activities and responsibilities

- What does a workday look like for this person?
- What are the main work related activities that this person does?
- For which activity/goal/area/operation is this person responsible?

Core needs

- What tools or equipment is needed for this job?
- What skills or education is needed?
- What other needs are necessary?

Motivation and values

- What motivates this person to come to work happy every day?
- Which work activities makes this person enthusiastic?
- What does this person value most at work?

Pain points and challenges

- What does this person struggle with?
- What frustrates this person at work?
- Which difficulties can occur at this job?



**“There is no truth.
There is only perception”**

Reflect and complement

± 10 minutes



Which problems are there?

± 10 minutes



Information

1. Lack of knowledge in waste management.
2. Hundreds of people use the waste station -> information flow is difficult

Responsibilities & interests

1. Responsibility: everyone is responsible, but no one feels responsible.
2. Operators are in a difficult position of having responsibilities in circularity, maintaining brand images and earning as much revenue as possible.
3. There is a principal-agent problem between Avinor and the tenants.
4. Waste or circularity is not the priority for tenants -> revenue is.

Operations

1. Waste management is suboptimal.
2. Operational problems, especially when Securitas is not present (compactor not run, mess, etc.)
3. High error sorting, especially when passengers do the sorting

Infrastructure

1. There is lack of space at the commercial units.
2. The design of the building is not optimal regarding waste management (multiple floor levels, waste stations not close by)
3. Distances between commercial units and waste stations are big.



Dot voting on the problems

± 10 minutes

Everyone has 3 dots



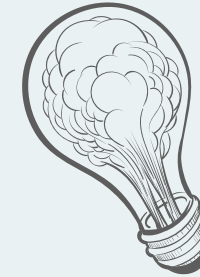
AVINOR

TU Delft

AVINOR

Brainwriting (or drawing)

± 30 minutes
2.5 min per round

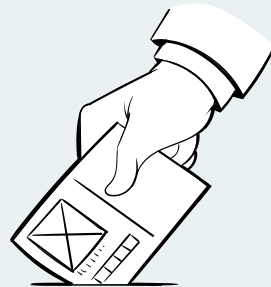


TU Delft

Dot voting on the solutions

± 5 minutes

Everyone has 3 dots



AVINOR

TU Delft

AVINOR

Thank you for participating!



TU Delft

Appendix G2: Templates for the walk in the shoes module

**Walk
In The
Shoes
Of...**

Waste collector

Collects the waste and delivers supplies to the serving units.



Description of work activities and responsibilities

Core needs

Motivation and values

Pain points and challenges

Template filled in by:

**Walk
In The
Shoes
Of...**

Avinor

Owner of the airport.



Description of work activities and responsibilities

Core needs

Motivation and values

Pain points and challenges

Template filled in by:

**Walk
In The
Shoes
Of...**

SSP manager

Tenant at the Airport and operates businesses in the terminal.



Description of work activities and responsibilities

Core needs

Motivation and values

Pain points and challenges

Template filled in by:

**Walk
In The
Shoes
Of...**

Serving unit staff

Works in a restaurant/bar/kiosk. Serves passengers food and beverages.



Description of work activities and responsibilities

Core needs

Motivation and values

Pain points and challenges

Template filled in by:

Walk In The Shoes Of...

SSP manager

Tenant at the Airport and operates
businesses in the terminal.



Description of work activities and responsibilities

MAKING SURE EVERYTHING "RUNS" ALLRIGHT.
making sure we got enough people at work at any given day
making sure all payments are in order.
making sure all orders/ paperwork are in order
Head of decisions, the daily data must RUN
allright

Core needs

Needs enough people, as well as trucks/garbage boxes.
Good with people, also need good people willing
to do the job.

Motivation and values

Rather Philosophical: what does indeed motivate
someone?
I Believe that depends
on the person.
The together-ness Before ASKING
his employees.

Pain points and challenges

People with attitude, always late, Sick.
People being lazy, not doing their job.
Not enough people. Human errors in ordering
or waste management.

Template filled in by: Giovanni Ferraro

Walk In The Shoes Of...

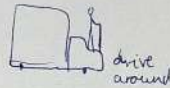
Waste collector

Collects the waste and delivers
supplies to the serving units.



Description of work activities and responsibilities

- transport goods "upwards"
- transport waste "downwards"
- work around the clock
- wake up early, get to the airport, start at 06:00
- know routes and ways around the airport



Core needs

- electric indoor car
- min. high school finished
- persistence
- physical strength (standing all day)

Motivation and values

do work
have experience

Pain points and challenges

- endless amount of regulations - Airports are challenging...
- have to deal with lots of ppl
- things often change
- it can be so busy that it becomes chaotic

Template filled in by: *Witz*

We start 05:00

go

Looks good!

Waste is 40% of my
work, the other part
is more towards
Delivery

Walk In The Shoes Of...

Serving unit staff

Works in a restaurant/bar/kiosk.
Serves passengers food and beverages.



Description of work activities and responsibilities

UNPACKING GOODS
FILL UP STOVE
PREPARING FOOD ITEMS
SERVING CUSTOMERS
BAR - RESTAURANT - KIOSK - LOUNGE
CLEANING

Core needs

KITCHEN EQUIPMENT
CLEANING -IT-

Motivation and values

NICE AND TIDY WORK AREA
ORGANIZED BELONGINGS AND BACK OFFICE SERVICE.

Pain points and challenges

SORTING WASTE
WHAT IS WHAT OF WASTE.
MESSY BACK ROOM AND STORE AREA.

Template filled in by: Patrick

Motivation
Good work mates

Core needs
Good working gear
- shoes - clothes
Motivation
Helping & serving people
Pain - customers
colleagues interaction

Walk In The Shoes Of...

- making plans, executing plans
- communication work
- data analysis
- structure things

Avinor

Owner of the airport.



- good cooperation with all companies

Description of work activities and responsibilities

Meetings? overseeing operations.
 overseeing and dialog with contractors.
 Looking into and solving existing and future possible problems.

Core needs

~~Computer~~
 Good technical skills?
 Equipment for specific jobs
 Education for specific jobs - maybe non specific

Motivation and values

To make the airport run smoothly
 Having a say in what gets done.

Pain points and challenges

Communication - information
 Money

- correct ✓
- + everything takes very long time
- + how to motivate ppl?

- ~ well...
- I want to do something good for the environment
- Learn & develop

Template filled in by: Simen MOBERG

Trash is Nasty
People want to
Get Rid of it
Fast.

Main challenges

TO MANY
USERS

100s
of people throwing
Waste daily means
more chance of
Somebody not caring
Or being morally
Wrong
Right

DISTANCE

money > commit-
ment

WHAT IS
WHY OF
WASTE



Infrastructure

Lack of
space in R.P.,
not possible to
expand

R.R.s look
awful

R.P. 19 is
very
messy

WASTE
STATION
SHOULD BE
MANAGED BY
PEOPLE

Infrastructure
- space for sorting
- "space" for handling
moving



Information flow

difficult to teach new ppe. No learning programs

not everyone have community app

no direct info channel to all 13000 ppe.

(IF)
- time



Responsibilities & interest

difficult to create a sense of responsibility

(R&I)
LAZY EMPLOYEES and CUSTOMERS
- Sorting WASTE

good environment commitment but poor daily practices



Operations

~~rules~~
rules are not
thought
through...

Big one for SSF:
Aviner closing the garage
20, (clean the Alder
(are metal)
alot of Refinements
close Later, turn

There is no
Place For Solid
Metal.

Operations

Too many different
waste handlers.

- no control

Soap at the
wash, plus towels
hasnt been changed
in year
up in the mistagen

Kontroll tid. i varemottak. ①

- The Garbage area closes Before the Restaurant/Cafe.
- the airport generally closes 21-23, the MIX station. We cant access after 20. This means Garbage will sit in the Restaurant until morning, among other issues

easy Solution: close MIX station
23:00 Like before

!!

ONE TEAM HANDLING ALL WASTE.
WASTE STATION OPEN 24/7. * THIS!
x

Allocate \$ to keeping the security control open longer.

* General idea of constricting "work" hours in a strict time frame, should be abolished.

②
Waste station
closing earlier
than serving
units

Solutions

7 WASTE
HANDLER

Solution
Waste management
team

\$ MONEY > ENVIRONMENT

calculate environmental costs as expense.

Make taking the choices that are better for the environment less costly. → Up residual waste costs?

Creating solutions in circularity that saves or generate money

Internalise other motivators than purely money? ~~penalties?~~

Penalties? Spiritual awakening to lesser human's greed?

④
Money over
environment

Too many people Handling waste } not caring Good Idea

- * One waste management team, dedicated to sorting and throwing waste in correct "department" containers
- * More dedication from each "user" on how to sort and dispose of garbage
- IF people are going to throw garbage them self it needs to be Stricter ~~Penalty~~ throwing wrong.
- People need to feel some sort of "morally Rightness" to throw better
- * WRONG SORTING OR HANDLING OF WASTE how? WILL HAVE A CONSEQUENCE, FOR THE USERS.
- * REWARDING RIGHT HANDLING OF WASTE.
- * have dedicated "miljøkontakt" in the NON F&B companies (construction, ground handling, entrepreneur etc) who we can teach, who in turn would teach their own.

③
More people
means higher
chance of
not caring

RESPONSIBILITY

* TAKE OWNERSHIP OF YOUR WORK.

- * Have a module in the ID card course that teaches and motivates people about waste reduction, recycling, looking at waste as a resource etc.
- * Reward and recognise actors who demonstrate circularity-related responsibility. Celebrate good solutions, both big and small.
- * Having one team overseeing waste collection and reporting back to venues ~~about~~ about their sorting.

Rewards/Punishments on a personal level.

Hire people with a meaning for environment.

People will not throw wrong if they are being watch.

Put on a Big Fake camera with a sign.

ply on "Fear"

①
Sense
of
Responsibility
is difficult

Appendix G4: Outcomes of the co-creation workshop

Co-creation workshop waste management Oslo Airport

Problems	Dot voting
Responsibilities & interests Difficult to create a sense of responsibility Lazy employees and customers regarding waste sorting Good environmental commitment but poor daily practices	
Information flow Difficult to teach new people. No learning programs Not everyone has the community app No direct info channel to all 13.000 people Lack of time What is what of waste	
Infrastructure Waste station is not managed by people Lack of space in waste station and not possible to expand Waste stations look awful Waste station Rp19 is noisy Space for sorting Space for handling moving Distance	
Operations There is no place for solid metal Rules are not thought through The waste station closes earlier than the serving units do Too many different waste handlers -> no control Soap and towels in the waste station haven't been changed in a year	
Other / general Trash is nasty, people want to get rid of it fast Too many users Money > environment 100's of people throwing waste daily means more chance of somebody not caring or being morally wrong	

Legend	
	Commercial unit employee
	Circular economy analyst
	Waste collector
	Commercial unit employee

Main problems	Solutions	Dot voting
Sense of responsibility is difficult	Take ownership of your work Have a module in the ID card that teaches and motivates people about waste reduction, recycling, looking at waste as a resource, etc. Reward and recognize actors who demonstrate circularity related responsibility. Celebrate good solutions, both big and small. Having one team overseeing waste collection and reporting back to venues about their sorting Rewards/punishments on a personal level Hire people with a meaning for environment People will not throw wrong if they are being watched Put on a big fake camera with a sign. Play on 'fear'	
Waste station closes earlier than the serving units	Close the waste station at 23:00 instead of 20:00 like before One team handling all waste. Waste station open 24/7 Allocate money for keeping the security control open longer General idea of constricting 'work' hours in a strict time frame should be abolished	
More people means higher chance of not caring	One waste management team, dedicated to sorting and throwing waste in correct department/container More dedication from each 'user' on how to sort and dispose garbage If people are going to throw garbage themselves it needs to be stricter on throwing wrong People need to feel some sort of 'morally rightfulness' to sort better Consequences for the user that handle or sort waste wrong Rewarding right waste handling Have dedicated 'miljokontakt' in the non F&B companies (construction, ground handling, entrepreneur, etc) who we can teach, who in turn would teach their own	
Money over environment	Calculate environmental costs as expense. Make taking the choices that are better for the environment less costly. -> Up residual waste costs? Creating solutions in circularity that saves or generate money. Internalise other motivators than purely money. Penalties. Spiritual awakening to lesser humans greed?	

Appendix H: Vacuum waste system at Oslo Airport

This chapter contains additional information and images regarding the vacuum waste system that was used in the past at Oslo Airport.

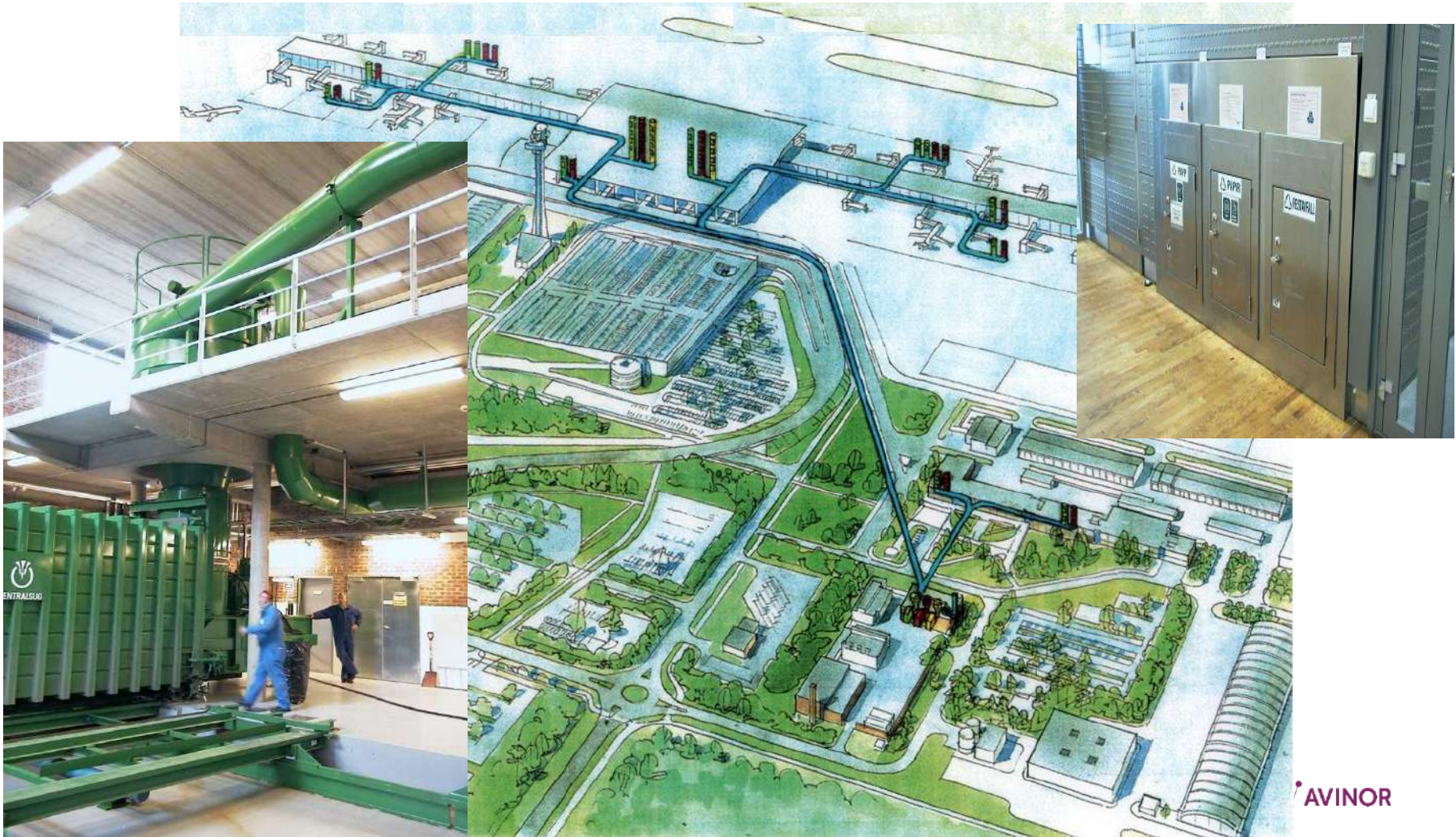
Waste suction plant - history

- Established at airport opening and designed for aircraft waste, cardboard, paper and residual waste
- Major operational problems. Technical problems and misuse.
- Reduced to only transporting public waste - SSP and ISS
- Expanded with extra hatches for the T2 extension.
- **Closed** March 2020 due to pandemic. Little use and power saving
- Possible start-up requires major measures - Cleaning of pipes ++
- The facility is currently not sustainable due to requirements for better sorting by 2025, and high energy consumption.

"The airports must collectively halve the amount of unsorted waste from ordinary operations by 2025, with a zero vision for unsorted waste in 2030. (By this we mean zero residual waste - i.e. 100 percent for reuse or material recycling (of what is suitable and/or possible to sort out) Food waste must be reduced by 50% per passenger by 2030 and 30% by 2025. Recycling and reuse rate must be increased. Minimum 70% material recycling/reuse by 2025"



Paper	2.200 tons/yr.
Residual waste	1.900 tons/yr.
Cardboard	1.100 tons/yr.



AVINOR

Airport operation without waste extraction facilities

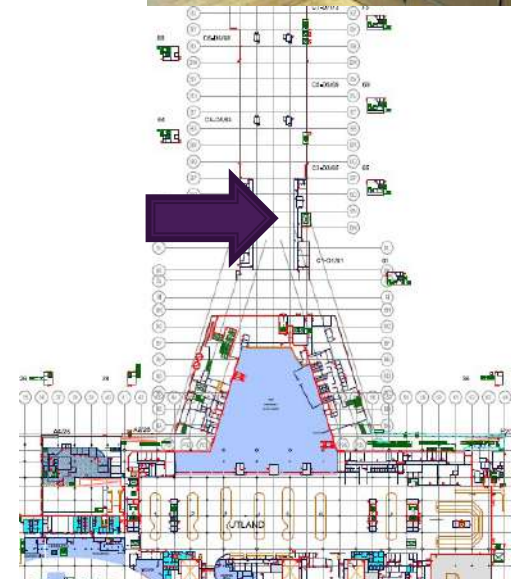
- Meeting with representatives of ISS and the Serving Locations in spring 2022. As a replacement for the facility, during a test period:
 1. A new return point is established at the "teddy bear lift" in Pier North. Ground plan.
 2. Fractions adapted to public waste are established in goods reception west
 3. Fractions adapted to public waste are established in the new return point UNSØ

User experiences so far:

- The new solutions work well
- Users miss short transport routes
- There has been increased traffic of trolleys with waste in the terminal
- Despite this, there are few complaints, and no financial claims due to the lack of a waste extraction facility - The facility is described in the contract terms.

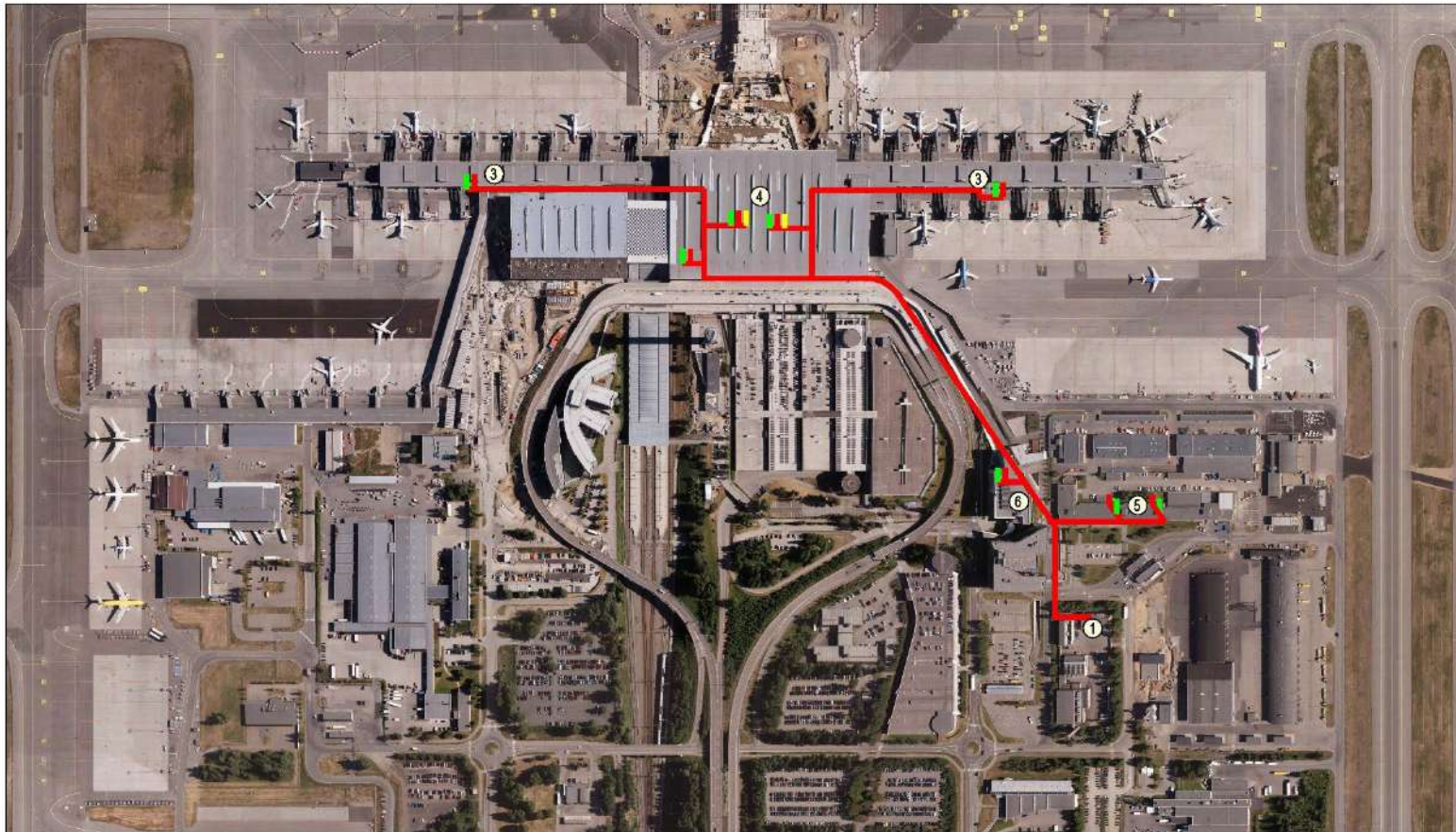
The way forward...

OSLO LUFTHAVN



AVINOR

Avfallssugeanlegg




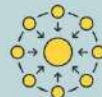
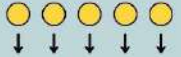
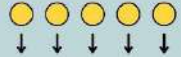








- ① Avfallsentral
- ② Flyoppstillingsplasser
- ③ Pir
- ④ Sentralbygg
- ⑤ Driftsbygg
- ⑥ Flyporten

Laget: GMBRE
Kontrollert: GMGVA
Godkjent: GMGVA

Org. enhet: G6220
OSLAS-AO-AOZ-65-0002
Rev. E03 av 17.02.15

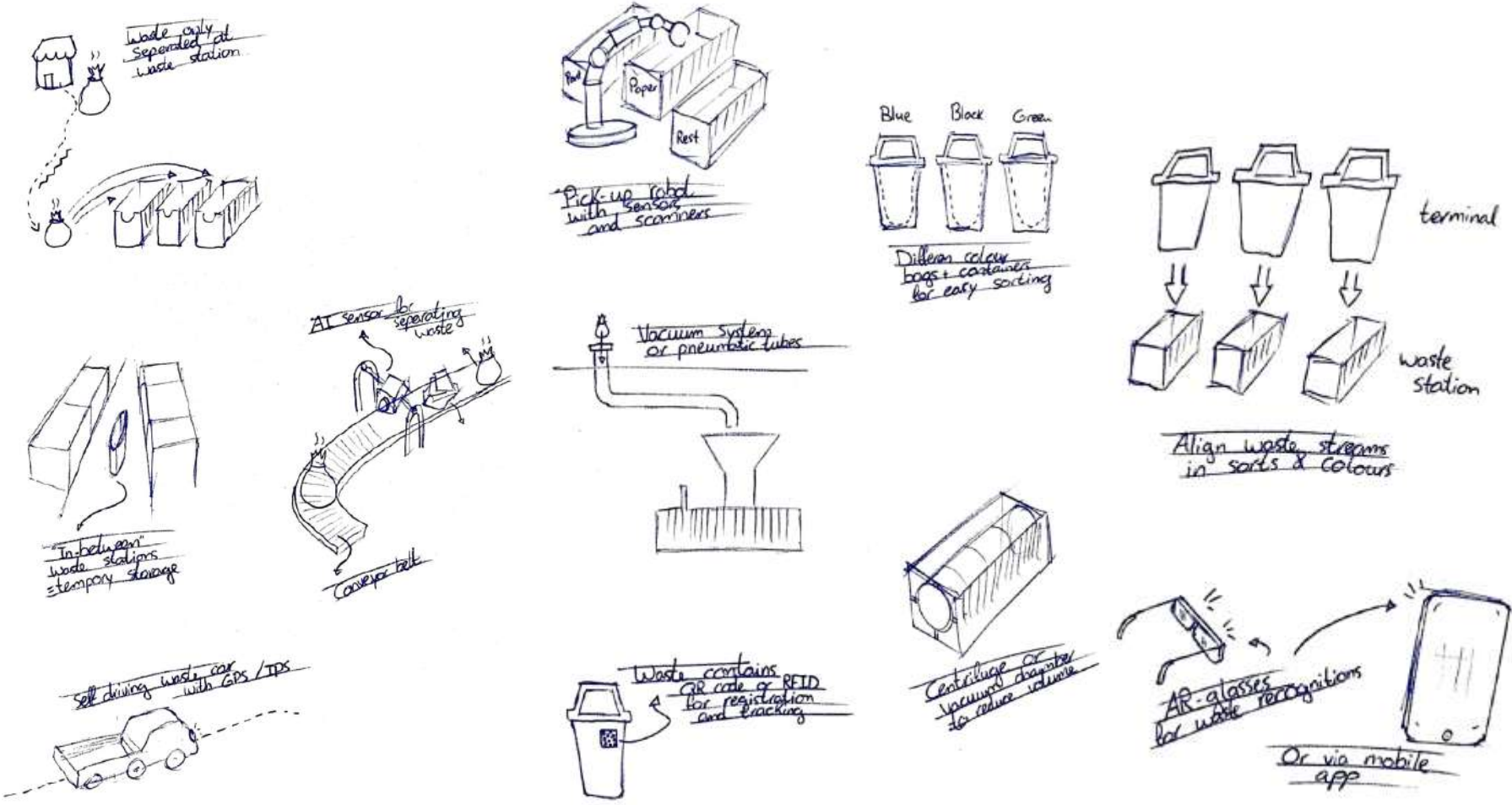
Appendix I: Overview of insights at Dutch public places.

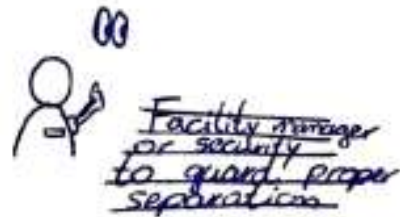
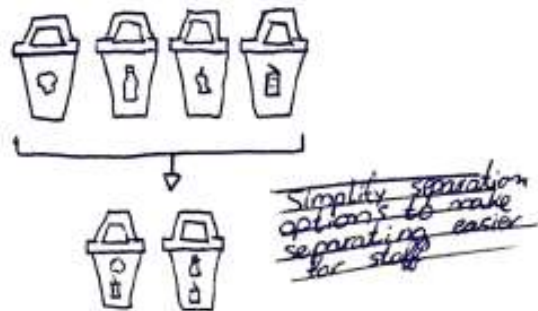
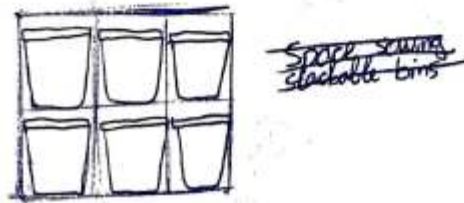
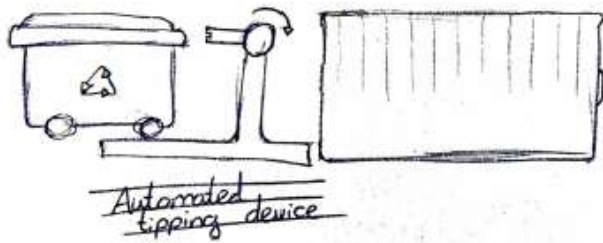
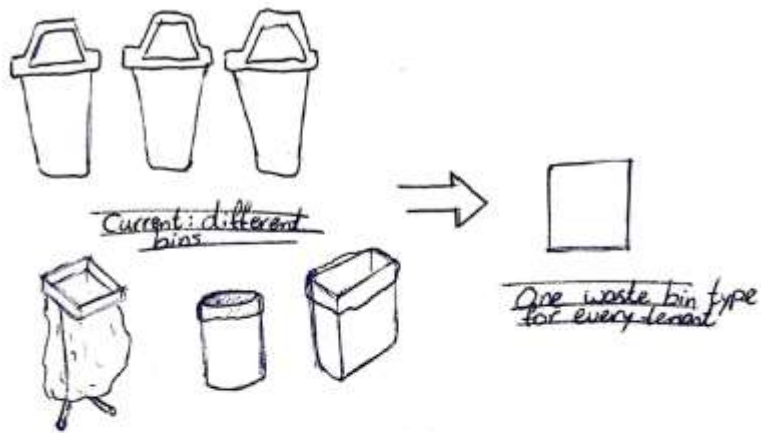
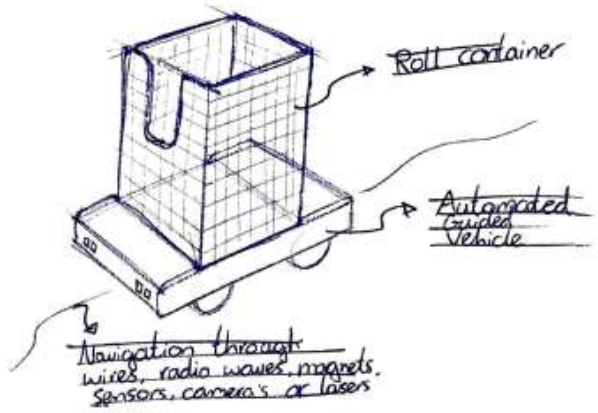
This chapter contains an enlarged image regarding the insights regarding waste management at Dutch public places.

	Rotterdam Central Station	Utrecht Central Station	Westfield Mall of the Netherlands	Zuidplein Shopping Centre
Type of waste collection	Centralised, outsourced by a cleaning company. 	Centralised, done by the NS (the operator of the station). 	Self by the staff of the commercial units. 	Self by the staff of the commercial units. 
Amount of times per day	Two times per day.	Multiple times per day.	When needed or at end of the day.	When needed or at end of the day.
Waste practices	Waste is collected at the back of the commercial units, connected to a passenger-restricted hallway behind the commercial units. And waste is then brought to a waste station at the back of the trainstation.	Waste is collected at the front of the commercial units in the passenger area. And waste is then brought to a waste station under the train station.	Staff of the commercial units brings waste to the waste station that they can access with a card. The waste station is positioned at the front of the Mall.	Staff of the commercial units can throw residual waste into shafts connected to containers in the basement. Cardboard waste is brought to the compactors downstairs outside.
Generated waste types	 PLASTIC PAPER REST WASTE ORGANIC	 PLASTIC PAPER REST WASTE	 PLASTIC PAPER REST WASTE ORGANIC GLASS	 PLASTIC PAPER REST WASTE ORGANIC
Separation options				
Payment	Included in rental agreement as a fee	Included in rental agreement	Included in rental agreement	Total fee is divided by the amount of square meters

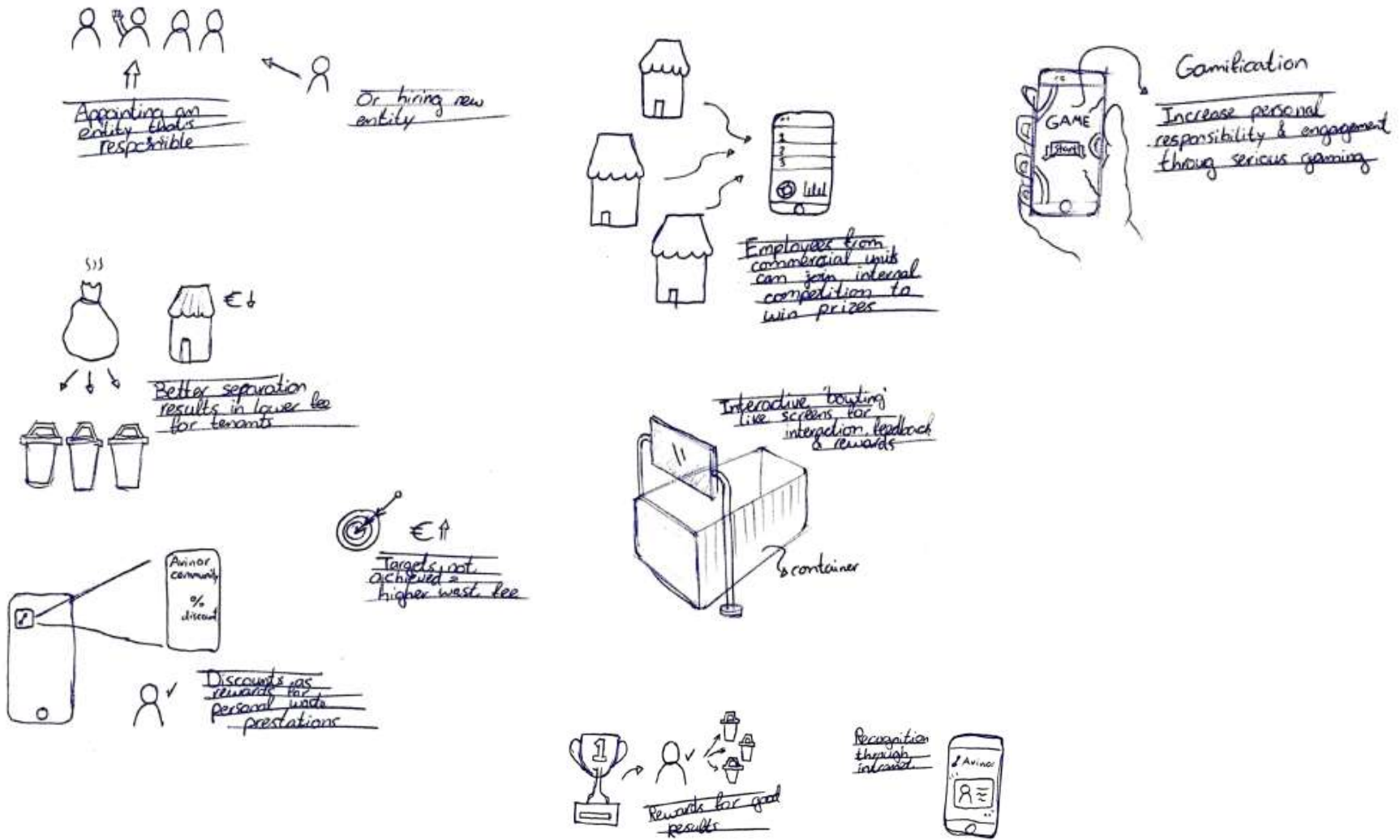
Appendix J: Idea generation

This chapter shows the generated ideas based on How-To questions.
How can the ability of waste separation and collection be improved?

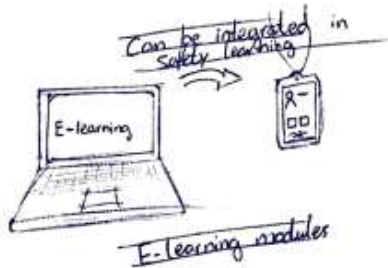
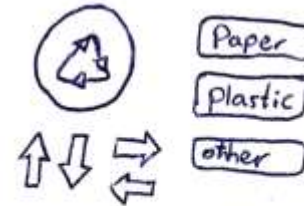
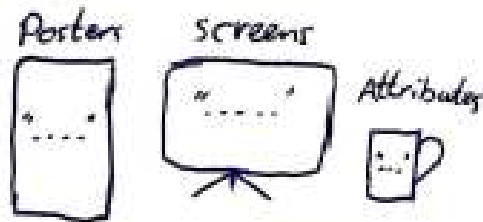
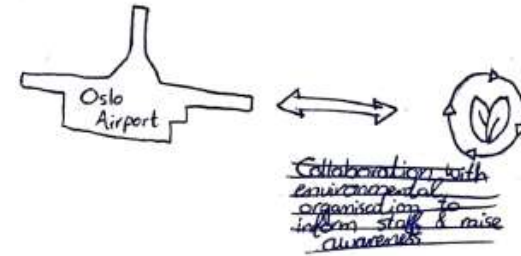
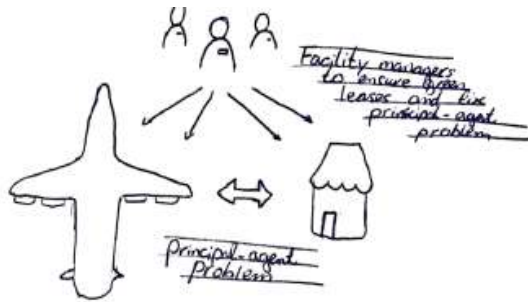
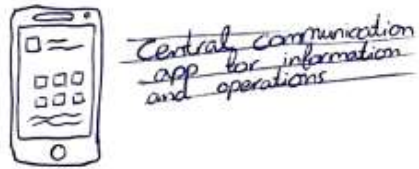




How can motivation regarding waste sorting be increased?

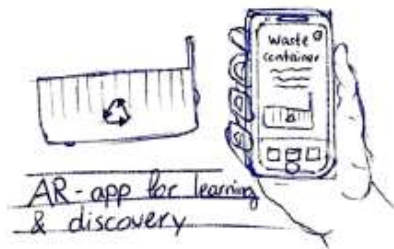


How can information provision and awareness be improved?



Creative slogan or message to support waste reduction

Improve instructions and signage



Appendix L: Morphological chart

	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9	Option 10	Option 11
Making waste separation easier	Improve and align instructions and signage	Interactive tv screens (like touchings) for separating feedback and interaction	Align and expand waste bin types for tenants	Colour coded waste bags and bins for easy sorting and recognition	Align waste bins for tenants with the containers at R19	Simplify and reduce waste separation options to make waste separation easier for tenants	Separate waste only once (at the waste station)	Waste sorting robot	AI sensor for separating waste - automatically on a conveyor belt	Direct waste separation through AR glasses for easier recognition	Better waste separation through AR app for waste recognition
Waste transportation	Automated Guided Vehicles for waste transportation	Vacuum or tube system for waste transport	A capsule in the middle of all 5 pits with a conveyor belt in it to transport waste to the core of the terminal.	Robotic bins that once they are filled drive automatically to the waste station	An electric car with multiple wagons to collect waste separately						
Saving space / waste storage	Save space through stackable bins	Centrifuge or vacuum chamber to reduce waste volumes	Modular waste bins that can be reconfigured per tenant based on amount and waste amounts	Vertical waste storage to save floor space	Collapsible bin for use only when needed (e.g. cardboard when new supplies are delivered)	Temporary waste storage points (e.g. a multi-pier in between commercial units and waste station)					
Weighing waste	Using RFID or QR codes for waste tracking and registration	Integrated weighing system or sensors in bins that instantly weigh the waste or volume	Supermarket vegetable/fruit given with a container (under-scan and weigh every waste bag and print's barcode as it	Use a rule of thumb for each waste stream and bin volume (e.g. one full bin of organic waste = x amount of kg.)	Interactive floor sensors that measure the weight of waste bins						
Training employees	Collaboration with environmental organisation to inform tenants and create awareness	Include an e-learning module in the top-card lobby training about waste management	AR app for how direct to learn and discover their way around the airport and about waste management	Organise recurring sustainability courses for tenants to stay up to date							
Information provision	Waste campaign to create awareness around waste reduction	Centralised app for information provision	Develop a waste FAQ section or more specific section in the top card or on the website about	Install a helpdesk or hotline for any questions regarding waste	A chatbot or virtual assistant offering help and guidance	Recurring waste audits and consulting services to help tenants with waste separation and reduction					
Motivating staff	Internal competition between tenants to waste reduction and separating to win prizes	Creative design or patterns displayed around the airport to support waste reduction and create awareness	Gain personal recognition in the internet (Avatar community app) when performing good	Discounts in Avatar community app for personal waste performance	A higher waste fee for a tenant that doesn't reach the waste targets	Rewards (e.g. gift cards) for personal results regarding waste	Big screen with waste performance / KPIs to create a proud feeling	Make waste managers 'fun' and engaging through virtual gaming			
Ownership of waste management	Hire facilitation manager as coordinator and carrier of waste management	Hire facilitation team to take over all waste related activities	Participatory decision-making options where all stakeholders have a voice in shaping the waste management	Stricter tenant agreements, including services regarding waste saving or reducing	Create a participation council to have all stakeholders' voices represented						
Other	Automated tipping device for emptying waste bins into container	Use data and machine learning to predict peak moments and best pick-up times	Installing more donation stations	Blockchain network for all goods and thus waste							

Appendix M: Concept validations

Appendix M1: Interview Avinor

- There are only 3 stations currently, but there's actually only 1 that provides all waste streams: Rp19.
- There are 2 standardized container sizes: 600L and 200L (kliko)
- The idea is very good
- This concept also solves the issue with security control
- The challenge with this concept: how exactly will the container hub look like

Points for me to figure out:

- Investment costs
 - Location
 - Which streams
 - How to access Rp19 with AGV?
-
- Investment costs are quite high, however personnel costs will be saved later
 - Placement on the first sight seems okay
 - Which waste streams? → 5 I suggested (paper, plastic, organic, metal/glass, residual)
 - Can a waste collector pick up 1 container or all containers at once?
 - Logistics is something to figure out, logistics is key: are the containers driving or will it be through small cars? How is recycling company A picking them up? should it be emptied in the bigger compactors?
 - Also think about if the container hubs should have compactors. Because paper is a lot of volume, so maybe you need to compact it. Also for PANT it should probably be a compactor.
 - Avinor wants to invoice on waste weight as soon as possible. Don't really want to earn money, but saving costs.
 - Should there be a residual container at the container hub at all? We want to make it harder to deposit residual, maybe a higher fee is not enough as a stimulator.
 - There is a lot of waste created in the basement at the storerooms as well → how will it work? Maybe just place a container hub in the basement as well.
 - Another thought: it may also work for the cleaning services and not only the commercials. Because the cleaning services have waste every hour and commercials only every 3 hours or so and not at night.
 - How to test → a pilot phase with 1 container hub.
 - What TULIPS would like to see: how long testing period, what measurements, what investment costs. This test plan is needed to allocate money.
 - Keypoint in this concept: it should be really easy to understand.
 - A contract can be a way to make it work to make clear who can use the system and who doesn't.
 - Sonja and Elisabeth can help with the test plan.
 - Waste processing company A could probably help with customizing container hubs or set up a test hub.

Location:

- Is it a place that can be sold for commercial purposes? Then there can't be a container hub probably.
- Operations: does it obstruct traffic or hinder passengers?

Stakeholders for this concept:

- Commercial units
- Operation team Avinor
- Recycling company A
- A supplier for the container hubs
- A supplier for the IT system

Appendix M2: Interview recycling company A

- Really like the idea of the concept
- There are a few point to take into account:
 - o How is the smell managed? Because waste can become smelly
 - I explained that there will be a lid of the container and another lid from the framework → Morten thinks this will be enough to block the smell.
 - o There is no control in waste sorting in your concept. People can still throw everything in one waste bag or in the wrong container. With people coming by the commercial units for pick up you do have control. Maybe the sorting control can be done with camera's at the container hubs.
 - o A big problem still is that people keep sort their waste wrong.
 - o Compacting the waste is necessary, either at Rp19 or at the container hubs. The location does not really care, but before transport it needs to be compacted to improve sustainability. Only glass & metal doesn't have to be compacted. The other waste streams should be compacted → the more, the better.
 - o Costs are important to calculate. This is a make it or break it aspect for this concept to make it work.
- My suggestion to use 600 L containers in the container hubs is good. These can be easily emptied into the bigger containers/compactor at Rp19 (with a tipping mechanism/device). This is not new. There are already solutions for this.
- There should be one responsible team, company or person for the service and also at Rp19.
- You don't want to bother passengers with container hubs or with information signs that are not for them.
- Recycling company A is able to provide the container hubs. They have a big network of suppliers in order to make the framework, include the weighing scale, etc.

Appendix M3: Interview F&B operator B

- Really likes the concept
- The one thing that is most appealing is having several locations in the terminal where you can deposit waste close by.
- Is it going to be registered per unit or per operator (F&B operator B)?
- Currently, F&B operator B employees are not linked to a certain unit with their ID card. In this way it is possible to swap employees between units.
 - o Lars thinks it best to register the waste per unit to create a healthy competition between the units in reducing waste.
 - o For that, it should be specified (e.g. through ID card changes) from which unit the waste comes → this should be arranged by Avinor.
- PAYT: this is the only way to do it. Lars is positive about this.

- However, he argues that there should only be a fee for residual waste and not for the other streams
- Residual waste is the biggest stream which Avinor really wants to reduce.
- Also, he thinks, that residual waste is the only waste stream that Avinor pays for.
- Suggestion Elisabeth: increase the monthly rent, so that the other waste fees can be included and then you'll only pay an extra fee for residual waste.
- Implementation will be easy. Lars sees no obstructions in this.
 - This service will provide more freedom for everyone to throw away their waste instead of having to wait for a person picking up the waste.
- Locations are well places according to Lars
 - It does depends on the next tender round where the big restaurants with a lot of waste will be located. Lars thinks that this may affect the placement of the hubs.
- Lars doesn't see big problems in the concept or aspects that are missing. 'This is a system that could work'.

Appendix M4: Interview F&B operator A

- I think your concept is a great idea. It's a good solution
- The only thing is that I am not sure if you'll get Avinor on board.
- Time saving and the ability to keeping the airport clean are the most beneficial points of this service.
- It's also a really sustainable solution I think, so that's good for Avinor.
- PAYT
 - This is smart to do.
 - However I think different tariffs per waste stream will lead to faulty throwing (people will throw residual waste into other 'cheaper' streams). → Rune advises to use the same fee for every waste stream.
- Implementation
 - I think it's easy to implement such a system, because it's always easy for people to shift to a way of working that makes it easier for them instead of harder or more difficult.
 - There is nothing missing or there are no recommendations to improve the service.
- Location
 - As long as you don't have to walk far, it's good
 - I would use trolleys for the transport of waste bags to the hubs. Because especially food waste is heavy (1 bag can be 30kg already).
 - Avinor should provide small trolleys or cars for this transport to keep it standardized throughout the airport.
- Earlier there was this vacuum system in place at the airport, but it closed down during Covid. This system was also initiated and owned by Avinor and I think people were very happy with it. But currently Avinor doesn't take any effort for waste management, they just leave it to the tenants.
-

Appendix M5: Interview guide

The semi-structured interview questions that served as validating the concept with the stakeholders.

1. Feedback on storyboard:

- After reviewing the storyboard, what are your initial thoughts or impressions?
- Do you find the concept clear and easy to understand?
- What aspects of the concept do you find most appealing or beneficial for Avinor?
- What is your opinion to implement a Pay As You Throw structure to motivate waste sorting and reduction and as revenue generator?

2. Usability and Functionality:

- Do you think the proposed waste management service would be easy to implement within the current infrastructure and operations?
- Are there any features or functionalities missing from the concept that you would like to see included?

3. Container hub locations:

- After reviewing the proposed locations for the container hubs, what are your thoughts on the locations?



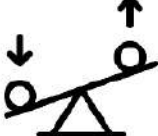



4. Improvement Suggestions:

- Are there any areas of the concept that you think could be improved or enhanced?
- Do you have any additional ideas or suggestions to make the waste management service more effective or efficient?
- Is there anything else you would like to add or share regarding the concept or your experience with waste management at Oslo Airport?

Appendix M6: Harris profile concept evaluation

Evaluation criteria		Concept 1				Concept 1.2				Concept 2				Concept 3				Concept 4				Concept 5							
		-2	-1	+1	+2	-2	-1	+1	+2	-2	-1	+1	+2	-2	-1	+1	+2	-2	-1	+1	+2	-2	-1	+1	+2				
Feasibility	Solves the problem of lack of space		■				■				■				■				■				■				■		
	Makes weighing of waste fractions possible			■				■				■				■				■				■				■	
	Solves the problem of long distances		■				■		■		■				■				■						■				■
	Can be integrated in current airport infrastructure & operations		■				■				■				■			■	■						■	■	■		■
	Makes efficient use of time and manpower		■					■	■		■				■				■			■	■			■	■		
	Technically feasible to be implemented in horizon 1			■		■	■					■				■		■	■						■	■	■		■
Viability	Favourable investment costs	■	■			■	■				■					■	■		■						■	■	■		
	Long-term operational savings	■	■					■			■					■	■		■	■		■	■			■	■		
	Revenue generation		■				■					■				■	■		■	■		■	■			■	■		
Desirability	Creation of ownership or responsibility over waste	■	■			■	■					■	■			■	■			■		■	■						
	Solves the principal-agent solution			■				■	■			■	■			■			■						■	■	■		■
	Willingness to properly separate waste		■				■					■	■			■			■						■	■	■		
	Intuitive and easy to use for all stakeholders			■	■			■	■			■	■		■				■						■	■	■		
	Contributes to the modern aesthetics of the airport			■	■			■	■		■				■				■						■	■	■		
	Convenience of waste sorting is improved			■	■			■	■			■				■				■					■	■	■		
Sustainability	Enable stakeholders to gain knowledge on waste practices			■			■					■	■			■			■						■	■	■		■
	Promotes waste sorting			■	■			■	■			■	■			■			■						■	■	■		■
	Promotes waste reduction		■				■				■					■	■		■	■					■	■	■		
	Durable & easy maintenance			■			■				■					■			■	■					■	■	■		

Appendix M7: Comparative assessment waste tracking

	Solution 1				Solution 2				Solution 3				Solution 4				Solution 5				Solution 6			
	 Traceability in the system through RFID tags or QR codes on the waste bags.				 Using camera surveillance at the container hubs to create a feeling of being monitored.				 Traceability in the system through comparison of the exact weight of a faulty sorted waste bag and the same weight as part of the cumulated total.				 Traceability in the system through sensors scanning the volumes of each waste bag.				 Direct feedback at the container hub with the help of sensors and AI technology.				 Traceability in the system through tenant-specific waste bags.			
<i>Evaluation criteria</i>	-2	-1	+1	+2	-2	-1	+1	+2	-2	-1	+1	+2	-2	-1	+1	+2	-2	-1	+1	+2	-2	-1	+1	+2
Accuracy			■	■	■	■					■			■				■					■	■
Costs			■			■					■	■		■	■		■	■				■		
User effort			■				■	■		■				■			■	■					■	
Effectiveness			■		■	■				■				■					■				■	
Reliability			■	■	■	■					■			■					■				■	■
Feasibility			■	■			■			■				■			■	■					■	

Appendix N: Information signs waste station

Above the containers in Rp19 are the 'official' signs stating what can and cannot be thrown into the container, but in front of the container new warnings are placed.



A close-up of these warnings can be seen in the figure below. This sign states that glass should not be thrown into the container together with plastic bags. In addition a photo is added to visualise the 'incorrect' way with a red cross through the picture.



The signs described above are replaced by these new ones during this graduation project.

**KUN EMBALLASJE,
IKKE ANDRE METALLER!**

KJØKKENUTSTYR, MØBLER, METALL FRA OPPUSSING O.L.
MÅ DERE LEVERE TIL RETURPUNKT 20

**ONLY HERMETIC BOXES AND CANS,
NO OTHER METALS!**

KITCHEN EQUIPMENT, FURNITURES, CONSTRUCTION METALS
AND OTHER METAL THINGS HAS TO BE DELIVERED TO RP20

AVINOR OSLO AIRPORT

**PLASTSEKK SKAL IKKE
KASTES I KONTEINER!**

TØM SEKKENE OG KAST DEM SEPARAT

**PLASTIC BAGS SHOULD
NOT BE THROWN IN!**

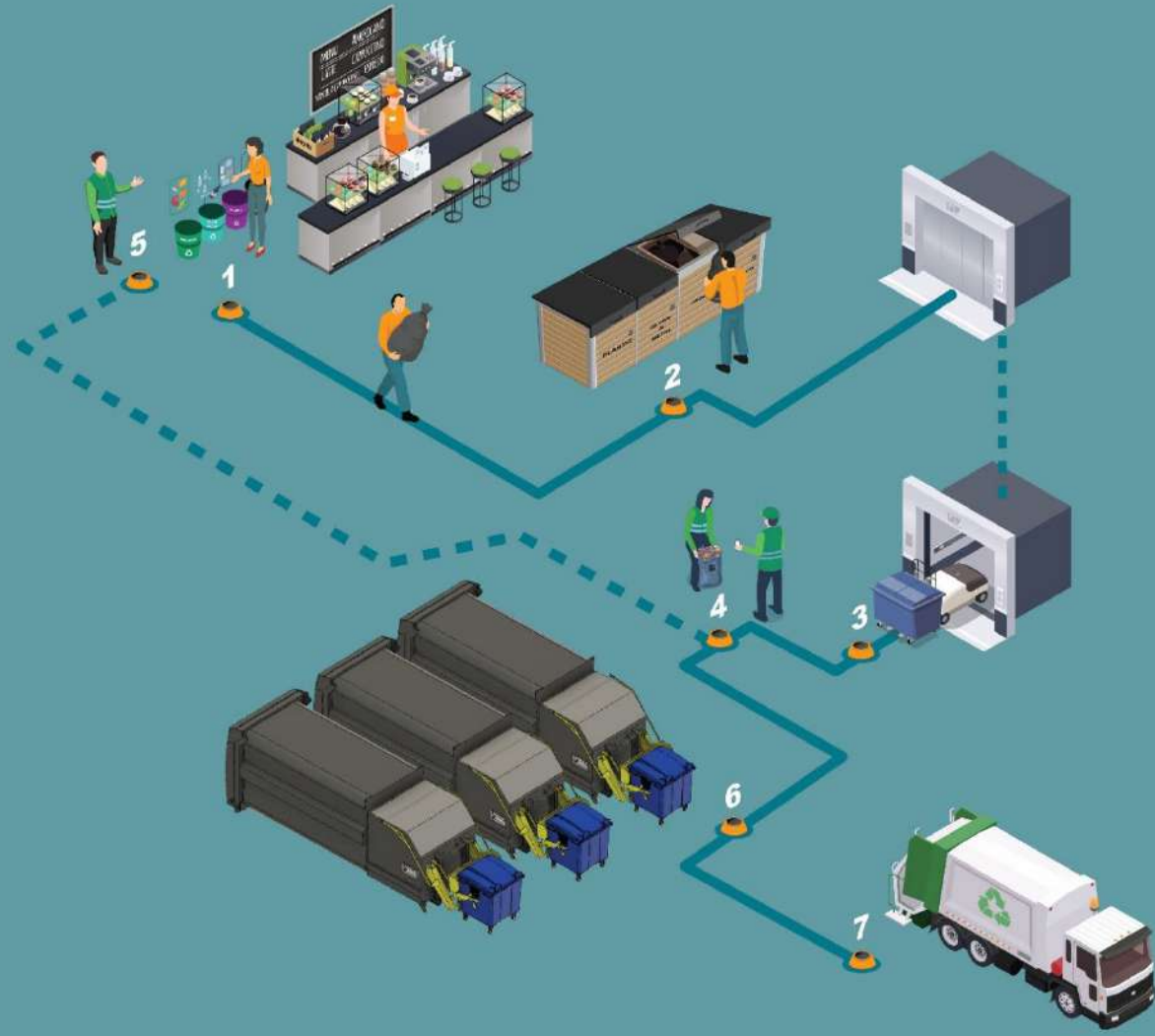
EMPTY THE BAGS AND THROW THEM SEPARATELY!

AVINOR OSLO AIRPORT




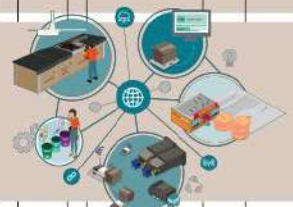
Appendix O: Final concept: overview of the service

Waste management service Oslo Airport

- 1 Waste is sorted in the right bin at a commercial unit.
- 2 The waste can be thrown away at a container hub and will be weighed automatically. The hub is accessible via ID card.
- 3 Waste will be transported with elevators to the basement through Automated Guided Vehicles.
- 4 A waste management team will perform spot checks on the separation rates of the waste. All bags have tenant-specific QR-codes.
- 5 The tenants will receive a fee for the amount of residual waste. And they receive feedback on improper waste sorting.
- 6 The waste will be thrown into the waste compactors and containers.
- 7 The recycling company hauls the containers once they are filled.



Appendix P: Strategic Roadmap

Phase	PILOT TEST 2024	HORIZON 1 2025	HORIZON 2 2025 - 2030	HORIZON 3 2030 - 2050
Goal	Test the feasibility of the concept	Achieve waste reduction at the airport	Achieve a zero waste airport	Achieve a circular airport
Drivers	Technical feasibility Data collection Design improvement Risk mitigation Operational feasibility	Awareness Transparency Information Supporting	Commitment Adapting Transition Configure Efficiency	Robust Sustainable Reliable Impactful
Product/service	 A pilot test with one container hub to test the feasibility of the concept.	 Improve employees' understanding, awareness and accessibility to reduce waste and properly sort waste.	 A service that makes it easier to properly sort and discard waste for tenants through clear information provision and smaller container hubs. Pay As You Throw is integrated into the system to stimulate waste reduction.	 The service as introduced in horizon 2 is made more robust and reliable through data collection, and automation in the form of autonomous vehicles to transfer the waste from the container hubs to the waste station.
Triggers	Product launch Stakeholder needs Process change Strategic planning User feedback	Providing the tools and information to reduce waste Support and motivate staff to properly separate waste	Collect data and integrate automation, AI and machine learning Align stakeholders with the horizons and goals	A robust system that is build upon data
Resources	Container hub Wheelie bins Weights measuring scales Information signs Data collection tools Feedback collection tools Analysis software	Waste management team Waste bin expansion and alignment	Information signs Avinor intranet waste module Small waste collection team IT system	Cloud connection ID badge, scale and PAYT Container hubs Automated Guided Vehicle system Cloud connection AGV system