TOWARDS REUSABLE MEAL PACKAGING AT OPEN EVENTS

A visitor-centered approach to raise awareness and encourage compliance in reusable meal packaging systems at small-scale open events

A circular economy

Special thanks

During my search for a graduation project, I came across this opportunity and I was immediately excited. A project that combines events and sustainable behaviour? That felt like a perfect match. The events industry has always fascinated me, and as a festival-goer, I know how important it is to make this world not just more enjoyable, but also more sustainable. This project gave me the chance to contribute to exactly that.

From the very start, I knew one thing for sure: I wanted to design something that would have a direct impact. No abstract future vision, but a tangible solution that could be implemented straight away. The world is changing continuously and sustainable change cannot afford to wait. Every shift towards a new direction is a step forward, no matter how small it may appear.

First and foremost, a big thanks to Dennis. Thank you for trusting me with this project. From day one, you were a fantastic mentor, and that remained true throughout the entire process. Your clear communication and flexibility helped me immensely, as I could always approach you easily with questions, and your quick responses were greatly appreciated. Additionally, your network, as well as the events I was able to attend, gave me the opportunity to engage in valuable conversations and listen to experts in the field. This deepened my understanding of behaviour and boosted my insights into the implementation of reusable tableware at events.

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And of course, my friends and housemates – thank you for the endless brainstorming sessions, the love, the motivation, and the unconditional support. You have made this journey so much more enjoyable, especially because I had the chance to graduate alongside my housemates. It is special to think that we once started together in the first year of our bachelor's and now we are all graduating at the same time.

Finally, to all readers: I hope my work inspires you to take that first step towards creating a better world.

Enjoy reading!

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ABBREVIATIONS

TERM	DESCRIPTION
CE	CIRCULAR ECONOMY
RMP	REUSABLE MEAL PACKAGING
RMPS	REUSABLE MEAL PACKAGING SYSTEM
RPS	REUSABLE PACKAGING SYSTEM
SUP	SINGLE-USE PLASTICS

GLOSSARY

Event | An organised occurrence that takes place at a specific time and location, often with the aim of providing a particular experience, activity, or event for a target audience. It can range from small-scale gatherings, such as a market or workshop, to large-scale events such as festivals, conferences, or sporting events. Events are often characterised by their temporary nature, a schedule, and a specific focus or theme.
(Boom uitgevers Amsterdam, 2010)

Habits | Habits are shortcuts that do not always guarantee the best decision but work well for a quick response, meaning that both good and bad habits tend to be repeated.
(Leal et al., 2022)

Reusable packaging | According to the EU, reusable packaging is defined as a product that has been designed, manufactured, and marketed in such a way that it enables reuse.
(NEN-EN 13429:2004 Nl, z.d.)

Reusable beverage packaging | Reusable beverage packaging refers to bottles, cups or other containers that can be used multiple times for storing and consuming beverages. They are easy to clean and reuse.

Reusable meal packaging | Reusable meal packaging refers to containers, such as trays and plates, that can be cleaned after use and reused for storing and serving meals.

Single-use packaging | Packaging that is used once and then discarded.

Sustainable consumption | This means consuming in a way that does not harm people or the environment. For example, by purchasing products with a sustainable certification or products that have a positive end-of-life destination.
(Ministerie van Algemene Zaken, 2024)

Tableware | Tableware refers to eating and drinking utensils, such as cups, plates, bowls, and cutlery.

EXECUTIVE SUMMARY

Events contribute significantly to plastic pollution, largely due to the use of single-use plastic meal packaging like plates and bowls. This results in major environmental issues, as these items are discarded after a single-use. With growing awareness of sustainability and increasing regulatory pressure, more events are transitioning to reusable alternatives. One promising solution is a return system, where visitors use reusable meal packaging and return them correctly. However, in practice, visitors do not always comply, which undermines the effectiveness of the circular system.

This study addresses the question: What are effective behavioural interventions to positively encourage event visitors to use and return reusable meal packaging responsibly? Responsible use and return means handling the meal packaging with care, preventing damage and minimising waste by returning it neatly.

To answer this question, the process began with a combination of literature research, desk research, observations and interviews with experts and event attendees. Key behavioural factors influencing the issue were identified and analysed using the COM-B model, which formed the basis for an iterative design process. This led to the development of five behavioural interventions and a framework.

The interventions were tested at three pilots and achieved an average return rate of 99%, confirming their effectiveness in small-scale open events.

The behavioural interventions and the framework have been compiled into a practical guide for event organisers looking to implement a reusable meal packaging system. It provides guidelines and recommendations to promote responsible visitor behaviour. While this research focuses on small-scale open events, further studies could explore the scalability of these interventions to larger events.

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INTRODUCTION

This chapter introduces the context of our society's large-scale plastic waste production, particularly from single-use packaging, which causes severe environmental issues and demands a shift to a circular economy. It emphasizes the urgency of adopting circular packaging systems at events and provides further details on the project background, research and design methods, serving as a reading guide for the document.

OVERVIEW CHAPTER

1.1 The need for circular packaging systems

Nowadays, people come into contact with more plastic than ever before. It is everywhere in our daily lives, affecting everything around us. The air we breathe, the water we drink, the food we eat. Plastics play an essential role in modern society but also cause significant impacts on the environment and climate (Mortensen et al., 2021b). Over the past 150 years, non-renewable fossil fuels (petrochemicals) have been the main source for plastic production, contributing to the depletion of natural resources (Hardman, 2023).

In Europe the packaging sector is responsible for approximately 40% of all the plastic materials (Plastics Europe, 2023) (see Figure 1), including single-use plastic products for meal and beverage packaging, approximately 85% of which ends up in landfills or as unregulated waste (Visual Feature | Beat Plastic Pollution, 2022c).
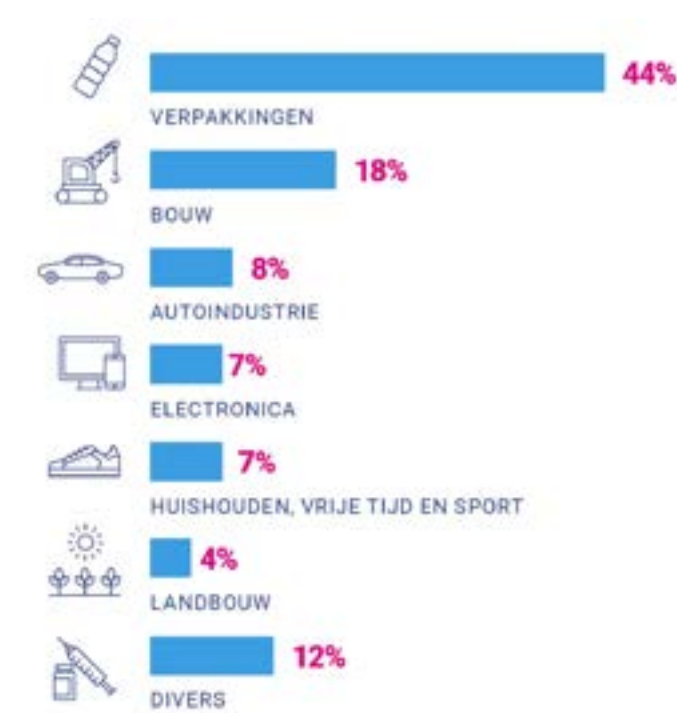

Figure 1. The share of packaging made of plastic
Source: Plastic Soup Foundation (2023)

Single-use plastic products (SUPs) are used once or for a short period before being discarded. The issue with SUPs is significant. Despite efforts to improve recycling, most collected plastic is still incinerated, releasing CO_2 emissions and contributing to climate change (Dreaberghorst, 2022). Additionally, a large amount of SUPs ends up in the environment, such as in the seas, as it is more likely to become litter compared to reusable alternatives.

The 10 most commonly found single-use plastic items (see Figure 2) on European beaches, along with fishing gear, account for 70% of all marine litter in the EU (Single-use Plastics, 2025). The plastic that ends up in the seas does not biodegrade. It breaks down into smaller and smaller pieces, eventually forming microplastics that become increasingly toxic. Plastic pollution causes significant harm to the environment, including animal deaths and the accumulation of microplastics in our food chain (Plastic Soep Oplossing | WWF | Oorzaak en Gevolgen, n.d.). This situation is unsustainable. It is therefore crucial to transform the current linear model of 'Take, Make, Dispose' into a circular system, where products are designed for reuse which leads to a minimised value loss and decrease in environmental harm.

Events, often functioning as temporary mini-cities, contribute significantly to plastic pollution. Much of the waste at events consists of SUPs, such as cups, plates and cutlery, which are discarded after a single-use. Despite the negative effects of SUPs, many events continue to rely on single-use tableware due to its low cost and the logistical convenience it offers. However, with increasing awareness of sustainability and pressure from legislation such as the EU Single-Use Plastics Directive (Single-Use Plastics (SUP) Directive | Verpact, z.d.), now is the right time to switch to sustainable alternatives. A circular system is a key example of such alternatives.
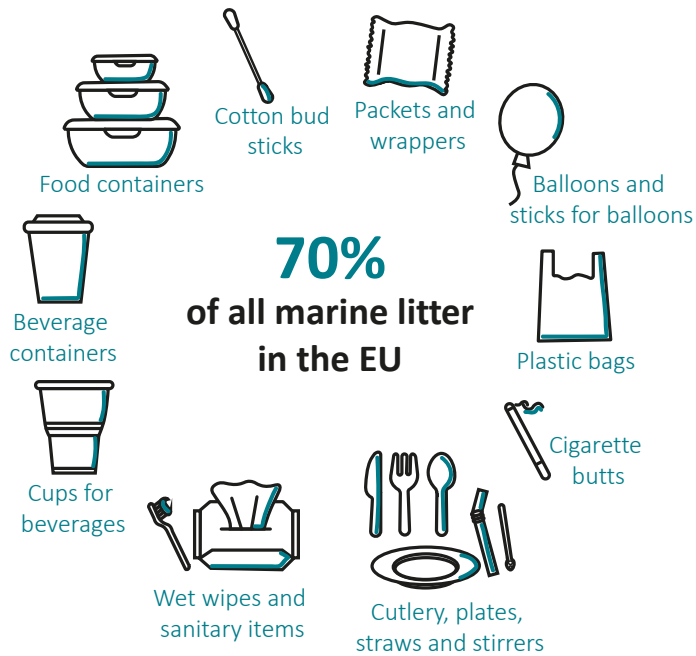
Figure 2. The 10 most commonly found single-use plastic items on European beaches
Source: Adapted from European Commission (2025b)

1.2 The problem statement

At current events, a significant amount of single-use meal packaging is still being used, leading visitors to habitually discard it after use. When event organisers decide to switch to reusable meal packaging, visitors often fail to handle it carefully or return it because they are still accustomed to the old system with single-use items (see Figure 3). This disrupts the circular system by causing material loss and increasing the need for replacements. Plastic reusable meal packaging often contains more plastic than single-use items, so when it is treated as single-use and not returned, a large amount of plastic material is wasted. The lack of insight into effective strategies to encourage responsible packaging return leaves event organisers uncertain about the economic and ecological viability of circular systems. Consequently, organisers may be hesitant to adopt such systems.

Figure 3. Unwanted behaviour with reusable meal packaging

1.2.1 Stakeholders

Introducing reusable meal packaging systems at events involves several stakeholders. Each of these stakeholders have their own interests, responsibility and influence on the success of the transition from single-use to reusable packaging. The main stakeholders are the government, event organisers, caterers, reusable meal packaging suppliers, cleaning partners and visitors (see Figure 4).
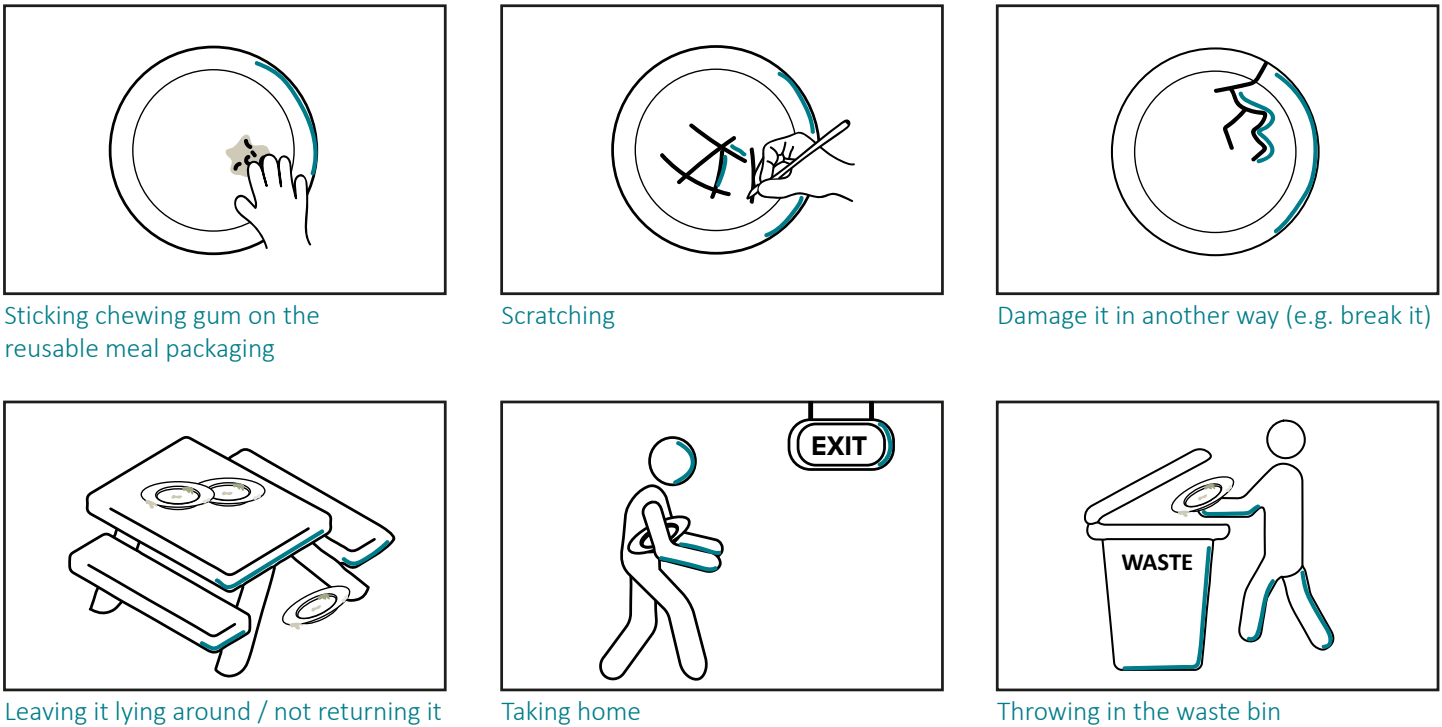
Establishing a well-coordinated network between these stakeholders is essential for the successful implementation of the system. This network should focus on collaboration and developing targeted solutions to the challenges associated with the transition to a circular economy. The transition is complex, as multiple stakeholders must simultaneously embrace new business models. This requires trust between parties and new types of interactions with visitors, which are essential for the success of the circular system on events.

Visitor centered-design

In the transition to a reusable meal packaging system at events, there are many stakeholders that must contribute. This project focuses on the behaviour of the visitors and how they adapt to and comply with the new system. Little is known about how visitors interact with this system, which is why this research specifically targets their perspective. What are their wishes and expectations? What obstacles do they face? These questions are explored and answered within this project.

1.2.2 Vision of the province of Noord-Brabant

This project, initiated by the province of Noord-Brabant, aims to contribute to a more sustainable world by moving from a disposable culture to a circular approach. The province focuses on making the production and use of plastics more sustainable with a focus on reuse instead of single-use plastics. This promotes the circular economy, reduces CO_2 emissions and encourages a more sustainable plastics industry. By encouraging behavioural change, the province aims to encourage consumers to choose reusable alternatives. Noord-Brabant supports projects that replace single-use plastic packaging products with reusable products, aiming to reduce environmental impact and contribute to a more sustainable future.

The province benefits from this project by supporting events in the region in applying behavioural interventions, which is essential for a successful transition to reusable meal packaging. The project will not only be valuable for events in Noord-Brabant, but also offers opportunities for national collaboration, where other regions can learn from this approach.

1.3 Project background

This section provides more context and background information clarifying the project and its necessity.

Circular economy

A circular economy offers a solution for single-use packaging by making products, components and materials reusable, which promotes sustainable production and consumption practices (Ellen MacArthur Foundation, 2013). In contrast to the linear 'Take-Make-Dispose' model, the circular economy aims for a closed material cycle, reusing materials and reducing ecological damage. This significantly reduces the waste stream compared to the linear model (see Figure 5).

The government plays a key role in facilitating this transition by implementing regulations, offering subsidies and setting sustainability targets to drive adoption. It also supports stakeholders by providing guidance, investing in infrastructure, and raising public awareness.

Event organisers play a crucial role in setting up and managing the circular system at their events. They create the necessary conditions, such as clear return procedures, accessible return points and cooperation with reusable packaging suppliers and cleaning partners, to ensure that the system is both functional and feasible.

Caterers play a key role in ensuring the use of reusable meal packaging by serving meals on it during events. For this stakeholder more practical aspects, such as the suitability of the type of tableware for their meals and the efficiency of the tablewares' distribution need to be taken into account.

Suppliers of reusable meal packaging are responsible for providing the suiting materials that enable a circular system. It is their job to deliver sustainable, practical, and easy-to-clean packaging that meets the needs of both caterers and event organisers.

Cleaning partners are responsible for cleaning of the reusable meal packaging. The cleaning partners ensure that the packaging is collected, cleaned and made available for reuse in an efficient manner. This process is crucial to keeping the circular chain intact and maintaining that the packaging remains in good condition.

EVENT ORGANISATION

Visitors are key stakeholders in the system, as their behaviour plays a crucial role in the successful transition from single-use to reusable packaging. Gaining insights into their motivations, concerns, and expectations is crucial in order to stimulate behavioural change. Visitors must be encouraged to use and return the packaging correctly, which requires thoughtful communication and system designs that align with their habits and behaviours.

Figure 4. Stakeholders and their roles in the reusable meal packaging system at an event
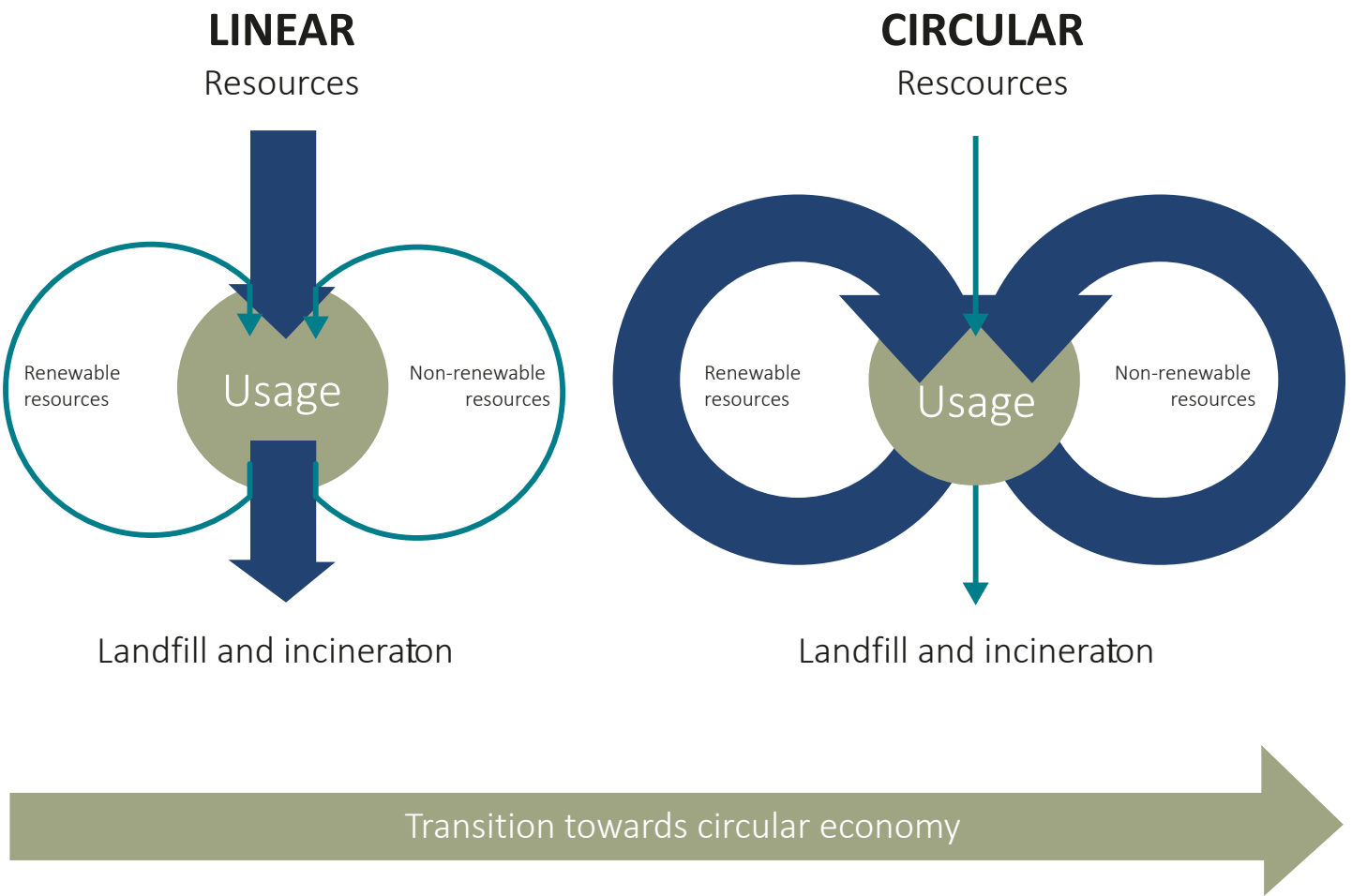

Figure 5. From linear to circular
Source: Adapted from PBL (2016)

Making reuse the norm

A circular economy is more than just recycling. While all stages of the R-ladder play an important role, this project specifically focuses on the third step (R3), also known as the 'reuse' phase (see Figure 6). The R-ladder indicates the level of circularity and consists of 6 steps (R1 to R6), each representing different strategies for circularity. Strategies higher up the ladder conserve more resources. The higher a strategy is on the R-ladder, the more circular it is. The reuse phase focuses on extending the lifespan of products by reusing them, either by the original user or by others. Reuse is a crucial strategy for reducing waste and conserving natural resources (Reducing And Reusing Basics | US EPA, 2025b).

Reuse generally provides significant environmental benefits. Reusable items must be reused a certain number of times to be truly more sustainable than single-use alternatives. However, the actual impact depends on various factors, such as the number of times an item is reused, the type of material, volume, cleaning methods and the efficiency of return logistics.

By making reuse central, this project aims to encourage a shift in the consumption behaviour of visitors at events, towards a state in which reusable packaging is considered the norm. After which events can serve as an example and play a key role in embedding reusing as the new standard within society.

Making the event industry more sustainable

The events industry must future-proof itself by reducing its ecological impact as it significantly contributes to waste and pollution. This makes adopting environmentally friendly solutions essential. More events are incorporating sustainability into their policies. Many event organisers have been focused on sustainability for some time with initiatives addressing energy consumption, waste management, mobility, procurement, water usage, and social sustainability including inclusion and diversity. Initiatives like Plastic Promise and Circular Festivals are examples of projects aimed at reducing single-use plastic and promoting circular processes within the events industry (Impactprogramma's- Green Events, 2025).

But what does it mean to be a circular and climate neutral event?

The Green Deal Circular Festivals (GDCF) participants and experts have defined what circularity and climate neutrality mean for the event sector. This model (see Figure 7) sets common definitions, long-term goals and short-term targets. As new insights emerge, the model will continue to evolve.

This project focuses on the goal 'Eliminate single-use plastics' from the model.

Figure 6. The R-ladder with strategies of circularity
Source: Adapted from PBL (2016)

Figure 7. The GDCF Model for circular and climate neutral festivals
Source: Circular Festivals (2023)

- Minimize use of materials
- Zero residual waste: all materials cycled at highest value
- Eliminate single-use plastics: unavoidable recycled
- 100% Materials from renewable resources
- Net Zero carbon emissions from (re)use, recycling and disposal

Laws and regulations

It is estimated that over 150 million plastic cups, containers, and plates are thrown away after a single-use at events in the Netherlands each year (Events, 2023). However, change is on the horizon, as reuse is becoming the norm. How? Through a ban on SUPs since July 2023 (Ministerie van Algemene Zaken, 2025). Additionally, the Wet Milieubeheer in the Netherlands has been tightened, making event organisers responsible for reducing waste and disposing of it correctly (Milieuaansprakelijkheid (Hoofdstuk 17), n.d.).

Despite the regulations, SUPs are still widely used at events due to an exception to the ban on disposable plastic: the option for high-quality recycling. This means that a collection system must be set up for plastic beverage packaging and meal packaging, so that after recycling, they can be reused as packaging for meals or beverages. The percentage of plastic packaging that must be recycled in this way increases annually, from 75% in 2024 to 90% in 2027 and beyond (Evenementen en Dagattracties, z.d.-b).

The SUP regulations specifically target plastic products. Other materials that are plastic-free and biobased, such as paper or sugar cane, are not subject to the same strict rules and can still be used. Event organisers can therefore continue using single-use products made from these materials.
However, this is not the approach of the province of Noord-Brabant. While the use of biobased products can help reduce fossil energy and CO_2 emissions, it is important to consider factors such as land use, water consumption and other environmental impacts. Biobased materials require a lot of water to produce and suitable agricultural land is becoming increasingly scarce. Additionally, biobased single-use products often end up as litter or in the incinerator. For this reason, the province does not view biobased products as a solution and focuses on promoting reusable options instead.

But what about meal packaging?

In short, there are two options: reuse or plastic-free. The preference is for reuse: not only because truly high-quality recycling is not yet possible, but also because it directly addresses another issue: discarded forks, ice cream spoons and plastic containers that end up in the surrounding nature after the open event (Events, 2023).

From 2024, the regulations were further tightened. There is a distinction between open and closed events:

Open event

If there is no enclosed area, it is referred to as an open event. For open events (such as a fair, marathon, or an open city event like Carnival or King's Day), visitors have been required to pay for a disposable cup and container if they contain plastic, starting from 1 July 2023. They must also be able to use a reusable alternative with a return system or bring their own cup or container (bring your own).

Closed event

At closed events, the use of disposable plastic cups and containers is no longer allowed since 1 January 2024. A circular system, where plastic cups and containers are returned for reuse or high-quality recycling, will then be mandatory.

For event organisers, this legislation brings new challenges, including the logistics of collecting and cleaning reusable packaging and the need to inform and encourage visitors to return their packaging. At the same time, the regulations present opportunities to make events more sustainable and contribute to the circular economy.

The current laws and regulations still leave too much room for interpretation, causing many organisers to delay the transition to reusable packaging. Although the government is pushing to reduce single-use (plastic) items, organisers can still use biodegradable or compostable materials, which are often not processed correctly and end up as waste. Additionally, there is currently no legislation in the Netherlands requiring a certain percentage of reusable tableware to be returned, which is crucial for maintaining a sustainable reusable system.

What is a high return rate?

The desired return rate for reusable tableware at events varies by organisation, but in many cases, organisers aim for a return rate of 90% or higher.

1.4 Theoretical knowledge on the subject

This project focuses on the challenge of transitioning from disposable to reusable meal packaging at events. The main goal is to encourage behavioural change among visitors so that they use and return the reusable meal packaging correctly. Scientific research on the circular economy and circular design has primarily focused on technical and operational challenges, with relatively little attention given to the role of the consumer and behavioural change (Hanes-Gadd et al., 2023).

There has been some attention given to design strategies that encourage the continued use of reusable packaging systems by consumers (Miao et al., 2024a). Research has been conducted on how packaging and system design not only influence product usage but also act as either incentives or barriers for consumers at various stages of the consumption process (Miao et al., 2023). These exploratory studies provide insight into how design choices can either promote or hinder the use of circular products.

Many organisations recognise that it is essential to place the needs and behaviours of the consumer at the centre of circular product design. However, research shows that a lack of insight into consumer behaviour often hinders progress, undermining the effectiveness of circular systems in practice (Hanes-Gadd et al., 2023).

Therefore, it is crucial that the consumer experience and behavioural dynamics are properly mapped when designing circular systems. This is a relatively underdeveloped area within academia, but it is essential for the broader acceptance of reusable products. Consumer acceptance is a key factor in the success of circular systems, but without effective behavioural interventions, the implementation of sustainable systems at events will remain limited (Hanes-Gadd et al., 2023).

Within the framework of Design for Sustainable Behaviour, there has been limited attention to the link between behavioural change and the design strategies necessary for the successful adoption of reusable systems (Huang et al., 2020). There is still much knowledge needed on which behavioural interventions are effective and how the benefits to the consumer can be best presented to create habits that encourage sustainable use of reusable packaging. This project aims to address these knowledge gaps by developing effective interventions that promote behavioural change and the adoption of circular packaging systems at events.

Theoretical and practical relevance

In recent years, there has been increasing attention to the role of the consumer within reusable packaging systems and how consumer behaviour affects the effectiveness of circular systems (Hanes-Gadd et al., 2023). This project contributes to the existing literature by developing and evaluating behavioural interventions aimed at encouraging event visitors to comply with reusable packaging systems.

Furthermore, this research offers practical relevance for event organisers. It provides them with insights into effective behavioural influence techniques that can help motivate their visitors to use reusable tableware sustainably. This enables organisers to facilitate the transition to a circular system, which not only allows them to reduce the ecological impact of their events but also helps them comply with the growing legislation surrounding sustainability and waste management. Therefore, the research provides both scientific and practical value by bridging the gap between theory and practice and by offering directly applicable behavioural interventions for a more sustainable events industry.

1.5 Project goal

Event organisers are considering the shift to reusable meal packaging but lack crucial insights into visitor behaviour within a reusable meal packaging system (RMPS). A key challenge is that reusable meal packaging is not always returned correctly, leading to material loss and a reduced reuse cycle. This undermines the sustainability of the system and incurs additional costs for organisers.

To ensure the effectiveness of an RMPS, it is essential to improve visitor behaviour at open events. This project focuses on developing effective behavioural interventions to increase the return rate. The results will support the province of Noord-Brabant in assisting event organisers to encourage sustainable behaviour among visitors.

The original project description with which this graduation project began can be found in Appendix A.

The aim set of this project in collaboration with the province of Noord-Brabant is:

Design a behavioural intervention to positively encourage visitors to responsible use and return reusable meal packaging during small-scale open events

a behavioural intervention | To date, there has been limited research on visitor behavior in the transition from single-use to reusable meal packaging. This project aims to contribute to expanding this knowledge.

positively encourage | To widely integrate the circular economy (CE), it is important that consumers open up to new, sustainable products and services. This often requires a positive change in mindset where consumers support CE concepts and want to change their habits.

visitors | An important aspect of the success of reusable packaging systems is that these items are reused enough times. Visitors play a central role in this, as their behavior directly affects the number of times the meal packaging is reused. This project therefore specifically focuses on visitor behavior, to ensure that the meal packaging does not prematurely leave the circulation and truly offers a sustainable alternative.

responsible use and return | The concept of 'responsible use and return' means that visitors handle reusable packaging carefully, prevent damage and minimize waste. This involves returning the packaging after use in the same condition it was received, neatly and undamaged, ensuring that reuse within the circular system remains as efficient as possible.

reusable meal packaging | This project focuses on meal packaging such as plates and containers. While reusable beverage packaging has already been widely implemented at many events, the use of reusable meal packaging is still relatively new. In recent years, several pilots have been conducted with reusable meal packaging at events and the lessons learned from these will be incorporated into this project.

small-scale open events | Several pilots have already been conducted at closed events compared to open events. Open events present a greater challenge, as they involve collaboration with multiple parties, such as various catering partners, diverse locations and other stakeholders. In an open event, the venue is freely accessible and there is no physical boundary. Examples of small-scale open events include a local fair, a small market, a neighborhood party, or a local food festival. These examples also provide the context for this project.

1.6 Project approach

The approach for this project will use the Double Diamond model (Framework for Innovation - Design Council, n.d.). The Double Diamond model is a structured approach to design new products and services through four phases: discover, define, develop and deliver (see Figure 8).

The first diamond is used to discover the current reusable packaging systems, pain points and opportunities for improvement. This involves both theoretical and practical research, such as observations at events, exploratory interviews with field experts and stakeholders and analyzing behavior patterns. The insights gained are used to define a clear problem statement.

The problem statement from the first diamond is used to kickstart the second diamond in order to generate ideas for an improved reusable meal packaging system. These ideas are developed into concepts, which are evaluated against criteria. The concepts are tested through both quantitative research (return rates) and qualitative research (such as visitors' opinions). Through iterative improvements, a final design is established, which is then prototyped, tested, evaluated and enriched with recommendations.

CH1 Introduction

CH2 Reusable meal packaging systems

Discover

Define

CH3 The behaviour of the visitor

CH4 Design vision

CH5 Iterative design process

Develop

Deliver

CH6 Final design

CH7 Conclusion

CH8 Discussion
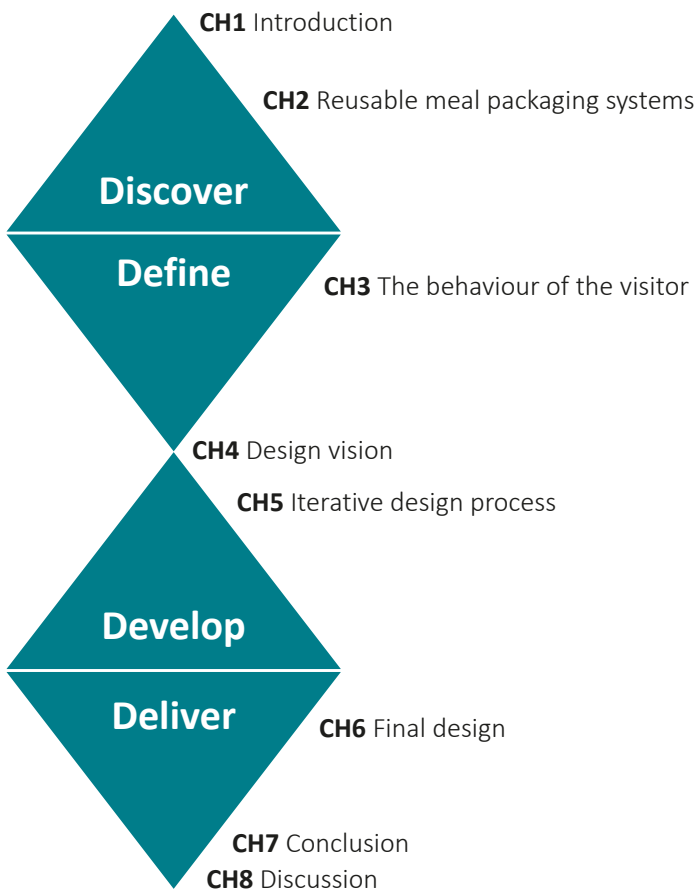
Figure 8. Design approach with the double diamond

CHAPTER 2
REUSABLE MEAL PACKAGING SYSTEMS

This chapter examines the use of reusable meal packaging at events and the system behind it. It is examined how consumers generally interact with the introduction of the reusable packaging system. Next, the focus is on meal packaging within the reusable system in the context of this project, namely for events. Previous pilot projects involving reusable meal packaging from other organisations are analysed to gain valuable insights for this project. Additionally, contextual research was conducted, consisting of exploratory observations and interviews to better understand the interaction with meal packaging and the behaviour of visitors. The interviews were held with key stakeholders, including event attendees, event organisers and caterers, to map their needs regarding reusable meal packaging systems.

2.1 The potential of reusable packaging systems

Reusable packaging systems (RPS) are increasingly gaining ground as a promising solution to the growing problem of packaging waste (Miao et al., 2024b). Given the rising concerns over the environmental damage caused by plastic waste, Dutch policy is aiming for a circular economy, with the goal of reducing fossil fuel-based plastic by 50% by 2030 (Waar Staat Nederland op Weg Naar een Circulaire Economie?, n.d.). A key pillar of this policy is the significant increase in the use of reusable packaging.

When reusable packaging is properly used throughout its lifespan, it can provide substantial environmental benefits. This is because the production of reusable products requires fewer new raw materials than the many single-use products they replace. Additionally, the use of reusable packaging leads to a significant reduction in plastic waste at the end of their lifecycle. A study by Oceana shows that a 10% increase in reusable beverage packaging by 2030 could eliminate over 1 trillion single-use plastic bottles and cups, preventing up to 153 billion of these containers from ending up in oceans and waterways (Oceana, 2025).

Figure 9. A consumer's interaction with the RPS
Source: Herbruikbare Verpakkingen: Duurzaam Antwoord op EU-regels, z.d.-a.

2.1.1 Consumer adoption of reusable packaging systems

Although consumers often recognise the environmental benefits of reuse, their actual reuse behaviour is sometimes insufficient, which can lead to disappointing effectiveness of sustainability efforts (Miao et al., 2024b). Scientific research has already been conducted on consumer perceptions of reusable packaging systems (Miao et al., 2023; Miao et al., 2024b). Figure 9 illustrates a consumer's interaction with the RPS and Figure 10 shows various factors that influence consumers, which can contribute to a better understanding and further development of an RPS.

Incentives

Transparency: Positive inferences about product quality and freshness

Sensory interactions: Enjoying the sound of pouring and the smell of food

Positive emotions: Reducing household waste may have a small impact on the overall environment, yet it evokes positive emotions and gives people a sense of satisfaction

Appearance: Dispensers with a new design could encourage consumer exploration, while a natural appearance aligns with the sustainable nature of the RPS

Value for the environment: Aware of the overconsumption of plastic

Financial: It helps save money by being able to adjust product portions

Familiar and ordinary: The transition to RPSs is easier for those already familiar with self-service systems and people who engage in sustainable actions (such as choosing organic products) are more likely to have a positive attitude toward its implementation

Barriers

Hygiene: Frequent use of reusable packaging can cause wear and tear, raising hygiene and safety concerns that reduce consumer acceptance. People avoid items touched by others and prefer RPS for dry goods to avoid leakage and spoilage. While trusting RPS hygiene, consumers worry about spills, misuse, and visible wear, linking them to contamination risks

Wear: Severe scratches may prompt users to return the packaging or switch to their own. Visible wear or growing dissatisfaction with the packaging can lead to early replacement or discontinuation of RPS

Lack of availability and variety: RPS is not yet widely available and the range of products offered in RPS remains limited

Financial: Consumers worry that damaged packaging could forfeit their deposit and see high initial costs as a barrier to choosing RPS over disposables. They are generally unwilling to pay more unless the product quality is significantly higher. Additionally, they compare economic benefits at the time of purchase and are reluctant to pay a premium for reusable packaging

High learning costs: Ineffective use of the new system on the first attempt

Scepticism: Individual reuse initiatives have less impact than collective action and RPSs require resources and energy. Plastic packaging, even when reusable, is seen negatively due to its environmental impact. Consumers feel good about reducing waste but question the effectiveness of their reuse efforts

Product quality and safety: A lack of information on the packaging (e.g., ingredients, expiry date, nutritional facts)

Additional time and effort: Preparation for reuse involves checking products, bringing the right packaging and empty containers for return. In stores, standing in line adds cognitive load. Storage requires space for empty containers and leftovers may remain when refilling. Cleaning can be difficult, especially with sticky products. Consumers find the new routine inconvenient and are reluctant to change their habits

Being sustainable: Consumers do not necessarily choose RPS for their sustainability and they have limited awareness of their actual environmental impact

Lack of knowledge: RPS only become more environmentally friendly than single-use packaging when each container is reused a minimum number of times, known as the environmental break-even point (e-BEP). A lack of knowledge about this critical threshold may lead consumers to be overly optimistic about their reuse behavior, resulting in insufficient reuse

Figure 10. Different factors influencing consumer adoption of reusable packaging systems

2.1.2 Environmental break-even point

Reusable packaging only becomes more environmentally friendly than its equivalent single-use packaging when each package is reused at least a certain number of times. This number is referred to as the environmental break-even point (e-BEP). When consumers are not well-informed about this critical point, they may be overly optimistic about their reuse behaviour, which can lead to insufficient reuse (Miao et al., 2024).

Below is an example of an e-BEP. The reusable PP cups reach the break-even point compared to single-use PP cups after approximately 50 reuse cycles (see Figure 11).

Single-use PP cup   Reusable PP cup

Figure 11. Example e-BEP of a reusable PP cup
Source: Cottafava et al. (2020)

2.2 Reusable meal packaging system at events

This section explores various aspects of reusable meal packaging at events. It covers the distinction between meal and beverage packaging, material selection, the stages of a reusable meal packaging system and the types of return systems. These elements are essential for understanding how reusable meal packaging systems function in event contexts.

2.2.1 Meal packaging versus beverage packaging

Reusable beverage packaging has been used at various events for several years, making many consumers familiar with this system. As a result, the reusable beverage packaging system is more integrated into consumer culture than that for reusable meal packaging. However, it is not simple to directly transfer the beverage packaging system to meal packaging. Figure 12 illustrates the main differences between these two reusable packaging systems. All stated differences need to be kept in mind, but a crucial takeaway is the necessity of a wider range of meal packaging compared to beverage packaging in the context of events.

Beverage packaging	Meal packaging
People get multiple drinks	Most people only get food once
It is fine to walk with an empty cup in your hand	People do not want to walk around with a dirty meal packaging
Only a few sizes of cups are needed	Food courts want meal packaging that suits their meals, so different types are needed
A stack of cups takes up less volume	Different types of meal packaging result in multiple stacks of varying items, this takes up more space
Cups are easier to clean	Meal packaging (food scraps) requires more handling (think about mould from food left on the packaging for too long)

Figure 12. Beverage packaging vs meal packaging at events

2.2.2 Material selection of reusable meal packaging

Several factors come into play when choosing the material for reusable meal packaging at open events, including sustainability, logistics and cost. Despite the possibility to select a different kind of material for the reusable meal packaging materials, plastic remains a commonly used option (see Figure 13). Materials such as ceramic, glass and porcelain are often considered more environmentally friendly by visitors. However these materials are less suitable for open events, due to the fact that meal packaging made from these materials are logistically complex. This complexity is caused by their weight and fragility. Therefore many event organisers still prefer plastic meal packaging, as the advantages in terms of cost, transport and ease of use often outweigh them at large-scale events.

Lightweight: Plastic meal packaging is much lighter than alternatives like ceramic, glass, or porcelain. This makes it easier to transport, distribute, and handle, both for organisers and visitors. It often indirectly reduces transportation costs.
Break resistance: Plastic is far less prone to breaking than glass or ceramics. This makes it a practical choice for events, where the risk of breakage is higher due to crowding and careless handling. It maintains its integrity, resulting in less tableware loss and lower replacement costs.

Cost-effective: Reusable plastic meal packaging is typically cheaper to purchase than alternatives such as ceramic or porcelain. This makes it a more financially attractive option for organisers of open events, particularly when implementing a reusable system. However, since the loss of tableware in this system can be significant, organisers may also incur higher costs when using more expensive tableware.

Versatility in design: Plastic meal packaging can be produced in a variety of shapes, colours, and sizes. This offers organisers the flexibility to personalise their event without compromising functionality.

Good availability: Plastic meal packaging can be produced in large quantities more easily, resulting in economies of scale. Therefore reusable plastic meal packaging is widely available, which makes it easy for organisers to quickly purchase or rent large quantities of reusable meal packaging for their event.

Space-saving: Reusable plastic meal packaging takes up less storage space than traditional ceramic or porcelain meal packaging. Thanks to its lightweight and stackable designs, a larger amount of meal packaging can be stored more efficiently. This is especially beneficial for organisers with limited storage capacity, as they can store more meal packaging in a smaller space.

Figure 13. The main advantages of plastic reusable meal packaging

Figure 14. Plastic reusable meal packaging
Source: Colin (2024)

2.2.3 Stages of a reusable meal packaging system

The single-use and reusable flow of reusable meal packaging at events is shown in Figure 15-16. In the single-use flow, everything ultimately ends up directly in the waste management system. Compared to the single-use, the reusable flow includes collecting, cleaning and redistributing the meal packaging. Exclusively in the stage where the meal packaging is rejected, due to damage for instance, does it end up in the waste management system. The additional stages of the circular reusable flow, which are not present in the linear single-use flow, will be the challenge to effectively integrate into the context of open events.

The scope of this project is focusing on the green-marked section in Figure 15, emphasizing on the responsible use and proper return of the reusable meal packaging. Leading to a system in which the meal packages get washed, rather than being lost or sent directly to the waste management system.
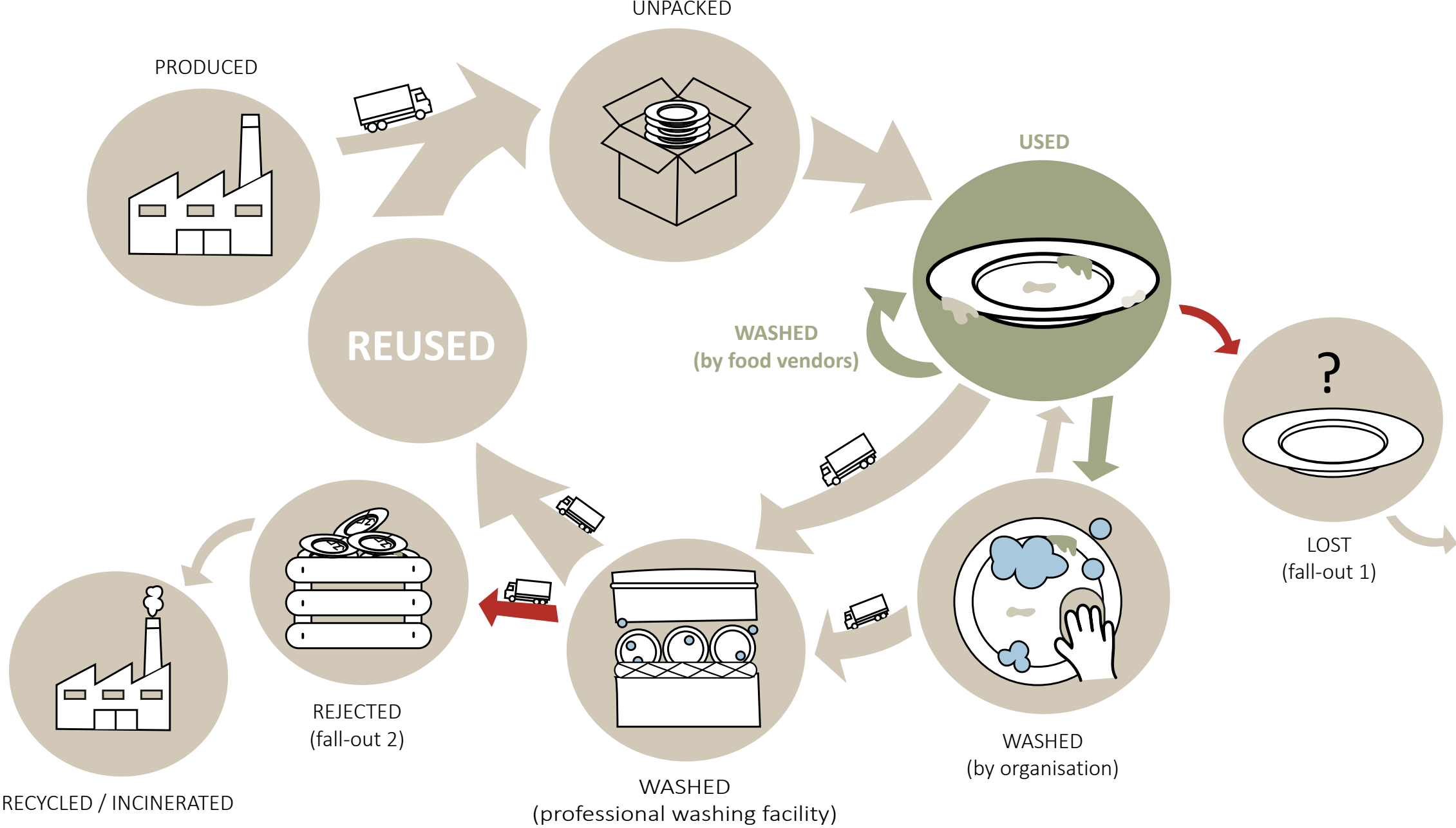
REUSABLE FLOW

Figure 15. Flow of a reusable meal packaging system at an event
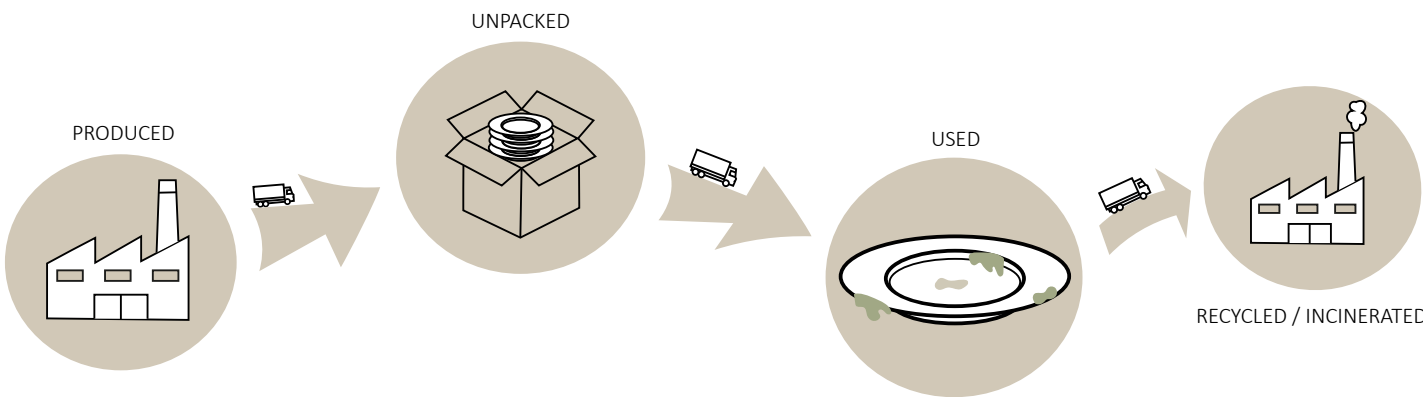
SINGLE-USE FLOW

Figure 16. Flow of a single-use meal packaging system at an event

2.2.4 Return systems

There are various return processes to retrieve reusable meal packaging (see Figure 17). Based on various interviews with field experts, it is recommended to introduce a deposit system for open events. This provides visitors with an additional incentive to return the reusable meal packaging.

There are currently 5 types of return systems:

Integration into existing system: Link the return system to an existing registration method (membership card, staff pass, app, or entry ticket) or payment system (consumption tokens, wristband) to enhance user convenience and avoid transaction costs.

Deposit system: The user pays a deposit for packaging and receives it back upon return. For the next purchase, used packaging can be refilled or exchanged for clean ones. A deposit token can also be used for logistical reasons or to reduce transaction costs. The token holds the deposit value. Upon return, users can choose between receiving a token, deducting the deposit from their purchases, or getting a refund.

Library model: When the packaging is issued, an amount is reserved on the user's bank account. This amount is only deducted if the packaging is not returned on time. This system requires a digital infrastructure, user data registration, and linking users to packaging via QR codes or RFID.

Environmental contribution / return token / cup token: Users pay a one-time environmental fee for packaging, which is non-refundable. This fee is only paid once if beverages or meals can be obtained by exchanging used packaging or a return token. Return tokens can be exchanged for packaging but not for money. This system offers convenience, as users do not have to carry around dirty packaging between purchases. Alternatively, tokens can be distributed for free, allowing users to avoid paying the environmental fee as long as they retain the packaging or token.

No deposit or contribution: This system is suitable under the right conditions, including clear communication, sufficient collection points, and dedicated cleaning teams. Since there are no financial incentives to return packaging, evaluating and analysing the return rate is crucial.

Figure 17. Return systems
Source: Ministerie van Infrastructuur en Waterstaat (2024)

2.3 Reusable meal packaging system in practice

Some events have already transitioned to or are experimenting with reusable meal packaging systems. The insights from this will be used in this project.

2.3.1 The visitor experiences

In 2022, Mission Reuse conducted pilots with reusable meal packaging at three events (Van Daele et al., 2022). The findings regarding the visitor experiences from this report are presented in Figures 18-20. Although these pilots are conducted in a 'closed' context, the experiences and insights at these events sparked the further steps in my design process.

DGTL

This closed event attracted 48,000 visitors over three days. During the pilot, which lasted a few hours on one day, 350 reusable plates were used by five out of the nine caterers. Of these plates, 97% were returned, although four plates (1%) were rendered unusable due to gum or damage. With a loss of 14 plates, 336 plates were ultimately available for reuse, resulting in an average rotation of 25 uses per plate in this context. No incentive was offered for returning the reusable meal packaging.

Positive experiences (incentives)
+ Less waste
+ More sustainable
+ Better dining experience
+ Easy to use
+ Feels more luxurious and better quality
+ Sturdier than disposable and therefore easier to walk around with and eat from
+ Simple
+ Non-Dutch-speaking visitors indicated that it is nice that the signing was in English

Barriers
- **Lack of explanation at food stalls**: Visitors missed direct explanations at the food stalls about how the reusable packaging system works. This led to confusion, especially since many people assumed they could return the packaging at the stalls.
- **Too little information about the sustainability impact**: There was little explanation about the environmental benefits of reuse, which may have led visitors to feel less motivated to follow the system properly.
- **Mixing reusable and single-use meal packaging**: Since both reusable and single-use meal packaging were used, visitors became confused, particularly those attending the festival for multiple days who noticed that the system changed on the final day.
- **Deviation from the familiar deposit system for cups**: The system for reusable meal packaging operated differently from the familiar deposit system for cups, which was confusing for visitors. Many people were used to a consistent return method and found the new approach difficult to follow.

Figure 18. Positive experiences and barriers regarding the reusable meal packaging system at events
Source: Mission Reuse (2023)

CASTLEFEST

This closed event attracted a total of 45,000 visitors over four days. The pilot with reusable plates ran for three of the four days, with 9,000 plates used by two out of the forty caterers present. Of these, 90% (8,074 plates) were returned, but 404 plates (5%) were unusable due to gum or damage. As a result, 7,670 plates were ultimately available for reuse, which equals an average rotation of 7 uses per plate in this setup. No incentive was provided for returning the reusable meal packaging.

Positive experiences (incentives)
+ Visitors who did not speak Dutch indicated that it is nice that the signing was also provided in English
+ Many visitors said they had seen the return points themselves (coincidentally), which helped them understand the system
+ Half of them (50%) found the return points well located
+ Visitors who saw prior announcements on social media found the system clearer and understood expectations better
+ Better eating experience
+ Sturdier
+ Feels more luxurious/quality
+ Less littering
+ Sustainability
+ More in harmony with nature
+ Less waste

Barriers
- **Limited number and visibility of return points**: The return points were insufficient in number and poorly visible, especially during busy times or in the dark. This made it difficult for visitors to find the correct place to return their meal packaging.
- **Inadequate signage**: The signs at the return points were too small and inconspicuous, meaning that most visitors did not notice them.
- **Lack of information and guidance**: Visitors mentioned that there was too little explanation about the reusable meal packaging concept. Although the intention was for staff at the food stalls to inform visitors, this usually did not happen. As a result, visitors were not sufficiently informed on how to return their reusable meal packaging.
- **Unclear directions at food stalls**: The signage at the food stalls was described as inconspicuous, too small, and confusing, leaving visitors without enough guidance to follow the correct steps.
- **Confusion caused by the combination of reusable and single-use packaging**: The mixed use of reusable and single-use packaging led to confusion among visitors, especially for those who had difficulty distinguishing between the different types of packaging.
- **Unfamiliar system for reusable plates**: The system for reusable plates differed from the familiar system for reusable cups, which caused additional confusion.

Figure 19. Positive experiences and barriers regarding the reusable meal packaging system at events
Source: Mission Reuse (2023)

INTO THE GREAT WIDE OPEN

This closed event received a total of 32,000 visitors spread over four days, with the pilot using reusable tableware running throughout all the days. All 35 participating caterers took part, and approximately 85,000 meals were served. No financial incentive was provided to return the reusable meal packaging.

Positive experiences (incentives)
+ Better eating experience, firmer than disposable
+ Less waste
+ Less littering
+ Sustainability
+ Feels good to do a collective sustainable contribution

Barriers
- **Uncertainty about personal clean-up responsibility**: Many visitors were unsure whether it was expected for them to clean up their meal packaging themselves. The lack of consistency (sometimes it was expected, sometimes not) caused confusion. As a result, visitors often left their meal packaging on tables.
- **Lack of clarity at return points**: Visitors who did reach return points often did not know which bin was designated for reusable meal packagign. Due to this uncertainty, they often copied the behavior of others, which was not always correct and led to incorrect waste sorting.
- **Confusion due to different types of meal packaging and systems**: The presence of both ceramic and plastic plates, especially the black plastic plates, led to the misconception that they were single-use. As a result, reusable plates were sometimes thrown into the wrong waste bins.
- **Insufficient communication about the reusable system**: There was a lack of information about the reusable system, the different return options and the proper use of the various types of meal packaging. This inconsistency contributed to the confusion among visitors, who sometimes had to return their meal packaging to the vendor and sometimes to return points.
- **Reluctance to walk around with dirty meal packaging**: Compared to reusable cups, visitors stated that they did not want to walk around with used meal packaging. This increased the likelihood that meal packaging was left on tables or placed in the wrong waste bin instead of being returned to the reusable system.

Figure 20. Positive experiences and barriers regarding the reusable meal packaging system at events
Source: Mission Reuse (2023)

The positive experiences and barriers shown in Figures 18-20 are incorporated into a behavioural change model in Chapter 4. This model provides structure to the factors that promote the desired behavior as well as the obstacles that hinder it. By integrating these factors, an overview is created on how behavior change can be encouraged and which interventions may be effective in overcoming these barriers.

2.3.2 Communication strategies

At the three events that have conducted a pilot with reusable meal packaging, the focus of the communication strategy was primarily to make visitors aware that the meal packaging is reusable and to encourage the return of the packaging. Figures 21-24 shows examples of the displays, signs and other ways of communication that were being used to realise this envisioned strategy.

DGTL

Visitors were informed about the pilot through posters and food stall employees.

Figure 21. Communication at DGTL

CASTLEFEST

Visitors were informed about the pilot through posters displayed at the food stalls and by the stall employees. The signs indicated that the plates would be washed and reused the following year. The signage was available in both Dutch and English.

Figure 22. Communication at CASTLEFEST

INTO THE GREAT WIDE OPEN

Communication with visitors was in Dutch. Small posters were displayed at the food stalls, providing limited information on where plates and cups could be returned and noting that they were reusable. The return points indicated the designated bins for tableware.

2023

Figure 23. Communication at ITGWO in 2023

2024

Figure 24. Communication at ITGWO in 2024

OTHER EVENTS

Here are also some examples of communication about reusable meal packaging at other events:
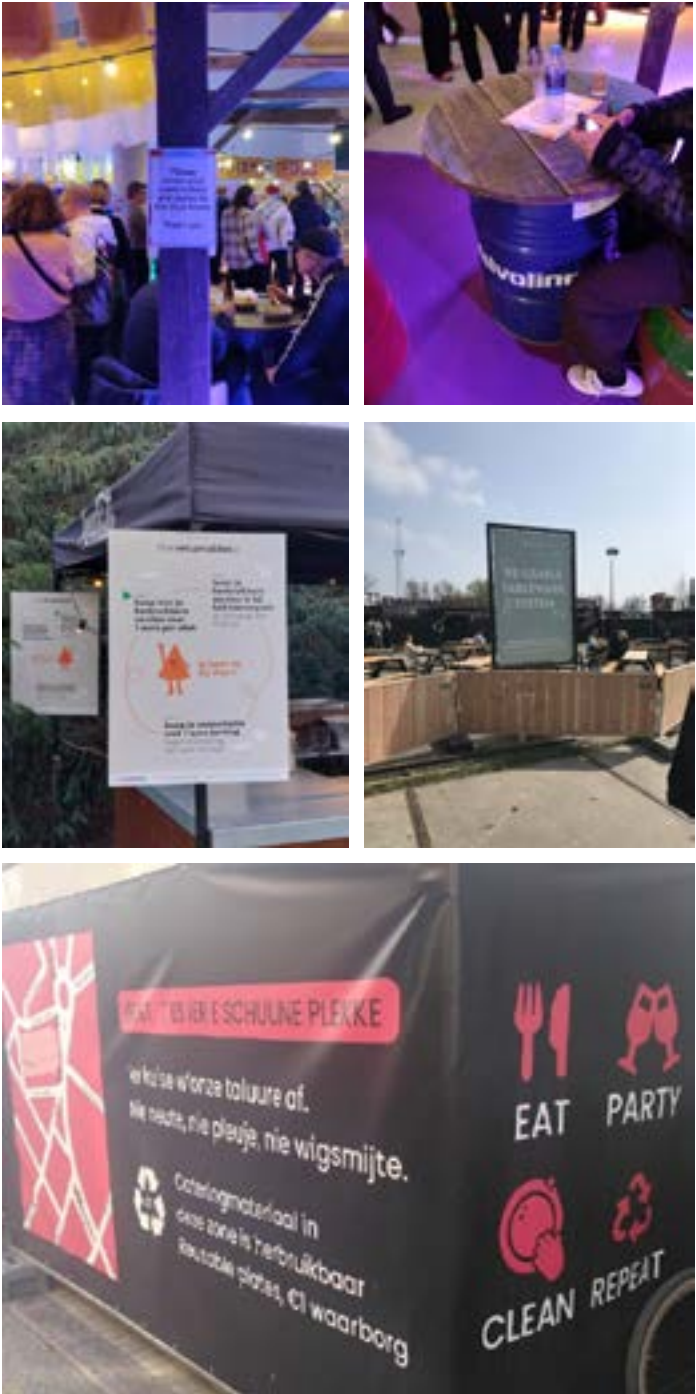

Figure 25. Communication at other events

Communication is provided at the food stalls and other areas of the event where visitors gather, such as along walkways or at tables where people eat. The size of the communication boards varies. These examples shows that the larger the event, the bigger the communication boards.

2.4 Observations

The observations were conducted at various events, both open and closed, to map the overall behavior of visitors with meal packaging. To get both ends of the spectrum, events that aim to switch to reusable meal packaging and events already using reusable meal packaging were observed. The contextual observations provide valuable practical insights that are harder to obtain through surveys or interviews. By analysing real-life situations, it becomes clear how visitors 'actually' interact with reusable meal packaging, where in the process bottlenecks occur and which behavioural patterns are repeated.

Observations were made at the events by walking around and taking notes on everything seen. A detailed description of the observations can be found in Appendix B. Below are the key takeaways:

The takeaways below had been observed at all events:
- Visitors primarily eat their meals in or around the food court.
- The majority of visitors look for a table to sit at and eat in peace.
- Most visitors eat in groups, with group sizes varying.
- The event locations were very clean, which contributed to the fact that visitors kept the area tidy. They littered very little on the ground.
- Visitors who do not bring their (reusable) meal packaging to the designated return points or to a waste bin often hide it in inconspicuous spots or quickly leave it in walkways, possibly out of guilt. This suggests that some form of social control is at play.
- The leftover (reusable) meal packaging left around was quickly cleaned up by the staff, ensuring the area remained tidy throughout the event.

The takeaways below had been observed at events with a reusable meal packaging system:
- There were peaks in dining activity, making it busy for the caterers and leaving them with little time to communicate the reusable system to visitors.
- Return points that did not resemble waste bins encouraged people to stack the reusable meal packaging neatly, while return points that looked more like waste bins were often used in a messy way. In these 'binlike' return points, the reusable meal packaging was not neatly stacked but was thrown in carelessly.
- When a waste bin was placed next to the return point, most people cleaned their reusable meal packaging of leftover food scraps. Without a waste bin nearby, reusable meal packaging with leftover food scraps was often left at the return point. This made the return point look untidy and staff had to do more work, as they often had to wipe clean the reusable meal packaging of large food scraps and other waste before it could be properly cleaned.
- Visitors who do not bring their reusable meal packaging to the designated return points often hide it in inconspicuous spots or quickly leave it in walkways, possibly out of guilt. This suggests that some form of social control is at play.
- The communication of the reusable meal packaging system was often too small (no larger than A4 size) or was exclusively placed on the return points itself, which meant visitors already had to know about the existence of the return systems and its corresponding return point.

Figure 26. Talking to the clean-up team at an event
Source: Photo by author

2.4.1 Differences between types of events

Observations and conversations with staff at the events revealed differences between the various types of events. In Figure 27, a distinction between indoor and outdoor events, as well as between closed and open events is made. Most of the open events, which is the scope of the project, are commonly held outdoors. An important correlation to take into account for the further stages of the design process.

Indoor event	Outdoor event
Limited space, often controlled environments	More space, with variable setups
Staff and security can effectively monitor in a controlled space	Staff and security need to cover larger areas, making it potentially harder to be present everywhere
Constant conditions, no weather influences	Weather conditions (rain, wind, sun) can have an impact
Visitors are often concentrated in smaller areas	Visitors are often spread out over larger areas
Designated drop-off points, easier to control	More scattered drop-off points, harder to monitor
Well-organised infrastructure, fixed structures	Flexible infrastructure, often temporary setups
Easier to visually share and communicate information	Greater challenge in visibility of communication, especially in large open spaces
Collection bins and material separation are often well-regulated	More difficult to effectively separate materials, especially when it's busy
Easier to track and store reusable tableware	Reusable items are more likely to be lost or discarded incorrectly

Closed event	Open event
Access is restricted, only registered visitors can enter the event	Access is open, anyone can enter the event
Tighter oversight of behavior and processes due to a limited number of visitors	It is harder to supervise due to large crowds and less controlled access
More controlled, with visitors often moving within specific space layouts	Visitors spread out over a larger area, making it difficult to track movements
Security and staff can be deployed more easily in central locations	Security and staff need to cover a larger area, which can reduce effectiveness
Resources can be easily centralized and monitored	More challenging to manage resources, especially when visitors are dispersed over a wide area
Communication is easier due to the limited space and controlled environments	It is harder to communicate consistently due to the larger and more open layout
Drop-off points can be more easily marked and made visible	Drop-off points can be harder to spot, especially in an open area without a clear structure
The infrastructure is often fixed and well-organized, offering less flexibility for changes	More flexible, but can be more difficult to set up effectively due to the larger space and unpredictability
Visitors often have a more controlled experience, making it easier to guide behaviors	Visitors' behavior can be more unpredictable because of the larger space and greater freedom

Figure 27. Difference in events

2.5 Exploratory interviews

Various people have been approached who are relevant to the event, with visitors, event organisers and caterers as the key groups. Exploratory interviews were held to gain insight into their thoughts, feelings, experiences and needs regarding the use of reusable meal packaging systems. The exploratory nature of the interviews aims to achieve a broader understanding by bringing underlying barriers and motives to the surface, rather than confirming the existing theoretical insights. The goal was to discover new ideas, identify patterns, and clarify ambiguities, without a strict interview guide. Examples of the questions asked in the exploratory interviews can be found in Appendix C.

2.5.1 Visitors

Each cluster in Figure 28 illustrates a barrier that emerged from the interviews with event attendees. These interviewees have gained experience with reusable meal packaging, which includes both reusable beverage and meal packaging, at events (such as carnaval, football matches, fairs, gatherings and festivals) over the past six months. The clusters of barriers are explained below.

The barriers:
- **Lack of awareness or knowledge**: This refers to visitors not having enough information about the reusable system and how to properly return the reusable packaging.
- **Practical barriers**: These include physical difficulties such as a lack of return points or long queues at return points.
- **Attitude and motivation**: This concerns the personal attitude of visitors who may not be motivated to participate in the system due to a lack of involvement or belief in it.
- **Social factors**: These are influences from others such as group behaviour or social norms that can affect visitors' decisions to engage with the system.
- **Alternative intentions**: This refers to other priorities or behaviours such as visitors taking home reusable packaging for aesthetic reasons.
- **Systemic or organisational problems**: This involves issues in the system such as insufficient supervision or unclear rules about how the system works.
- **Uncomfortable reusable packaging**: This refers to reusable packaging that is difficult to handle or visually unappealing which reduces visitors' willingness to use reusable packaging.

The main overarching needs in the interaction with reusable meal packaging systems are convenience and clarity. Convenience refers to how easy and effortless the system is for visitors to use, ensuring that returning the packaging is simple and quick. Clarity refers to how well the system communicates its processes and expectations to visitors, making it clear where and how to return the packaging. These needs reflect what visitors envision in their interaction with reusable meal packaging systems. Barriers are factors that make it difficult to achieve this ideal interaction. Many interviewed visitors support the general idea of reducing waste but when the circular system is too complex, impractical, or frustrating to use, it becomes a burden rather than a benefit. By reducing these barriers and strengthening the positive incentives to behave as intended, the ratio of visitors who return reusable meal packaging properly can be significantly increased.
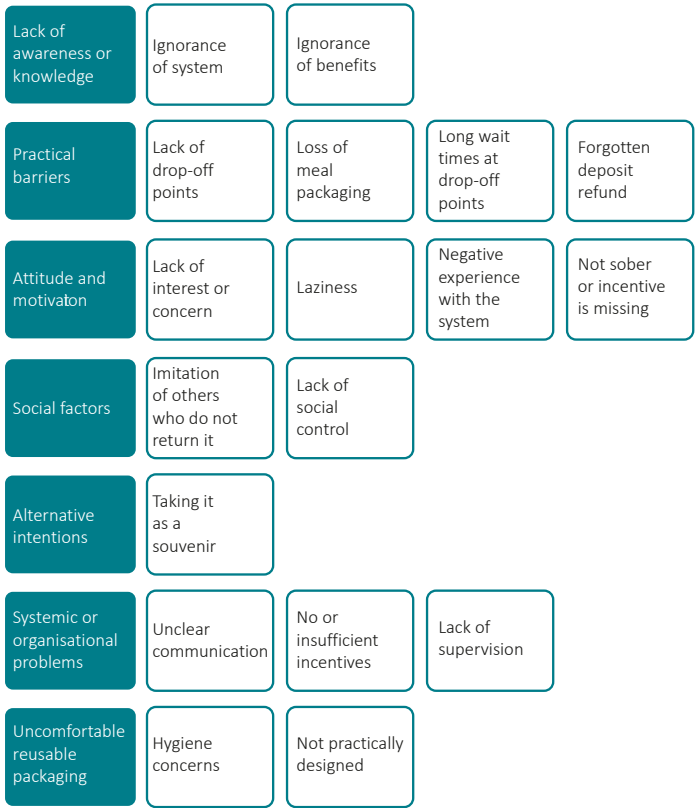
Figure 28. Barriers regarding the reusable meal packaging at events

Visitor journey

To gain a better understanding of the interaction with reusable meal packaging, three individuals who attended the Into The Great Wide Open (ITGWO) festival last summer were interviewed. This festival has fully transitioned to a reusable tableware system. A visitor journey was created for each of them to pinpoints opportunities in the process and map out the overall user-experience with the reusable meal packaging system in detail, see Appendix D for the three visitor journeys.

Insights from the visitor journeys:

- **Early exploration of the offerings**: Visitors often scan the food stalls before dinner time to see what the food on offer is and walk past several stalls to see their options.
- **Focus on the food**: In the food court, the attention is fully focused on the menu and dish selection. Visitors are mainly focused on finding something delicious to eat, and the type of meal packaging does not cross their minds once.
- **Social interaction in the queue**: While visitors are standing in the queue, the time waiting is often filled with talking to other visitors looking around at their surroundings.
- **Brief interaction with the caterer**: When at the front of the queue, there is often a brief moment of contact with the caterer, creating a personal and informal atmosphere.
- **Looking for a place to sit**: After picking up their food, visitors typically look for a seating area near the food court, so they can enjoy their meal peacefully.
- **Little focus on the reusable meal packaging**: While eating the meal, the focus is not on the meal packaging, but purely on the food itself. Only after finishing the meal the visitors start to think about what to do with the reusable meal packaging on which the dish was served.
- **Perception of the reusable meal packaging**: The reusable meal packaging does stand out because of its different look and feel compared to the single-use alternative packaging. This perceived difference increases the awareness and appreciation for the reusable meal packaging system in place.
- **Group dynamics during return**: Often, one person from the group returns the used reusable meal packaging, stacks all the packaging together, and looks for the return point.
- **Confusion at return points**: There is confusion about where to return each type of reusable meal packaging. Some items must be returned at central return points, while others need to be returned to the caterer where they were collected. Visitors would prefer to return all packaging at the central return point for convenience.
- **Environmentally conscious audience**: ITGWO attracts a diverse audience, ranging from young to old, and is generally culturally and environmentally conscious. Visitors value the festival's commitment to nature conservation and sustainability, with many recognising its reputation for being sustainable and progressive.

Figure 29. Atmospheric impressions of ITGWO

2.5.2 Event organisers

Event organisers' needs regarding the use of a reusable meal packaging (RMP) system stem from exploratory interviews with event organisers:

Operational requirements for efficient logistics and service:
- Adequate staff at the return stations to effectively manage the return logistics.
- More staff is needed for washing the RMP on-site.
- A significant amount of additional staff is required for distributing, collecting, and sorting RMP.
- Sufficient RMP must be available for the caterers to perform their work efficiently.

System organization and optimization:
- A uniform system with clear communication to prevent confusion and save time during sorting.
- Simplicity and uniformity in the system reduce confusion and facilitate operational procedures.
- Efficient pre-sorting and timely cleaning of RMP to maintain cleanliness and prevent the packaging from becoming unusable.
- Post-sorting increases return rates by extracting RMP from other waste streams but requires additional staff, which can be offset by volunteers.

Sustainability goals and cleanliness:
- A system that supports the sustainability goals of the event.
- Reduced waste production during the event.
- Prevention of leftover RMP on-site.
- A tidy and clean site throughout the event.

Management and control:
- Prevention of fraud with deposits and unwarranted reimbursements.
- Clarity on legislation and regulations regarding RMP

Customer experience:
- Optimizing the customer experience during the event.

2.5.3 Caterers

Caterers' needs regarding the use of a reusable meal packaging system stem from exploratory interviews with caterers and a report (Van Daele et al., 2022):

Functional requirements for RMP:
- The RMP must be heat-resistant for certain types of dishes.
- The RMP must be durable and able to withstand use in busy environments.
- Sharp knives should not be used on the RMP, as this can cause unhygienic damage (scratches).
- The RMP must be suitable for a wide range of dishes, including various sizes, colours, and shapes.

System optimization and efficiency:
- The RMP should be stackable to optimize space in food trucks and when collecting used items.
- The system should not require additional time or actions from the caterers.
- A uniform system of RMP ensures greater clarity and efficiency in use.
- Caterers need clarity on how and where they can order additional RMP and where unused RMP can be returned.
- There should be a single point of contact for questions about RMP, ordering additional items, etc.

Catering experience and brand experience:
- Caterers want RMP that supports the desired dining experience.
- Caterers want to be able to brand their RMP; otherwise, they will use disposable items with their name or logo.
- The focus of the caterers should remain on the food, not the RMP. Caterers want the food to stand out, even when RMP is used.
- RMP allows caterers to offer a better dining experience, as it is sturdier than single-use meal packaging.

Sustainability and collective responsibility:
- Caterers want to contribute to a collective sustainable solution, which gives them a sense of fulfillment.
- Using RMP helps reduce waste and litter.

Engagement and collaboration:
- It is optimal to involve caterers from the beginning in selecting the festival-wide RMP system, so their needs and requirements are taken into account.
- Standardization of RMP has the advantage that food trucks operating at multiple events do not have to adjust portion sizes, cost calculations and dining experiences each time.

Availability and stock management:
- There must be sufficient RMP available throughout the event to meet catering needs.

2.6 Conclusion

Overall, Dutch policy is aiming for a circular economy, in which the transformation towards reusable packaging systems can play a substantial role. The barriers and incentives of these reusable packaging systems in general are therefore the first to tackle and incorporate in order to benefit environmentally when the break-even point has been reached.

By scoping down, from general reusable packaging towards reusable meal packaging, it arose that a wider range of reusable meal packaging is necessary in the context of events. Compared to the diversity in existing reusable beverage packaging systems. Although materials such as ceramic, glass and porcelain are often considered more environmentally friendly by visitors, plastic is counterintuitively the preferred material choice to achieve this wider range. The plastic material proposes practical advantages like: low cost, efficient logistics and a higher breakage resistance.

To support the reusable material selection, the system itself should transform from a linear to a circular one. This renewed system demands an effective integration of several additional stages of the packaging flow. This project will emphasize on one of these stages, namely, the responsible use and return of the reusable meal packagings. Leading to a system in which the meal packaging gets washed, rather than being lost or sent to the waste management system. Since various different return systems are used at events, the scope requires a universal solution.

Previous cases of reusable meal packaging implementations show the visitors' appreciation for the sustainable approach and improved dining experience. However, a streamlined process and clear communication are fundamental for a successful adoption of this renewed system. An insufficient number of return points and unclear and/or insufficient communication, especially directing towards return points, are key barriers for the visitors' adoption. Additionally, the mix of reusable and single-use meal packaging caused confusion, as did deviations from familiar return systems.

In the contextual inquiries underline the importance of distinguishing the differences between open, closed, indoor and outdoor events. Closed, especially indoor events, offer increased control of visitors' behaviour and environment, simplifying an efficient implementation of systems like reusable meal packaging. Open, mostly outdoor events, on the other hand offer more space and freedom leading to widely distributed visitors. From a visitors perspective these characteristics are seen as benefits, nevertheless from an event organisers' perspective when implementing reusable meal packaging systems it becomes a challenge to oversee and manage.

The use and return of reusable meal packaging is highly dependent on the physical environment. Social control and the cleanliness of the event location plays a significant role. The cleaner the event location, the more likely visitors are to keep it tidy. Well-organised return points are essential to encourage proper visitor behaviour. This means return points should look neat and not be overflowing. Clear communication about which return point is designated for which type of reusable meal packaging is also important to ensure correct return flows.

Visitors support reusable meal packages, but part of a complex or impractical system can become a barrier to proper use and return. Clear communication and a simple system can contribute to higher return rates. In their journey, visitors mainly focus on the food itself and only think about the packaging after finishing their meal. Environmentally conscious visitors appreciate reusable meal packaging, but to influence the behaviour of most visitors, the system must be simple.

Event organisers seek an efficient and sustainable system. Uniformity and clear communication help prevent confusion and extra costs. Caterers want practical and attractive reusable meal packaging. The reusable meal packaging must align with their dining experience, be stackable for efficient space usage and not require additional actions or costs. Additionally, they want branding opportunities and flexibility in reusable meal packaging options.

THE BEHAVIOUR OF THE VISITOR

This chapter delves into consumer behaviour, focusing on sustainable consumption and the question of who holds responsibility for it. It then addresses all the factors (the barriers and positive experience as incentives) identified in the previous chapters that are important for the consumer (in this project, the visitor) within the reusable meal packaging system. These factors are structured according to the COM-B model to determine which barriers and incentives have the greatest impact on the consumer. The aim is to stimulate the desired behaviour and determine the behavioural strategies to be employed to achieve this.

3.1 Consumer behaviour

A consumer is someone who purchases or uses goods or services for personal use, and not for resale or further production (Consumers - Econlib, 2022). The consumer is often seen as the end user of products. In this project, the visitor at an event who uses reusable meal packaging is the consumer.

3.1.1 Government, companies and consumers

To tackle climate issues, it is essential that not only consumers commit to environmentally friendly behavior, but also companies and governments (Van Der Werff, 2022). Preventing environmental damage requires joint efforts. What is the role of the consumer and what responsibility lies with businesses and the government? (see Figure 30)

"
It is often said that people are reluctant to change and indeed, this is noticeable. "Fly less, run more, turn down your heating." You live in a society that asks for exactly the opposite and you're constantly swimming against the current. It's naturally difficult for people to change. However, if large companies and governments improve the conditions, it becomes much easier for us to adapt."
— Chantal van der Leest, psychologist working on behavioural change

3.1.2 Sustainable consumption strategy

Sustainability is often not the primary driver for people. Daan Remarque (2019), a psychologist and communications consultant for impact and growth, discussed in the programme 'De hongerige stad #51: Duurzaam gedrag' that only 5% of society is intrinsically motivated by ecological reasons, while 95% is more focused on self-interest. The 5% who already engage in sustainable behaviour respond directly to sustainable initiatives, meaning they take immediate action when they encounter sustainability-focused efforts, while the remaining 95% are less keen to environmental arguments.

Green consumers

Within a group of consumers a distinction can be made between their level of sustainable involvement: the 'green', the 'light green' and the 'grey' consumers. These sustainable consumer types range from those who are not yet concerned with sustainability at all (grey) to the green consumers which are already conscious and intrinsically motivated to make sustainable choices. Although green consumers make up only 5% of society and may have a limited direct impact, they play a crucial target audience to initiate sustainable practices.

3.1.3 The long-term benefits of ecologic-driven motivation

According to Leonne Cuppen (2021), the motivation to participate in sustainable initiatives is often driven more by economic factors than ecological ones. Consumers are generally unwilling to pay extra, unless they can get their invested amount back. Therefore, the current incentives to return reusable meal packaging are primarily financial in nature.

Exclusively incentifying on the financial motivation to get your money back will not create a long lasting sustainable behavioural change. The aim is to transform the consumers' mindset, from an exclusively economic-orientation to an ecologic-oriented one, which is needed to create a lasting sustainable system.

"
People often believe that their well-being will increase if they have more things and money, yet research shows this is not the case. When you acquire something new, it may bring short-term happiness, but you quickly return to your previous level of contentment. At the same time, there is a common belief that acting sustainably limits your well-being because it may be more expensive or less enjoyable. However, research has shown that sustainability contributes to higher well-being, not necessarily because it is immediately pleasurable, but because it is meaningful. Doing something good for others or the environment gives you a sense of warmth and can enhance your happiness."
— Linda Steg, professor of environmental psychology at the University of Groningen

GOVERNMENT
Government can introduce policies and regulations to promote sustainability

COMPANIES
Companies can make their processes more sustainable and offer more environmentally friendly products

CONSUMERS
Consumers can have a direct impact on the environment by choosing reusable items over single-use items. They can also have an indirect influence by urging governments or companies to take more sustainable measures, for instance by protesting or supporting organisatons working to achieve this
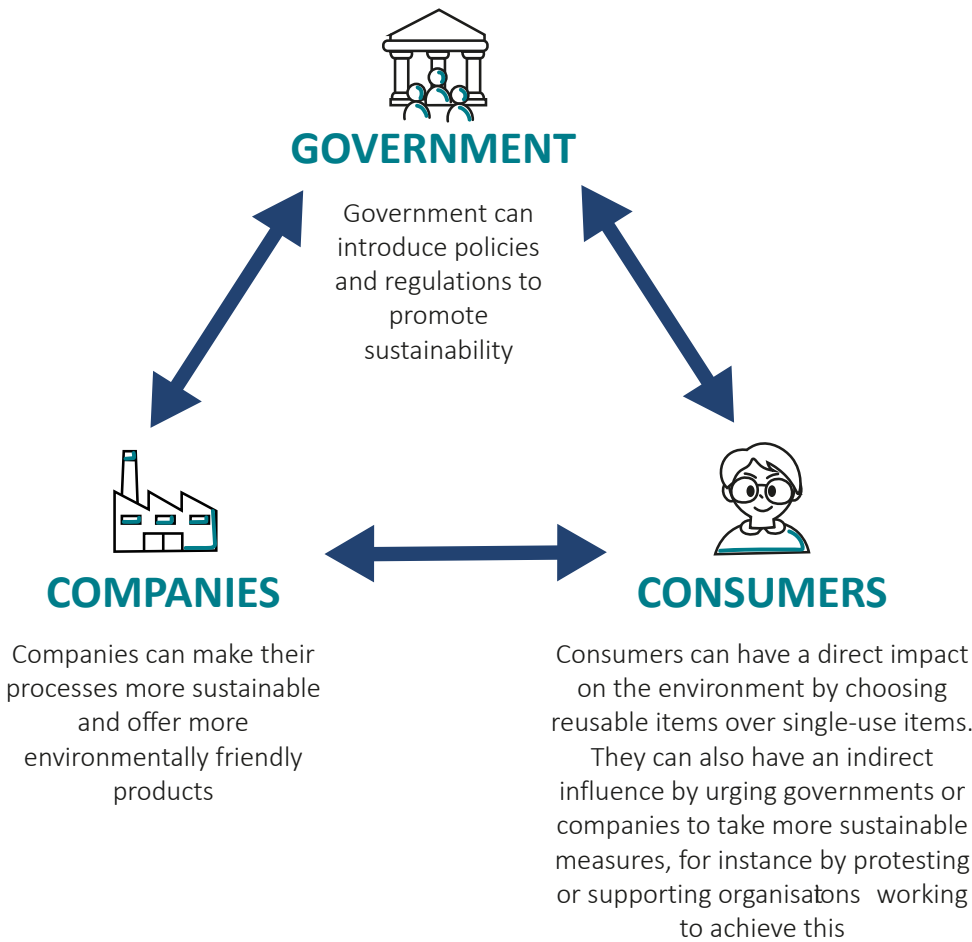
Figure 30. A triangular relationship: government, companies and consumers

3.2 What makes behavioural change so complex?

Before a behavioural intervention on a consumer level can be developed, it is important to understand why behavioural change is so complex. In this section, several key factors of this complexity will be discussed.

Intentional behaviour gap

Although people may want to eat healthier and exercise more, adopt sustainable habits, stay organized, be productive, or manage their finances better, they often act against their own intentions even when they know how to reach their goals (Leal et al., 2022b). The issue is not necessarily a lack of knowledge about sustainable choices but rather being stuck in bad habits and procrastination. This happens because they act unconsciously and follow ingrained behavioural patterns.

Habits and routines

Research shows that habits change slowly, especially when new products or materials are introduced, such as plastic in the early 20th century (Lammi & Pantzar, 2010). Resistance to change plays a significant role, but with regulation and peer pressure, people gradually adjust to new habits.

The reusable meal packaging system is still in its early stages, meaning that visitors need time to adapt. Single-use packaging was the norm at events for a long time, causing visitors to automatically dispose of their plates. This is largely driven by convenience: strategically placed (municipal) waste bins are readily available at outdoor events, making disposal easy. As a result, discarding reusable meal packaging often happens unconsciously and out of habit.

The natural transition usually goes from routine to habit, as habits are formed by consistently repeated routines (Demirci et al., 2025). Properly handling reusable meal packaging must ultimately also become a habit. Before this can be achieved, several steps must be taken.

---

1) Start with a conscious routine

It's important that visitors at events using reusable meal packaging are aware of how to properly use it and what to do with it afterward.

- *"Visitors need to know that they are dealing with reusable packaging and how to correctly return it—this awareness is essential for effective reuse."* — Assistant professor of innovation acceptance and consumer research

2) Repetition

By consistently repeating this behavior in the same context (at every event with reusable meal packaging), it will become more and more automatic. This is also known as the Mere Exposure Effect: By seeing or experiencing something more frequently, a more positive attitude toward that object, idea, or behavior develops (Janiszewski, 1993b). Familiarity often evokes feelings of comfort and trust.

- *When as many events as possible switch to the reusable system, people will encounter it more frequently, and the behavior will be repeated more often.*

3) Automation

Over time, the behavior can become a habit (Lally et al., 2009). You do it automatically, without thinking consciously about it.

- *The ultimate goal is that you no longer need to think consciously about what to do with reusable meal packaging, but you automatically take responsibility for it and return it neatly at a designated return point.*

Before this behavior becomes a habit, we first need to introduce visitors to the reusable system in a low-threshold way. It should be implemented in an accessible and non-intrusive manner.

People are irrational

Behavioural sciences have developed in recent decades as a response to rational economics, which assumes that people rationally maximize their self-interest. People are not homo economicus, who consistently uses rational judgments, as defined by John Stuart Mill in the 19th century in his Principles of Political Economy. Instead, people behave in surprising and irrational ways. This is partly due to the workings of our brains (Kahneman, 2011).

Daniel Kahneman, an influential psychologist who won the Nobel Prize in Economics in 2002 for bridging economics and psychology, distinguished two types of thinking that govern the decision-making process: System 1 (S1) and System 2 (S2) (see Figure 31).

People switch between S1 and S2. Around 95% of our daily decisions are made automatically. Our brain often relies on S1 for most choices because it is faster and requires less energy.

Kahneman highlights that we frequently rely on S1, even when S2 should be engaged. This can lead to cognitive errors and poor decision-making, especially when we need to act quickly or when we don't have enough time to think rationally.

SYSTEM 1
95%

S1 is a fast, unconscious, effortless, automatic and error-prone system that is used in everyday decision-making (based on heuristics and rules of thumb).
- S1 usually works quite well for routine decisions.
- Heuristics are used by S1.

SYSTEM 2
5%

S2 is a slow, conscious, effortful and reliable system that is used for complex decision-making.
- While S2 leads to better decision-making, it requires a lot of our cognitive resources and demands effort beyond what is humanly possible; people cannot constantly be in S2 mode.

Figure 31. The two systems of thinking: S1 and S2
Source: Adapted from Kahneman (2011)

3.3 Design for behaviour change

To develop effective interventions for behavior change, it is essential to first gain insight into the factors that influence human behavior within the reusable meal packaging system. Understanding the drivers behind behavior – such as skills, motivation, and environmental influences – allows for the design of targeted strategies that align with the needs and motivations of the target audience. This is explored using the COM-B model.

The COM-B model provides a valuable framework. This model helps to understand and address the reasons why visitors may not exhibit the desired behavior (Michie et al., 2011).

3.3.1 The COM-B model

The COM-B model is a behaviour change framework that proposes three necessary components for any behaviour (B) to occur (see Figure 32).

- **Capability** is defined as the psychological and physical capacity of an individual to engage in the desired activity. This includes having the necessary knowledge and skills.
- **Motivation** is defined as all the brain processes that stimulate and drive behaviour, not just goals and conscious decision-making. It also encompasses habitual processes, emotional responses, and analytical decision-making.
- **Opportunity** is defined as all the external factors that enable or encourage the behaviour.

Use of the COM-B model

During this project, several factors influencing the visitors were analysed. Since the focus is on the visitor, the analysis is done from their perspective.

In previous chapters, data was collected through observations, interviews, and reports to analyse the factors that influence behaviour within the three COM-B components. The full analysis can be found in Appendix E, and Figure 33 shows the model outcome.

Outcome of the COM-B Model

Within each COM-B component, several factors have been identified. Most of the factors are related to the physical environment, while the social environment and physical capability contain the fewest factors.

To maximise the impact of the intervention, the factors have been ranked from most influential to least influential. The focus is on the most decisive factors: enabling factors are reinforced, and inhibiting factors are reduced to promote behavior change.

The selected factors included in the intervention are marked with a red dotted line in Figure 33.

The selected factors:
- **Clear and straightforward communication**
  (incentive → strengthen)
- **Awareness of using reusable meal packaging**
  (incentive → strengthen)
- **Reusable meal packaging is perceived as single-use**
  (barrier → reduce)
- **Lack of knowledge about the system**
  (barrier → reduce)
- **The packaging itself clearly signals that it is reusable**
  (incentive → strengthen)

Explanation of my approach

Since it is not possible to address all barriers and reinforce all incentives within this project, I am focusing on specific factors that have a significant impact and where I can design practical behavioural interventions. The ultimate goal is to create interventions that event organisers can use as practical examples when seeking workable solutions.

Not all factors can be fully resolved, and some must be considered as basic requirements, such as ensuring sufficient drop-off points and facilitating repetitions. Therefore, I am developing a framework with essential elements that event organisers need to consider in order to successfully transition to a reusable meal packaging system. The result of this framework will be presented as part of my final design in Chapter 6.

Figure 32. The four elements of the COM-B Model
Source: Adapted from Michie et al. (2011)

CAPABILITY

Physical capacity

Easy to use

Psychological capacity

Lack of knowledge about the system

The packaging itself clearly signals that it is reusable

Use of different return systems creates confusion

Additional costs when using reusable meal packaging

Lack of clear information on environmental benefits

Making the use of reusable meal packaging mandatory

Making reusable meal packaging not too attractive

A better eating experience

OPPORTUNITY

Physical environment

If you have experienced the system in an approachable way before, it is easier to understand

Clear and straightforward communication about returning the packaging

Too little and unclear info, explanations and instructions about returning the packaging

A uniform system for all reusable meal packaging

Plenty and tactically placed drop-off points that remain highly visible at all times

Limited number and poor visibility of drop-off points

Walking far to return the packaging and then finding your friends in the crowd again

Long queues to get deposit back

Less (litter) waste

Extension of drop-off point opening hours

Overflowing drop-off points, preventing packaging from being placed inside

Social environment

Imitating others' behaviour / social control

MOTIVATION

Motivaton (conscious)

A financial incentive or reward

Awareness of using reusable meal packaging

Reusable meal packaging is perceived as single-use

Staff who actively support you

Attractive reusable meal packaging

A collective sustainable contribution

A sustainable ambience

Insufficient deposit refund

Motivaton (unconscious)

Walking around with dirty reusable meal packaging

A clean, tidy environment

Lack of motivaton and awareness

Feels more luxurious and of better quality, sturdier

Forget about the deposit refund

Legend

Incentives

Barriers

Figure 33. COM-B model outcome

3.3.2 Behavioural strategies

The COM-B model has provided insight into identifying the factors that can promote behavioural change. To actually realise this change, behavioural strategies are essential. For the interventions related to the chosen factors, the following two strategies from the literature will be applied: nudging and aligning with existing practices. These strategies were chosen because both effectively address human behaviour and complement the COM-B model well.

Nudging

Nudging is the subtle influence of people's choices by adjusting the environment or presentation of options, without limiting their freedom (Leal et al., 2022c). Nudges help redesign the choice architecture by using thoughtful and predictable methods to change people's behaviour, adjusting cues, and activating unconscious thought processes in decision-making, so that decision-makers can make better choices. Nudging implies that decisions are voluntary and that all alternatives are offered without extra costs or effort. This perspective suggests that nudges are neutral because they do not significantly alter the economic incentives (Marchiori et al., 2017). At the same time, nudges are very powerful because they are not based on strenuous processes, but rather on the unconscious nature of the decision-making process, playing into cognitive biases (De Ridder et al., 2021b).

Presenting the desired option

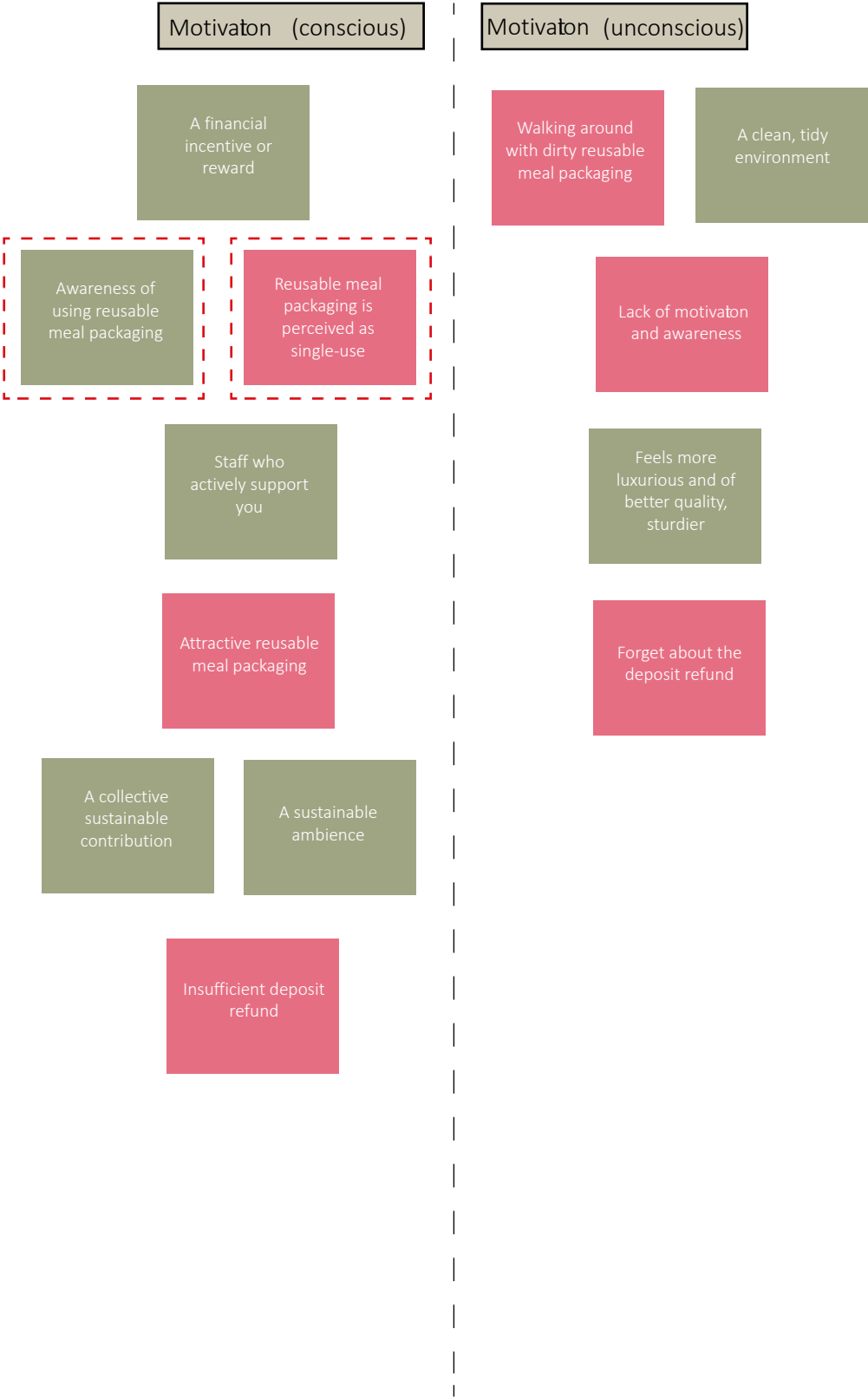Nudging is an application of choice architecture. Choice architecture is the process of designing the environment in which choices are made, enabling people to make better, often more considered, choices (Leal et al., 2022b). It involves the idea that the way options are presented influences people's behaviour and decision-making, without them always being aware of it. The goal is to help people choose what is in their best interest by steering them towards more desirable options, without forcing or manipulating them.

Presenting the desired option in **the right way**, at **the right place** and at **the right time** is a key principle within choice architecture. In Figure 35, you can see the different options for this project.

Aligning with existing practices

Previous studies have shown that new products and services are more easily accepted when they align with the existing habits and dynamics of consumers (Antikainen et al., 2015; Mylan, 2014). Therefore, it is important that the behavioural intervention integrates well into the current system.

Huang et al. (2020b) propose a design method in their study that uses metaphors, allowing designers to link product characteristics to behavioural and experiential stimuli through metaphorical thinking.

The use of metaphors in (physical) product design to encourage sustainable behaviour is not uncommon. One example is the "Blikvanger", (see Figure 34) a net-like waste bin along Dutch motorways designed to reduce littering (Tromp et al., 2011). In this case, the designer consciously linked the idea of catching things to the intended action of throwing items away. In practice, this design encourages people to act in an intuitive and desirable manner, motivating them to perceive the challenge as something enjoyable.

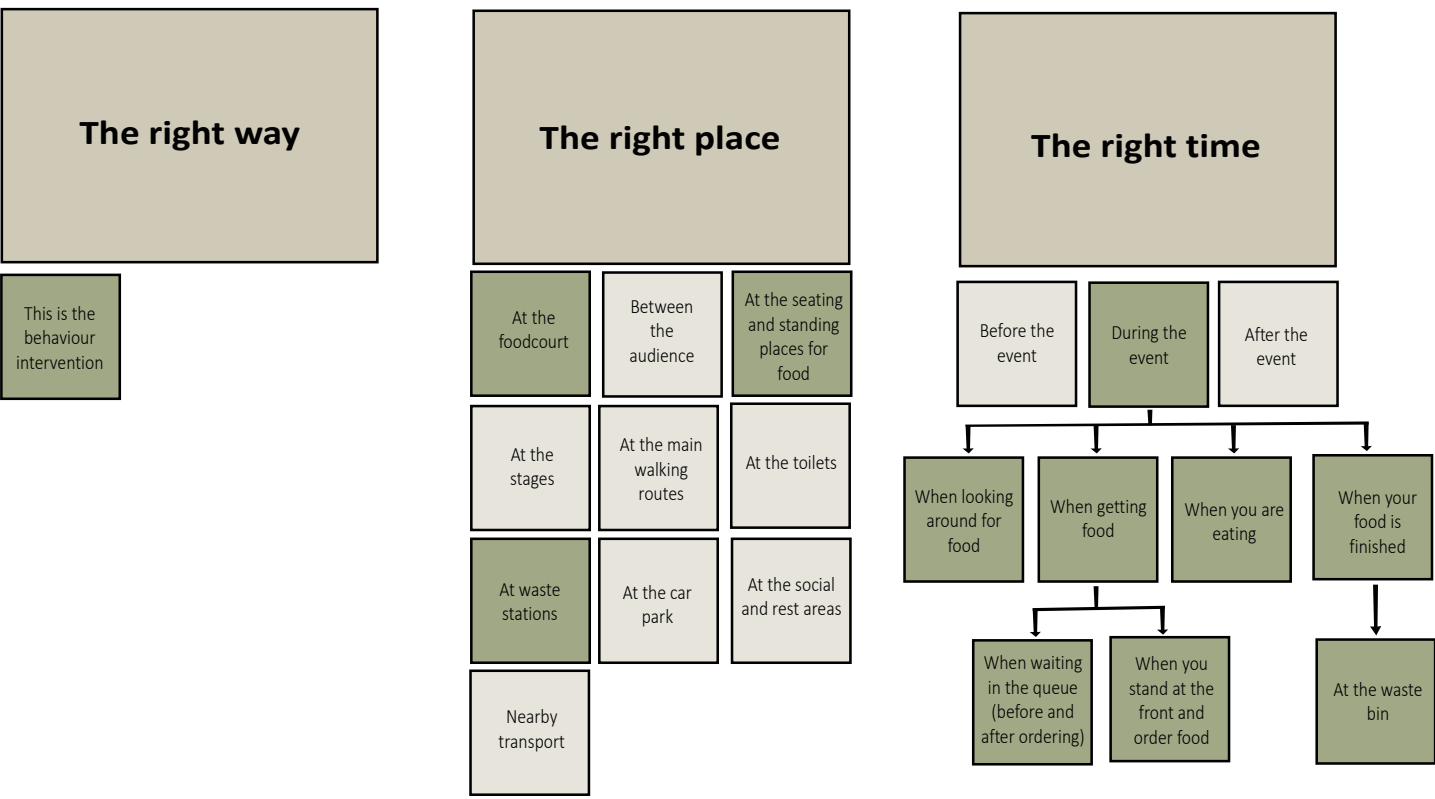*Figure 34. A blikvanger*
Source: Binsystem (2023)

Figure 35. Presenting the desirable option

3.4 Conclusion

In order to get all event visitors to adopt the reusable meal package systems, a structural approach towards a behavioural change is necessary. Next to the visitor, in this chapter stated as the 'consumer', actions of companies and governments can (in)directly affect consumer behavior. Although, regulations and infrastructure create conditions that can accelerate the behavioural change, too many top-down mandates will do the contrary. Since behavioural change works best if people experience the benefits themselves the scope for the interventions will target the consumer.

Research shows that the vast majority (95%) of consumers' mindsets are self-interested, which leaves 5% that are primarily ecologically driven. Due to the importance of the visitors' environment and social influence in realising behavioural change, the so called 'green' consumers should not be neglected. This type of consumers are a key target audience to normalize sustainable alternatives, in order to gradually convey the 'light-green' and 'grey' consumer types. The current solution offered by event organisers, financial incentives, is a short term economic-driven solution which is insufficient to spark a long lasting behavioural change. It should integrate both financial and environmental incentives, ensuring a strong connection between the two, with each playing a role in its own way.

Unfortunately, realising behavioural change is easier said than done, as people generally tend to hold onto their personal ingrained habits and unconscious routines. Additionally, the context of events (mostly fun and pleasurable) take it a step further, due to a direct correlation with inactivity of complex-decision making (S2) processes. These S2 processes need to be activated in order to act rationally. Therefore, the bare necessity and first step towards behavioural change is introducing visitors to the reusable system in a low-threshold, accessible and non-intrusive way. By repeatedly demanding the same action of the visitors, it will eventually become an automatic habit driven by familiarity, in and out of the event context.

The COM-B model was used to analyse the factors driving the current behaviour. Prioritising these factors helps address those with the greatest influence. The selected factors are either reduced or strengthened through the designed behavioural interventions.

DESIGN VISION

This chapter provides the basis for the design phase and reiterates the key factors that will guide the development of the interventions. Additionally, relevant design challenges are identified to keep in mind when shaping behavioural interventions. Finally, the design criteria that the intervention must meet are clearly defined.

4.1 Problem overview

The overarching problem statement for this graduation project is: Visitors insufficiently return reusable meal packaging responsibly during open events. This problem can be defined through subproblems. From section 3.3.1, the key factors are defined as the subproblems. These subproblems are incorporated into the design of the behavioural interventions, with the aim of creating effective solutions that contribute to reducing the problem.

An overview of the subproblems:

- **Lack of clear and concise communication**
- **Unawareness that reusable meal packaging is being used**
- **Reusable meal packaging is perceived as single-use**
- **Lack of knowledge about the system**
- **The packaging itself does not clearly indicate that it is reusable**

Multiple behaviour interventions

The analysis of presenting the desirable option and the visitor journey highlights key touchpoints where visitor behaviour can be influenced. There are multiple moments to encourage the desired behaviour. Therefore, more behavioural interventions are designed than one. These interventions at the right moments are shown in Figure 36.

Multiple interventions are also beneficial for the following reasons:

- **Repetition and reminders enhances effectiveness** (Lally et al., 2009): Reinforcing the message through different interventions increases its impact.
- **Different stimuli appeal to different people**: Not everyone responds to the same type of intervention.
- **A combination of conscious and unconscious guidance**: Some interventions directly engage decision-making, while others subtly influence behaviour.
- **Prevention of habituation**: A single nudge may lose effectiveness over time, so using a variety of interventions helps maintain engagement.
- **More opportunities to encourage the desired behaviour**: Multiple interventions provide more touchpoints for influencing behaviour
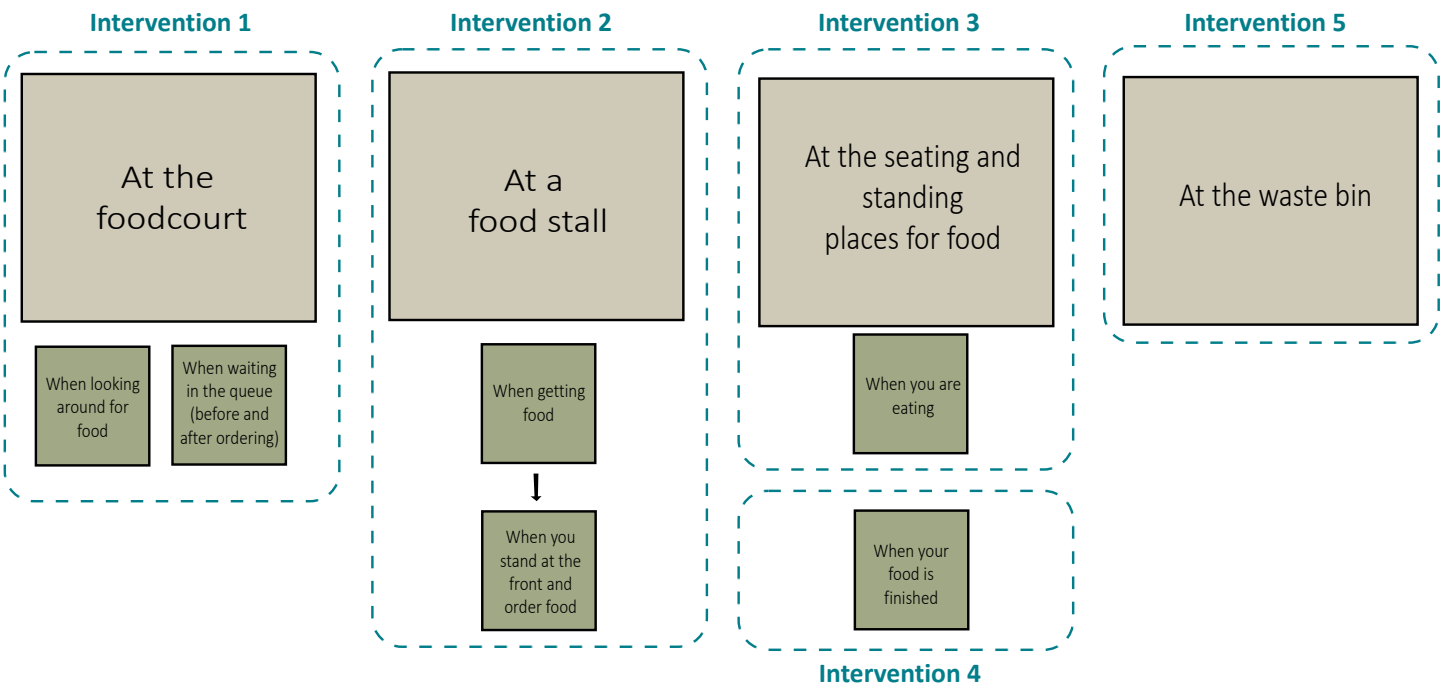
4.2 Design challenges

When developing effective behavioural interventions, it is important to take various design challenges into account. These challenges arise from the complexity of human behavior, the variety of influences, and the need to effectively reach different target groups.

Open outdoor events

Open outdoor events are often held at locations where not everything in the physical environment can be adjusted. Sometimes, unavoidable elements, such as municipal waste bins, influence visitors' behavior. Additionally, weather plays a significant role, as it can affect the atmosphere and comfort of the attendees which in turn impacts the success of behavioural interventions.

Diverse audience

At open events, where visitors are free to come and go, the audience is typically very diverse. There are various age groups, cultural backgrounds, and socio-economic statuses, making it difficult to reach everyone in the same way. Interventions, therefore, need to be flexible and take this diversity into account in order to be effective for everyone.

Not sober

Behavior change at events is particularly challenging because visitors are not always sober. Alcohol and other substances affect decision-making, reduce self-control, and reinforce automatic behaviors, such as carelessly discarding reusable meal packaging. This makes it harder to establish new, conscious routines, like correctly returning reusable meal packaging. Therefore, it is crucial to make the system as simple and intuitive as possible, so that even under the influence, the right choice is the easiest one.

4.3 Design criteria

Based on the previous research in the preceding chapters, requirements and wishes for the intervention have been established.

Requirements (must-haves)

The intervention:

- Must fit within one of the existing return systems already used at events.
- Must stand out and be clearly visible.
- Must be specifically aimed at reusable meal packaging.
- Must require minimal mental effort from visitors.
- Must be understandable for Dutch and non-Dutch speaking visitors.
- Must raise awareness about the use of reusable meal packaging.
- Must communicate clearly about returning reusable meal packaging.
- Must be recognisable and intuitive for users, aligning with their existing habits.
- Must not come across as demanding.

Wishes (nice-to-have conditions)

The intervention:

- Subtly highlights the sustainable benefits of reuse.
- Is memorable and leaves a lasting impression on visitors.
- Is understandable for visitors, even if they may not be fully sober.
- Contributes to the sense of a collective sustainable effort.
- Takes into account a diverse audience.
- Does not incur additional costs for visitors.
- Must be compatible with different types of reusable meal packaging.

Figure 36. The proposed interventions at different moments at an event

ITERATIVE DESIGN PROCESS

This chapter discusses the iterative design process that contributed to the development of the behavioural interventions. The iterative process is a crucial part of the design, involving continuous feedback collection and application to optimise and refine the interventions. This process ensures that the interventions increasingly align with the needs of both the users (visitors and the organisers). The chapter provides a detailed description of the steps and methods followed in the iterative design process, as well as the key findings and adjustments that led to the final behavioural interventions.

5.1 Development of the behaviour interventions

The iterative design process can be divided into three phases. The first phase, ideation, focuses on the general concept development related to the project goal. In the second phase, concept development, the focus is on the subproblems from section 5.1 and the appropriate presentation of the desired options at the right locations, as described in section 4.3.1. This phase results in five behavioural interventions that are developed and tested. The third phase involves testing the interventions in a real-world context during pilot trials. All ideas from phase 1 are taken to phase 2, where ideas are assigned to the designated intervention. With tests, feedback is collected to arrive at a concept for each intervention. The chosen concepts are then evaluated during pilots.
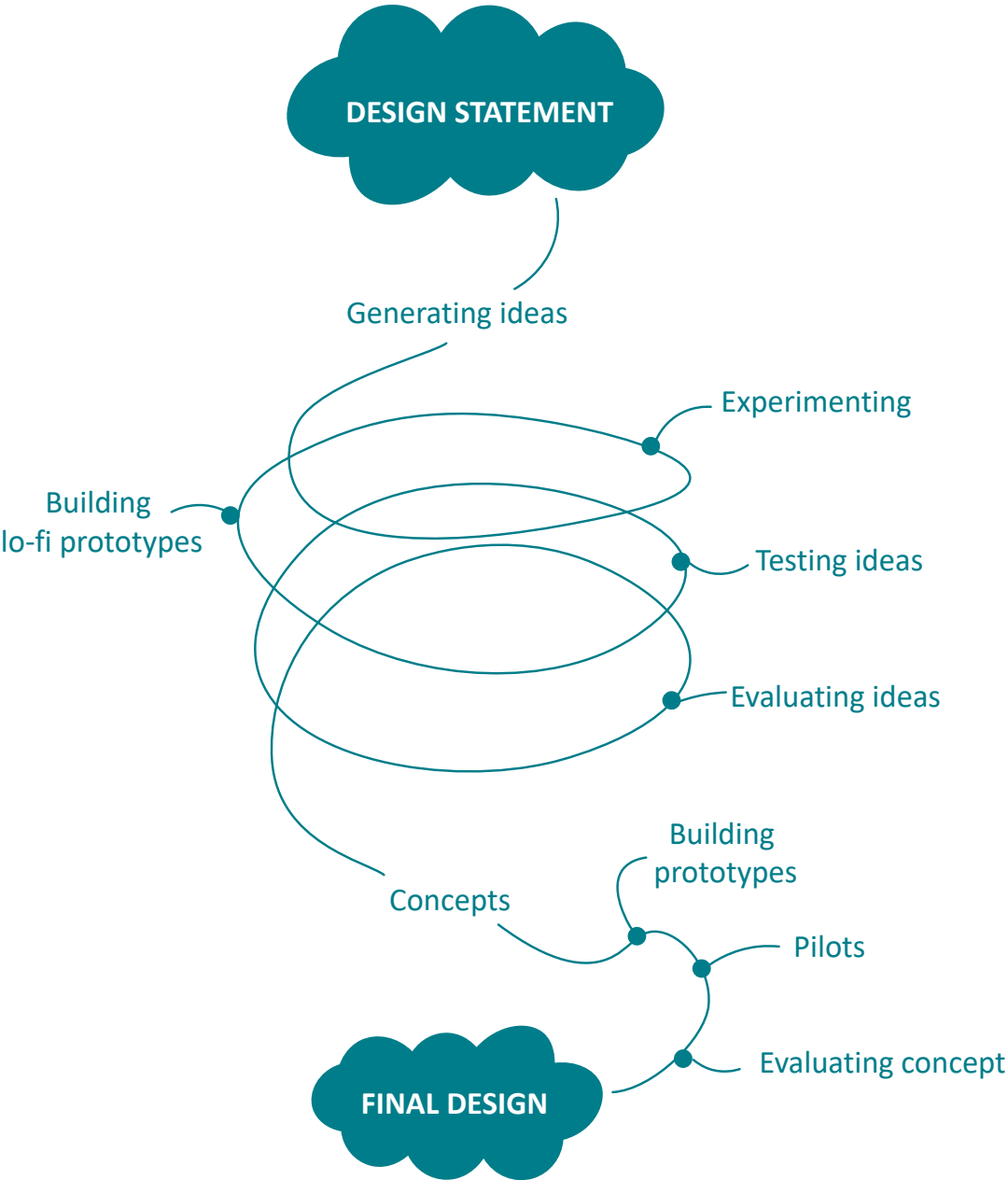
Figure 37. An iterative design process

5.1.1 Phase 1: Ideate

The goal of the ideation phase is to generate as many ideas as possible based on the information from the previous chapters. In this section, various ideas are first collected, all focused on the design statement. In the following section, these ideas will be further refined and honed. A more detailed explanation of the ideation phase can be found in Appendix F. Below, the methods used and the results are briefly presented.

Brainstorming

The brainstorming technique is used to generate a variety of (unusual) ideas.

Figure 38. Generating a lot of ideas with brainstorming techique

How to's

The How-To's technique is used to stimulate a wide variety of options in the idea finding. The How To's generate additional ideas alongside the brainstormed ones. They also allow for more specific idea generation, such as:
How to create something that is valuable.
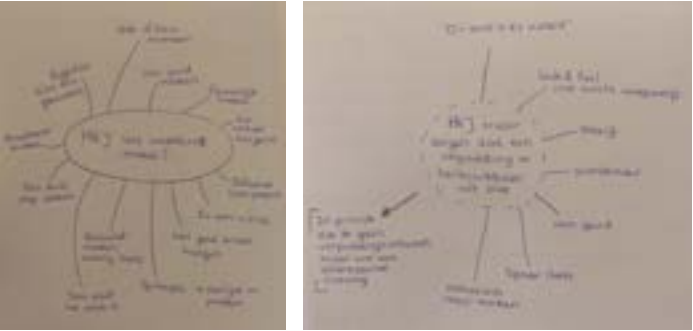
Figure 39. How to's examples from my sketchbook

Creative sessions

A creative session is gathered where participants collaboratively generate ideas and solve problems. It is an effective way to combine different perspectives and discover innovative solutions. Conducting such a session with fellow students is valuable, as it provides new insights and stimulates creative ideas that one might not have come up with alone.

Figure 40. A creative session with co-design students

Experimenting

Experimenting is the process of testing and exploring ideas to see how they work in practice. It allows for new insights and helps refine the design. Experimentation is crucial as it transforms theory into practical, workable solutions.

Ensuring that the message is effectively communicated is essential. A message is more likely to be received when it captures attention. Therefore, small experiments were conducted to observe people's reactions and determine when the message was most effective. The key message was: the meal packaging is reusable and must be returned. These tests were carried out randomly to identify valuable insights. A detailed description of the experiments can be found in Appendix F.

On the following page, you will find the small experiments and the results for each test.

Insights of the experiments:

Experiment 2. The message with text and image and the message with only tex

Test participants were given a reusable meal packaging and were asked to intuitively return it to one of the two return points.

Figure 41. Small experiments

- **Images are more attractive than text**: People are drawn to pictures faster than to written text.
- **Too much text is not read**: People want to understand the message quickly, preferably at a glance.
- **Images must be accurate**: The image of the meal packaging must match the type of meal packaging that should be returned, otherwise, it can cause confusion.

Experiment 3. Self-interest vs collective interest

Test participants were given a reusable meal packaging and were asked to intuitively return it to one of the two return points.

Figure 42. Small experiments

- **People value self-interest more**: Individuals often focus more on what benefits them personally.
- **It's nice to receive something immediately**: Immediate rewards are perceived more positively than rewards that come later.
- **People do not believe the target will be achieved**: There is often skepticism about achieving promised results or goals.
- **It is difficult to give a physical reward to a large audience**: Distributing a physical token as a reward is complex without digital tools supporting the process.
- **People prefer to complete a task in one step**: Performing a task in one go is more appealing than waiting or performing multiple steps, such as picking up a reward later.

Experiment 4. Different colors of return points and one color of meal packaging

Figure 43. Small experiments

- **People associate colors of different objects with each other:** Objects with the same color are often automatically linked together.
- **People associate the colors of return points with waste bin colors:** For example, green is often associated with the green bin for separated waste, and gray with the general waste bin.
- **The color red can evoke negative associations:** Red can give the impression that something is prohibited or not allowed, which may create aversion among visitors.

Experiment 5. A transparent plastic return point versus a closed paper return point.

Figure 44. Small experiments

- **People want the return points to appear clean when they have to place the reusable tabware in them themselves:** They are afraid of placing their meal packaging in a dirty bin if it does not appear well-maintained.
- **People prefer closed bins:** They feel more comfortable when the meal packaging is out of sight.
- **People do not want to reach into deep bins:** They are concerned about the dirt on the high edges when placing their meal packaging inside.
- **The return point should look sturdy:** A robust appearance increases users' trust in the bin.

Experiment 6. Receiving a compliment after returning your reusable meal packaging

Figure 45. Small experiments

- **A cheerful animation with a compliment makes people smile:** Smiling releases endorphins. This "happiness hormone" reduces cortisol levels and influences the amount of dopamine and serotonin, chemicals that positively affect overall mood. (Berk, L. S., et al. (1989). "The influence of mirthful laughter on stress and immune function.")

5.1.2 Phase 2: Concept development

After the ideation phase comes the concept development phase, where the ideas from the previous chapter are further refined into concrete concepts. Below, promising ideas from phase 1 are linked to suitable interventions at various touchpoints and additional concepts are developed. This process remains iterative, allowing for continuous refinement and improvement. A detailed explanation of the concept development phase can be found in Appendix G. What follows is the concept development for each intervention at one of the five moments illustrated in Figure 46.

The designed behavioural interventions will be included in the next section (5.1.3) and tested in real-world pilot settings. During the pilots, the concepts will continue to be iterated and refined.
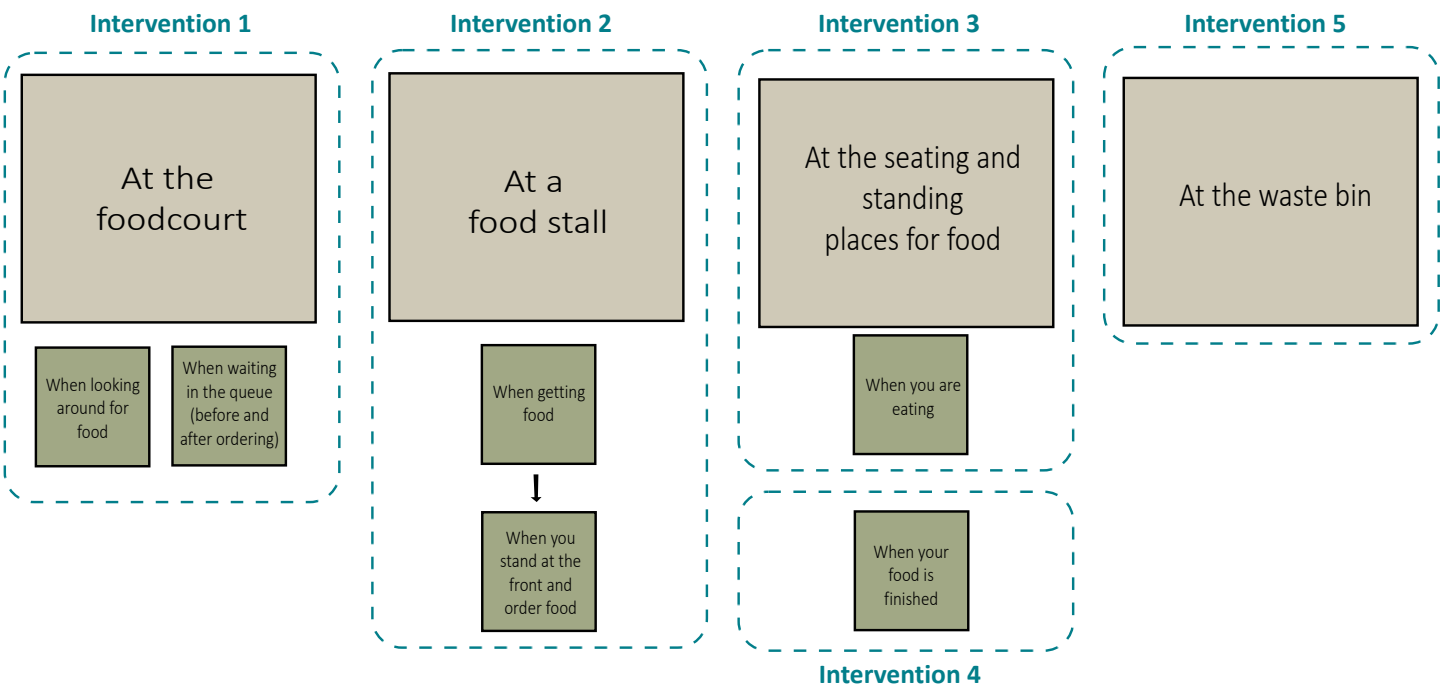
Figure 46. The proposed behaviour interventions

Development of behaviour intervention 1

The food court is a central area at events where visitors gather to eat and drink, making it an ideal moment to raise awareness about reusable meal packaging and encourage proper return behaviour. This intervention targets visitors' behaviour while they are walking around the food court in search of a meal.

Among various ideas (see Appendix G), the menu board was selected as the final intervention (see Figure 47). This is mainly because research showed that people naturally tend to look at menus in the food court, as their attention is automatically drawn there. This can therefore be leveraged.

"*You go through all the menus: what food is available, what looks appetising, and what is the price-quality ratio.*"
— Visitor journey 3

What should be displayed on the menu board?

This was tested with individuals who frequently attend events. These participants were asked to create their own menu board (see Figure 48). Various items were collected in advance for them to use. For more details, refer to Appendix G for this task.

The insights gained from this test are as follows:
- Use minimal text.
- The information should be informative, short, and clear.
- The information should be easily understood at a glance.
- There i s no need to include the word 'menu' as it could cause confusion if there is not an actual menu. The shape of the board alone is sufficient.
- Images are more effective than text.
- The text should be friendly, not demanding (avoid phrasing like "You must do this" or "You must do that").
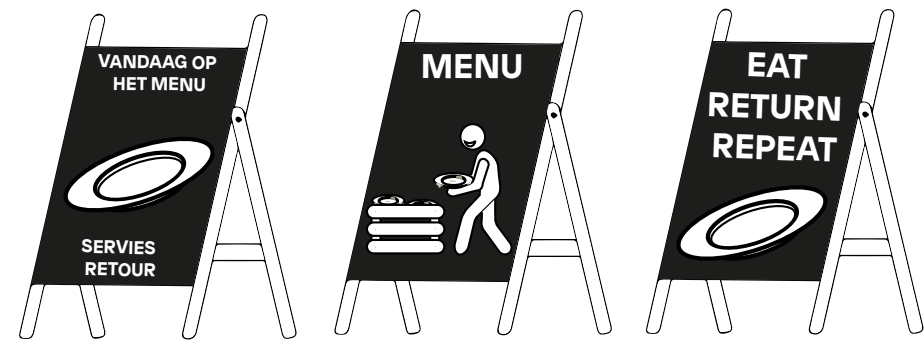
Figure 47. The concept of the menu board
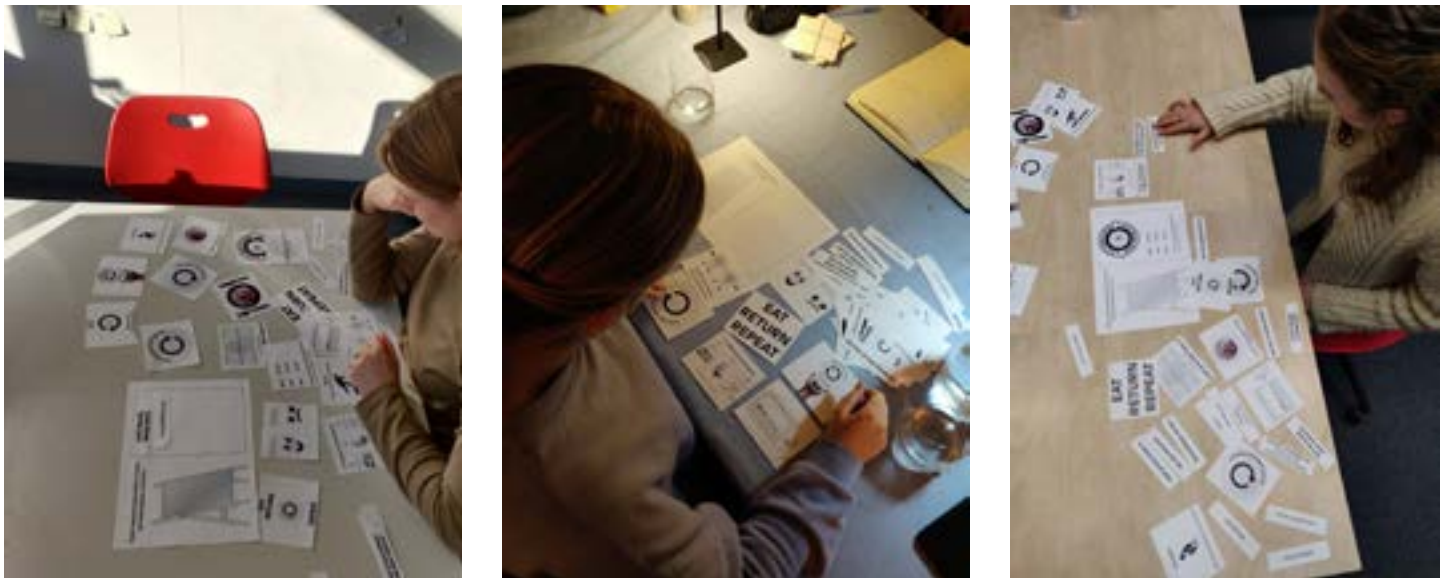
Figure 48. Creating a menu board

Development of behaviour intervention 2

The food stalls are the heart of the food court and serve as the first point of interaction where visitors order and receive their food. Creating awareness about RMP and the importance of returning it at this moment can effectively encourage the desired behaviour, as this is when visitors first encounter the RMP. Additionally, all visitors who use RMP will pass by a food stall, giving an intervention at this point a wide reach.

From various ideas (see Appendix G), the mannequin with a hanging sign was chosen.

EAT
RETURN
REPEAT

Figure 49. A mannequin with a sign

What people like about the mannequin with the sign:
- The mannequin represents the caterer (who may not always have the time to explain that the meal packaging is reusable).
- Such mannequins are often appealing because people tend to want to touch them and change their posture. This interaction itself can draw attention to the mannequin.
- It can be easily placed on the counter and does not take up much space.

Development of behaviour intervention 3

Conversations with visitors and observations show that many visitors deliberately seek a spot to eat after collecting their food. Tables naturally become gathering points where visitors tend to stay longer. This makes them a strategic location for interventions, as people are more receptive to subtle cues during moments of relaxation.

A table piece is not just a decorative element; it also serves a functional role in guiding visitor behaviour. A well-designed table piece can gently remind visitors about the reusable meal packaging and the importance of returning it, without disrupting their dining experience.

The table centerpiece became a mini version of the glass display case, which will be discussed later in the development of intervention 5. During the brainstorming for intervention 5, it was realized that this display piece could also work as a table centerpiece. A small display case with a reusable meal packaging inside, intended to capture attention and make people think: "What is this little display case and what is in it?" (see Figure 50).

Figure 50. Mini glass display cases on the tables

Development of behaviour intervention 4

Conversations with visitors and experts highlighted the importance of making the reusability of the reusable meal packaging visually clear. As mentioned earlier, plastic meal packaging is still widely used in reusable form, whereas ceramic or glass meal packaging is no longer associated with disposability.

It is essential that the meal packaging itself conveys its reusability. A clear visual cue on the packaging immediately communicates that it is reusable. If the message or instructions are directly printed on the item, this ensures that anyone handling it understands its purpose, without relying on external communication channels.

The challenge is how to ensure that plastic reusable meal packaging clearly communicates that it should be returned. Since packaging design is a specialised field, this project did not focus on redesigning the meal packaging itself. Instead, desk research was conducted to explore how other organisations address this issue with reusable meal packaging (see Figure 51).

Figure 51. Packaging with different reusable symbols

The key findings from this exploration are:
- The word 'reusable' is commonly used across different designs.
- Not all reusable meal packaging items are explicitly labelled as reusable. In some cases, this information is only on the packaging, meaning it is lost once the packaging is removed.
- There is no universal symbol for reusability, various items use different symbols.

Subsequently, a study was conducted to identify which symbol effectively conveys the message of 'reusable and return' (refer to Appendix G for study details).
This was tested in three ways:

- (1) A survey featuring various symbols associated with reusability, where participants were asked to interpret their meaning.
- (2) Plates displaying both textual and visual symbols related to reusability and returning, with participants selecting the plates they felt best communicated the message.
- (3) Plates featuring only symbols, with participants asked if they understood what action was expected based on the symbol alone.

Since it must be clear that the meal packaging is reusable and must be returned and from the tests, the following symbol emerged (see Figure 52).

Figure 52. 'Reusable and return' symbol

Development of behaviour intervention 5

Many reusable meal packaging still end up in the waste bin because people unconsciously consider them single-use. Therefore, intervention at the bin is needed to break this behaviour.

Several ideas were developed, which can be found in Appendix G. Visual sketches were used to discuss ideas and gather valuable feedback. In the end, the glass display case concept was chosen as the most promising solution.
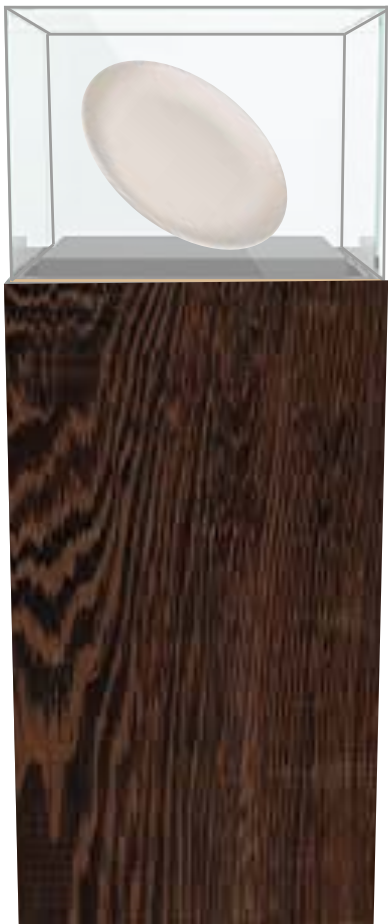
Figure 53. A glass display case on a pedestal

A glass display case has been selected to test whether people develop a different perception of reusable meal packaging. The goal is to see if the display case influences how people view the packaging. Ideally, it should make people see the reusable packaging as valuable, so they no longer associate it with waste, but instead they want to use it multiple times because of its value.

A test of the glass display case with deposit cans and bottles

As there was no immediate test event location with reusable meal packaging available, an alternative was sought to test this concept. An object needed to be placed in the glass display case that also required returning. Deposit cans and bottles were found to be suitable for this purpose.

The test was carried out twice at the Rotterdam Blaak market, on a busy Saturday. Prior to the test, an observation was made to identify which waste bin was in a strategic location, clearly visible, with a lot of foot traffic and easy to monitor.

During the test, a glass display case was placed with a deposit can and bottle inside. Additionally, a special return point was set up where visitors could deposit their deposit containers instead of placing them in the regular waste bin. The amount of cans and bottles that ended up in the return point, rather than in the waste bin, was then observed. See Figure 54 for the test set-up. A detailed description of the test can be found in Appendix G.

The insights from the test:
- People perceive the glass display case as a vault or a piece of art. They appreciate it as a creative way to highlight the value of deposit cans and bottles.
- Placing something next to a waste bin that does not look like waste quickly attracts attention. The item also drew attention due to its aesthetic appeal compared to the bin.
- The object needs to be large or tall enough to remain visible, even when people are standing in front of it.
- Many people immediately understood that it was related to deposit-return packaging, especially because of the images of the can and bottle with the € symbol on the collection bin.
- Despite being smaller than the bin, the display case still attracted a lot of attention. Many people looked at it, even from a distance of about 15 metres.

Figure 54. Test with the display case at Blaak

5.1.3 Phase 3: Pilot case

Before the behavior interventions can be implemented, it is crucial to conduct pilots in the real-world context. The COM-B model provides valuable insights but does not always fully capture the complex and dynamic reality in which an innovation must ultimately function. Pilots allow for testing assumptions, identifying unforeseen obstacles, and evaluating the practical feasibility of the intervention. The selected concepts for each intervention from the previous chapter will be tested in the pilots.

Falafval

For the pilots, a collaboration was established with a caterer called Falafval, which operates on Saturdays at the Rotterdamse Oogstmarkt. Falafval sells pita falafel (see Figure 55) as well as individual falafel portions.

Figure 55. Pita falafval
Source: (Instagram, z.d.)

Rotterdamse Oogstmarkt

Here is some background information about the Rotterdamse Oogstmarkt to provide context on the location of the pilot studies.

The Oogst is a local market in Rotterdam Noord aimed at providing a platform for local, sustainable producers to offer their products to Rotterdam residents in an environmentally friendly way. This market is the perfect test location for this project because:
- It is an open environment.
- It attracts early adopters, also known as environmentally conscious consumers (green people).
- It attracts a diverse audience, including both young and old visitors, as well as Dutch citizens and foreigners.

Figure 56. Exploration day at the Oogst
Source: Photo by author

Exploration day (1/2/2025)

An exploration day at the Oogst (see Figure 56) was conducted prior to the pilots being carried out there. This was to understand the operations at the Oogst. For a detailed description of the day, refer to Appendix H. During the day, I focused on the following aspects and the insights are provided alongside:

? Do many people eat at the market (or do many people also take-away)?
Most people eat at the market square, but some also opt for takeaway, depending on the food stall.

? How many bins are there and where are they placed?
Around 10 bins were placed by the Oogst, with possibly a few more. The municipal bins on the square are covered with a bag because they are open and often attract litter due to birds. Therefore, their own bins with lids are placed next to them.

? How many seating areas are there?
There are quite a few seating areas spread out across the market square.

? How is the pita falafel currently served?
In paper.

? How clean is the market square?
Very clean. There is almost no litter on the ground at the market.

? What kind of people visit the Oogst?
A variety of people, from families with young kids to couples, from young to old and both Dutch and foreigners. There is a mix of all kinds of people.

The baseline measurement

A baseline measurement is important because it provides a starting point for measuring changes or effects of an intervention. It helps to capture the situation before the implementation of the behaviour interventions so that the impact and results of subsequent actions can be properly evaluated.

Explanation of my approach

After conducting the first pilot, I realised it would have been valuable to carry out a baseline measurement beforehand. This would have allowed me to better demonstrate the effectiveness of my interventions. Since the first pilot had already taken place, conducting a baseline measurement afterwards would not have been entirely reliable, as visitors might have already interacted with the interventions.
To establish a reference point, I looked at other food stalls that also use reusable packaging but do not apply specific interventions. At these stalls, visitors are only informed verbally that the packaging is reusable and one stall has a crate labelled 'Reusable tableware'. As these stalls implement hardly any physical behavioural interventions, their initial situation when they first switched to reusable packaging can serve as an alternative baseline measurement. This allows me to compare a situation without intervention to the effects of my own intervention. For this, I spoke to five food stalls and asked about their initial dropout rates:

Caterer 1 (trays of PP)
Drop-out rate: 5/25 = 20%

Caterer 2 (glass wine glasses)
Drop-out rate: 4/200 = 2% (on a busy day)

Caterer 3 (coffee cups from PP)
Drop-out rate: 15%

Caterer 4 (tempered opal glass plates)
Drop-out rate: 1%

Caterer 5 (PP trays and cups)
Drop-out rate: 5% trays and 3% cups

The pilots at the Oogst

A total of three pilots were conducted. The pilot was conducted to gather both quantitative and qualitative feedback.

> **Quantitative:**
> The return rate.
>
> **Qualitative:**
> I positioned myself close to the Falafval stall to observe how people interacted with the reusable meal packaging. I asked them questions only after they had returned the packaging to ensure the return process remained uninfluenced.
>
> The questions asked were:
> - How did you know that the RMP is reusable?
> - How did you know that you needed to return the RMP?
> - What do you think of this idea of using RMP and having to return it?
> - What do you think of this RMP?
> - What if everyone at this market used RMP?
> - Do you have any tips or suggestions for improvement?

Pilot approach

The behavioural interventions were tested in three different pilots each with a slightly different composition. After each pilot an evaluation was conducted to identify how the interventions needed further testing and these were improved and retested in the following round.

All three pilots took place during the lunch peak, the busiest time of the day. Each pilot lasted approximately three hours. Before lunch the interventions were set up with the help of others. The reusable meal packaging was then handed over to the caterer and from that point observation and interaction with visitors began.

During lunch the area near the caterer was observed to see how visitors interacted with the interventions and with the reusable meal packaging. Once people returned their reusable meal packaging they were briefly surveyed about their experience and motivation for returning it. This provided valuable insights into the effectiveness of the interventions and potential areas for improvement.

A detailed description of the three pilots can be found in Appendix H. Below is an overview of the pilots with the results and key insights.

Pilot 1 *Test with Falafval at the Oogst (8/2/2025)*
What has been tested in pilot 1:

The menu board	The mannequin with the sign	The glass display next to the waste bin	The glass display on a table

The results of the first pilot:

Quantitative
Return rate: (68/70) 97%
All 68 reusable meal packaging were returned to the designated return point. Nothing had to be collected on the square or fished out of a waste bin. What happened to the missing two packs remains a mystery.

Qualitative
Short interviews with visitors after they handed in the reusable meal packaging.
The responses are compiled and a summary answer is created for each question.

- **How did you know the RMP was reusable and that it needed to be returned?** The menu board and the raccoon on the mannequin sign catch visitors' attention. They quickly notice the message that the RMP must be returned. Visitors find that the message is communicated clearly and effectively.

- **What do you think of this idea of using RMP and having to return it?** Visitors value the deposit-free system as it is simple and does not involve additional costs or waiting times. RMP fits well within this market. There is a strong preference for reusable packaging over single-use alternatives.

- **What do you think of this RMP?** The RMP is perceived as sturdy and functional, offering a better eating experience than single-use packaging. Some visitors find the colour less attractive and indicate that a different colour or pattern would make it more appealing. Despite these aesthetic considerations, the RMP is seen as practical and hygienic. The design prevents waste and catches food residues.

- **What if everyone at this market used RMP?** There is strong support for uniform RMPs across the market as it enhances recognition and clarity for visitors. This means that the RMPs at each stall should look similar, using the same colour and material. Strategically placed drop-off points would streamline the process further. The move to RMP is seen as an important step towards sustainability with benefits like reduced waste and litter. However, some suggest that extra explanation may be needed for those unfamiliar with the system, particularly if the RMP is not consistently used by all food stalls.

- **Do you have any tips or suggestions for improvement?** It is recommended to place the communication at eye level and next to the menu of the food stall, as this is the area visitors naturally look at. While some visitors saw the message on the counter, it was not always consciously registered. Recognising the system is made easier by the similarities with other stalls, where a return point is placed next to the food stall for returning the RMP.

Observations
- The 'menu board' catches the attention of passersby, with people stopping and looking at it. This shows the board is effective at drawing attention and could be used to convey important information.
- Most people empty their RMP into the nearest waste bin before returning it. However, some RMPs were returned with food leftovers. By the end of the day, one dirty napkin and five forks were found in the return point. Overall, the RMP were emptied well. Visitors generally return the RMP neatly, though additional communication or visual cues could help reduce leftovers in the return point.
- The display case on the table has little effect, likely because it was only placed on one table among multiple picnic tables. Despite being the closest table to Falafval, not all visitors saw the display case. It would be more effective if placed on multiple tables to increase visibility and impact.
- The glass display case next to the waste bin attracts attention, even from people who did not order from Falafval. This suggests the location was strategically chosen and reaches a wider audience than just Falafval's customers.
- The mannequin catches the attention of people ordering food, as it is placed next to the menu board and at eye level. This confirms the effective positioning to capture the attention of those placing orders.
- People neatly stack their RMP on top of each other rather than throwing them into the return point. This indicates care when returning the RMP, which may contribute to more efficient collection and less damage to the RMP.
- People who did not see the message still walk back to the caterer, assuming the return point is there since that is where they picked up their food.
- Orders are placed on the left side of the counter, and customers wait on the right side for their food. This is likely because the payment terminal and menu are on the left side of the counter.
- Most people find a place to sit and eat their meal peacefully.

Pilot 1 showed that the menu board and the mannequin holding the sign stood out at the food stall, while the glass display cases were less noticeable. They were not placed at every waste bin or table, making them easy to overlook despite being positioned close to the stall. Many people said they had not really noticed them and returned their packaging because they saw the menu board or the mannequin with the message.

People did find the glass display case next to the waste bin interesting and it helped raise awareness of reusable packaging, especially since a couple other stalls also used reusable packaging. The one on the table, however, was noticed by very few. This was likely because the market had communal tables for everyone and the display case was placed on just one, often occupied by people who had not collected food from Falafval. I also observed that the display case on the table took up too much space. Some people placed their belongings on it, using it as an extra table, which made the reusable meal packagign inside less visible. The display case itself became less noticeable as a result.

Since the menu board and the mannequin were both highly visible, I wondered whether they reinforced each other or if one alone was enough. That is why I want to test only the menu board in pilot 2.

During pilot 1, I discovered that people appreciated the fact that the reusable meal packaging pictured on the menu board matched the reusable meal packaging they received at the food stall. This recognition made it easier for them to understand that they needed to return the reusable meal packaging from Falafval.

For the first version of the menu board, I printed the design and mounted it on cardboard for durability. However, this meant that if a food stall used different tableware, a new menu board would have to be printed each time, which I found impractical. This led me to brainstorm ways to make the board more universal. I came up with the idea of using plexiglass. Since plexiglass is transparent and can function as a whiteboard, the frame of the menu board could remain the same while the board itself was made of plexiglass. This would allow any type of meal packaging to be placed behind it, keeping it visible through the transparency. Additionally, caterers could customise the message in their own style, as the text could be easily erased and rewritten thanks to the whiteboard effect.

Pilot 2 *Test with Falafval at the Oogst (15/2/2025)*

What has been tested in pilot 2:
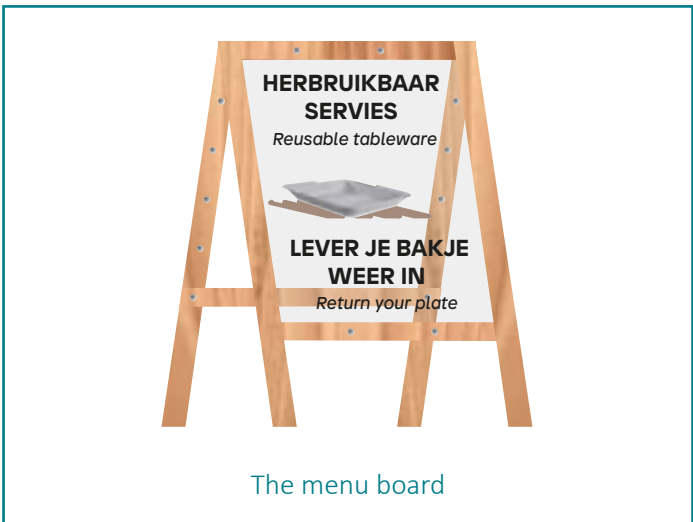
The menu board

Figure 58. Testing the 'menu board' intervention at pilot 2

The results of the second pilot:

Quantitative

Return rate: (51/51) 100%

All 51 reusable meal packaging were returned to the designated return point. Nothing had to be collected on the square or fished out of a waste bin.

Qualitative

Short interviews with visitors after they handed in the reusable meal packaging.

The responses are compiled and a summary answer is created for each question.

- **How did you know the RMP was reusable and that it needed to be returned?** The recognisability of the RMP, both through its sturdy material and the visual similarity to reusable coffee cups on the market, helps visitors intuitively understand that the RMP should not be thrown away. Additionally, the menu board and previous experiences with reusable meal packaging at the market contribute to smooth adoption of the system.

- **What do you think of this idea of using RMP and having to return it?** Visitors find the reusable meal packaging system easy and logical, contributing to less waste, sustainability, and a cleaner market. The sturdy material and ease of use are seen as positive aspects.

- **What do you think of this RMP?** The RMP is seen as sturdy, practical, and pleasant to eat from, though some visitors find the design and color less attractive.

- **What if everyone at this market used RMP?** If all the food stalls used the same RMP and there were enough return points placed strategically, the system would be more logical, clear, and easier for visitors.

- **Do you have any tips or suggestions for improvement?** Placing additional communication at eye level and near the payment area can make the message more visible, particularly while waiting for food. Including the caterer's name or the Oogst logo on the RMP can help identify it as property and reduce the risk of loss.

Observations

- The menu board is noticed, but the message seems less impactful than before, possibly due to the reduced contrast of the acrylic plate.
- Despite the message being less noticeable, passers-by do still draw attention to it and see the menu board.

- There is an increase in RMP being returned with (food) leftovers, indicating a less conscious about emptying the containers.
- In groups with multiple RMPs, the RMPs are stacked, and one person returns them all together.
- If people have not seen the message, they often return to the caterer and place their RMP on the counter, indicating they instinctively look for a way to return the RMP to the place where they received it.

Explanation of my approach (between pilot 2 and 3)

The effectiveness of the menu board alone has been confirmed, as the return rate reached 100%. This shows that the menu board works independently in this context. However, many people provided feedback that having something at eye level would still be helpfull. This suggests that the mannequin from pilot 1 was useful since it stood at eyelevel. For pilot 3, I want to reintroduce the mannequin in de test.

I have tested the glass display case next to the waste bin multiple times and previous results showed that people responded to it as intended. The perception I aimed for, seeing the tableware in a case, associating it with art and value, was achieved. However, since it was placed next to only one waste bin and was not highly visible to Falafval customers, I consider its testing in Pilot 1 sufficient.

The glass display case on the table, on the other hand, is something I still want to explore further. While the display case itself may not have been effective, a table centerpiece could work, as many people gather around tables to eat. This led me to brainstorm an alternative centerpiece, one that encourages interaction. People had previously mentioned that they liked being able to engage with an intervention.

From this, I developed the idea of using fresh herbs as table decorations. Like flower arrangements, they add to the table's appearance, but visitors can also pick and use the herbs on their food.

In pilot 3, I will test the menu board again, now alongside the mannequin to meet visitors' preference for something at eye level and introduce the engaging table centerpiece.

Pilot 3 *Test with Falafval at the Oogst (15/3/2025)*

What has been tested in pilot 3:

The menu board

The mannequin with the sign
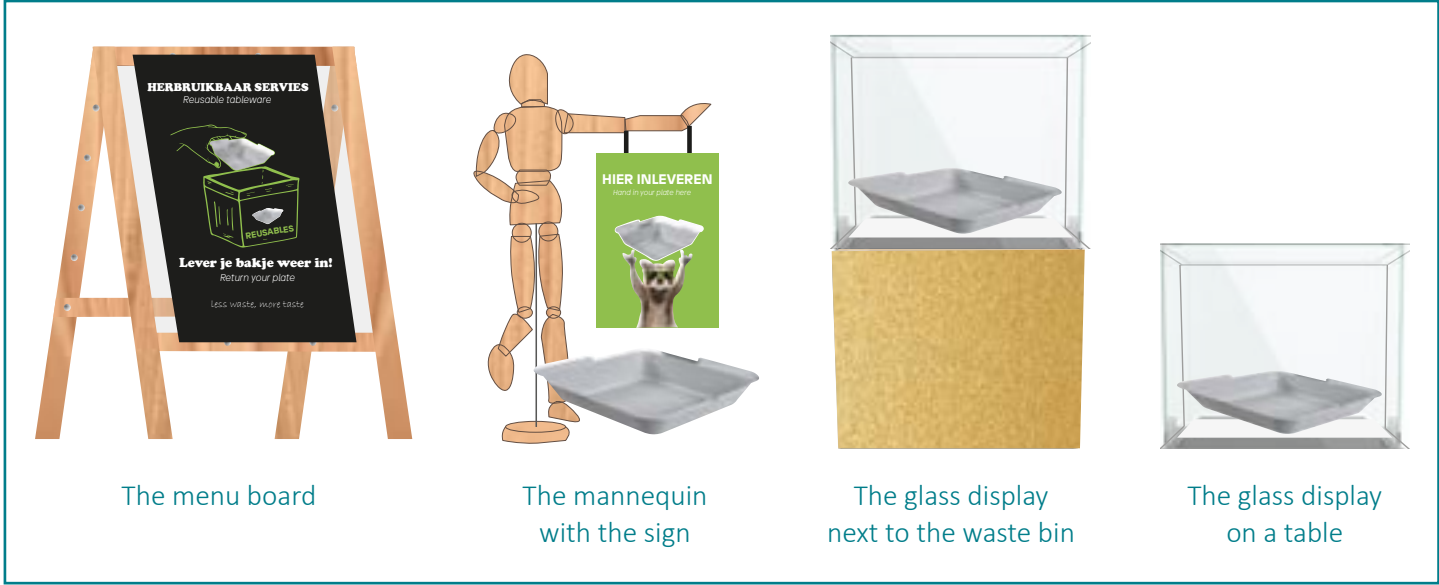
The fresh herbs table centerpiece
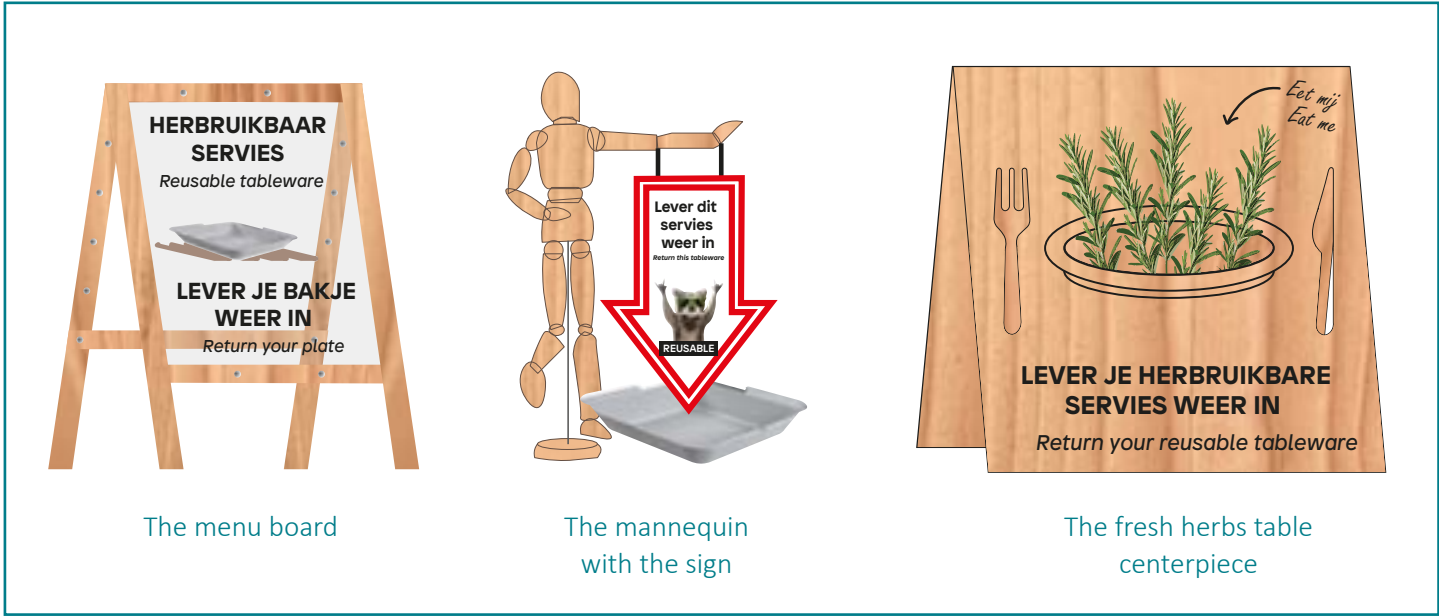
Figure 59. Testing the interventions at pilot 3

The results of the third pilot:

Quantitative
Return rate: (69/70) 99%
All 69 reusable meal packaging were returned to the designated return point. Nothing had to be collected on the square or fished out of a waste bin. What happened to the missing one pack remains a mystery.

Qualitative
Short interviews with visitors after they handed in the reusable meal packaging.
The responses are compiled and a summary answer is created for each question.

- **How did you know the RMP was reusable and that it needed to be returned?** Most people noticed the board and understood from it that the RMP was reusable. Additionally, the RMP felt sturdy, which led them to think it was not single-use.

- **What do you think of this idea of using RMP and having to return it?** Everyone was only positive about it. They believe more food stalls at the market should adopt it. They could not find anything negative about it. The concept is clear and it works easily. They also mentioned that it helps that the market is not very large, so it is not much effort to walk back to the food stall to return the RMP.

- **What do you think of this RMP?** The only downside is that the pita falafel does not stay upright so if the pita is lying down some of its contents may fall out. However, it thankfully falls into the RMP instead of on the ground, allowing it to still be eaten. Aside from that, most people find it convenient. They also mention it is easy to stack, especially when a group of people goes to get a falafel but only one person returns the RMP, making it handy that they can be stacked.

- **What if everyone at this market used RMP?** Most people say that would be great. However, it would be helpful if everyone switched to RMP at the same time, as visitors often get food from multiple stalls. It could be confusing if some stalls have switched to RMP while others have not. They also mentioned that if a few stalls have already switched (like it is now), it would be useful if the stall's logo was on the RMP. This way, people would know which stall the RMP belongs to.

- **Do you have any tips or suggestions for improvement?** Consider using RMP made from a material other than plastic, as it is currently plastic. Bioplastic is one option. If you are already transitioning to a more sustainable alternative to single-uses, it would be beneficial to choose truly sustainable materials. Research more eco-friendly alternatives to plastic across the various types available.

Observations
- Some people still return the RMP by placing it on the counter. The caterer then directs them to the designated return point, and they comply immediately.
- Children enjoy returning the RMP into the return point, suggesting that making the return point more engaging could enhance the experience.
- Most people first empty their RMP into a waste bin before placing it in the return point.
- Groups with multiple RMPs tend to stack them before one person returns them all at once.
- People waiting for food in the queue see others handing in their RMP in the return point. This can help in understanding the system.
- People neatly stack the RMP, rather than throwing them into the return point.

"*If my girlfriend had been a part of this, she would be so lyrical about the reusable meal packaging, she would really love it.*"
— Visitor at the Oogst

5.2 Development of the framework

All factors that are not included in the behavioural interventions but are essential for a well-functioning reusable meal packaging system have been incorporated into a framework (see Figure 60). In this framework, the factors are grouped into clusters, allowing all related factors to be presented together for each theme. See Appendix I for a readable version.

Bezoekersgericht framework voor herbruikbare maaltijdverpakkingen
Richtlijnen voor evenementenorganisatoren in duurzame organisaties

Bezoekersinformatie	Gebruiksvriendelijk systeem	Inleverlogistiek	Servieskwaliteit	Financiële toegankelijkheid	Actief personeel	Duurzame sfeer

Figure 60. First version of the framework

5.3 Evaluation of the behaviour interventions and the framework

5.3.1 The evaluation of the behaviour interventions
The behavioural interventions will be evaluated against the requirements and by field experts.

Evaluation - Requirements
The design criteria established will be used to evaluate the behavioural interventions. In Figure 61, each design criterion is shown and the behavioural intervention that meets this criterion is marked with a V.

Requirement	Intervention 1	Intervention 2	Intervention 3	Intervention 4	Intervention 5
Must fit within one of the existing return systems already used at events	v	v	v	v Printing a symbol on each package depends on the type of tableware. It is also not desirable to print it with ink, as this reduces recyclability. Ideally, with plastic RMP, for example, you would want to apply the symbol with relief printing.	v
Must stand out and be clearly visible	v The menu board caught the eye of most people, but some had not seen it clearly. They did notice something in the corner of their eye, but thought it was clutter' standing next to the food stall.	v	The table piece did not catch everyone's eye as it was only positioned on one of the many tables throughout the market	v	v
Must be aimed at reusable meal packaging	v	v	v	v	v
Must require minimal mental effort from visitors	v	v	v	v	v
Must be understandable for Dutch and non-Dutch speaking visitors	v	v The English text on the board may need to be larger so that it stands out more for non-Dutch speakers.	v	v	v
Must raise awareness about the use of reusable meal packaging	v	v	During the pilots, people did not always realise that the message was meant to convey that the meal packaging is reusable.	v	v People understood when they got closer that it was about the value of RMP, but when walking past quickly, the message was not very clear. Most people thought, "Oh, interesting, something artistic."
Must communicate clearly about returning reusable meal packaging	v	v	v	v	People did not always grasp the message but looked at the glass display and then walked on.
Must be recognisable and intuitive for users, aligning with their existing habits	v	v	v	v	v
Must not come across as demanding	v	v	v	v	v

Figure 61. The interventions evaluated by the requirements

Evaluation - field experts

To evaluate the behavioural interventions, three different experts were consulted: a sustainability consultant for events, a caterer operating a food truck serving fries, and a project coordinator for circular business at a packaging manufacturer. Each intervention was reviewed individually, with feedback gathered based on their expertise. Their opinions, suggestions for improvement and insights are reflected in Figure 62.

Who	Intervention 1	Intervention 2	Intervention 3	Intervention 4	Intervention 5
	HERBRUIKBAAR SERVIES / LEVER JE BAKJE WEER IN	lever je servies weer in	LEVER JE HERBRUIKBARE SERVIES WEER IN / Return your reusable tableware	REUSABLE	
Project coordinator for circular business at a packaging manufacturer	**+** It is good that there is not much text on it, people are not going to read a lot of text. **+** The idea is good, as people look at the menu boards while waiting in line. **Tip** The menu board should be at least as large as the caterer's menu to ensure the message comes across more effectively. **Tip** A message is more effectively conveyed with a visual representation. **Tip** Ask caterers what they think of certain texts, as they believe the focus should be on their food rather than on the RMP.	**+** You can place it anywhere on a counter, which is quite convenient. **Tip** Ask a caterer what they think about having something like this on their counter.	**-** It is extra work to provide fresh herbs and place them on every table. Of course, it also depends on how many tables there are.	**+** The word 'reusable' is well-known in the industry. **Tip** What i's also interesting to ask people is: What can you do with reusable items?	**Tip** Where would you place this? By every waste bin?
Caterer (food truck serving fries)	**+** It is good that visitors know in advance, before they receive the RMP, that they see the menu board and understand that the RMP is reusable. **Tip** It is great if it can become part of your branding as a caterer.	**Tip** It should not take up too much space on the counter, as you are constantly busy serving food. You do not want it to be in the way and risk knocking it over.	+ He thinks visitors will really like this. **Tip** You could also place this on the counter.	**+** It is convenient, but he would not have it printed on there himself due to costs. However, if the symbol is already there, then it is just an added bonus.	**+** He likes this idea next to a waste bin.
Sustainability consultant for events	**Tip** Use the same sentences across all interventions. Ensure consistent communication.	/	/	**Tip** What process do you use to print the symbol? Using ink would reduce its recyclability. **Tip** Place this symbol on all communication boards as well. This will ensure recognition.	**Tip** It is better not to place waste bins, but only drop-off points for materials). This shows people that nothing is waste and that every material has a purpose.

Figure 62. The interventions evaluated by experts

General comment Clear and consistent communication across multiple locations is crucial for the successful introduction of a return system. Use a uniform message with minimal text to keep the information clear and accessible. Visitors appreciate reminders, so placing a communication tool with the same core message at each caterer is effective.

5.3.2 The evaluation of the framework

The framework was reviewed with the sustainability consultant for events. The improvements are listed below.

- **Improving clarity and readability:** The guidelines can be formulated more clearly and in a more organized way. Currently, some points overlap, but refer to different locations, such as the food stall or waste points, while essentially describing the same intervention. By reducing duplication and simplifying the structure, the framework will become more organized and easier to understand for users.
- **Improving structure and order**: The order of communication can be improved by arranging it chronologically according to the customer journey. Start at the entrance and ensure that the message is visible at strategic locations in the public area. Next, the communication should also be present at the food stall and, ultimately, at the waste or return points.
- **Combining similar elements**: Similar elements in the guidelines can be combined to make the message more concise and clearer. For example, the environmental benefit and a specifically mentioned sustainability advantage seem very similar and could potentially be combined.
- **Emphasizing uniform communication**: It is crucial to apply uniform communication. Using one consistent message across all communication materials ensures that visitors understand the information more quickly.
- **Placing key points at the top**: Ensure that the most important points are placed at the top of the guidelines, while less important matters, such as the sustainability benefits, are secondary and come below.
- **Clarification of terms**: Some terms, such as "uniform appearance," need further clarification, as this can be unclear for event organizers.
- **Distinguishing between deposit systems and open systems**: Provide clear instructions for deposit systems and separate guidelines for open systems, so it is clear which actions are associated with which system.
- **Providing additional clarification for certain guidelines**: Some guidelines need additional clarification. For example, for a reusable item with "reusable" printed on it, the symbol should not be printed with ink as it reduces recyclability. Instead, the symbol should be applied using relief printing.

CHAPTER 6
FINAL DESIGN

This chapter presents the final design, which consists of a package of five practically applicable behavioural interventions and a framework with guidelines. The behavioural interventions and the framework have been compiled into a guide titled: *REUSABLE MEAL PACKAGING AT OPEN EVENTS. Guidelines and effective behavioural interventions for the smooth running of sustainable packaging systems - to meet visitors' expectations and encourage reuse.* The guide is primarily intended for event organisers who wish to transition to a reusable meal packaging system and gain more insight into visitor behaviour. The aim is to provide effective behavioural interventions that will increase the return rate of reusable packaging. This chapter consolidates all research findings related to this final design.

6.1 The behaviour interventions

The final design consists of 5 behavioural interventions.The interventions are designed to be flexible and adaptable to different events.

Behavioural intervention 1

The Menu Board

People often focus their attention on menu boards at food stalls as they come to check the food offerings. When walking around a food court, visitors typically scan the menu boards to see what is available to eat. This intervention is called the Menu Board. It takes the form of a typical standing menu board at a food stall, but instead of the menu, it displays a message indicating that the meal packaging is reusable and should be returned. Since visitors naturally look at menu boards, this intervention makes optimal use of their line of sight.

The Menu Board consists of wooden panels with a plexiglass panel, allowing a reusable meal packaging to be placed behind it while remaining clearly visible. It is designed to be universally usable by caterers, as each caterer can display their own type of meal packaging. The plexiglass also functions as a whiteboard, allowing caterers to customise the menu board to match their branding. These adjustments can be made by any caterer, ensuring the menu board remains reusable for every event and can be customised to fit each caterer's unique style. The Menu Board is shown in Figure 63.
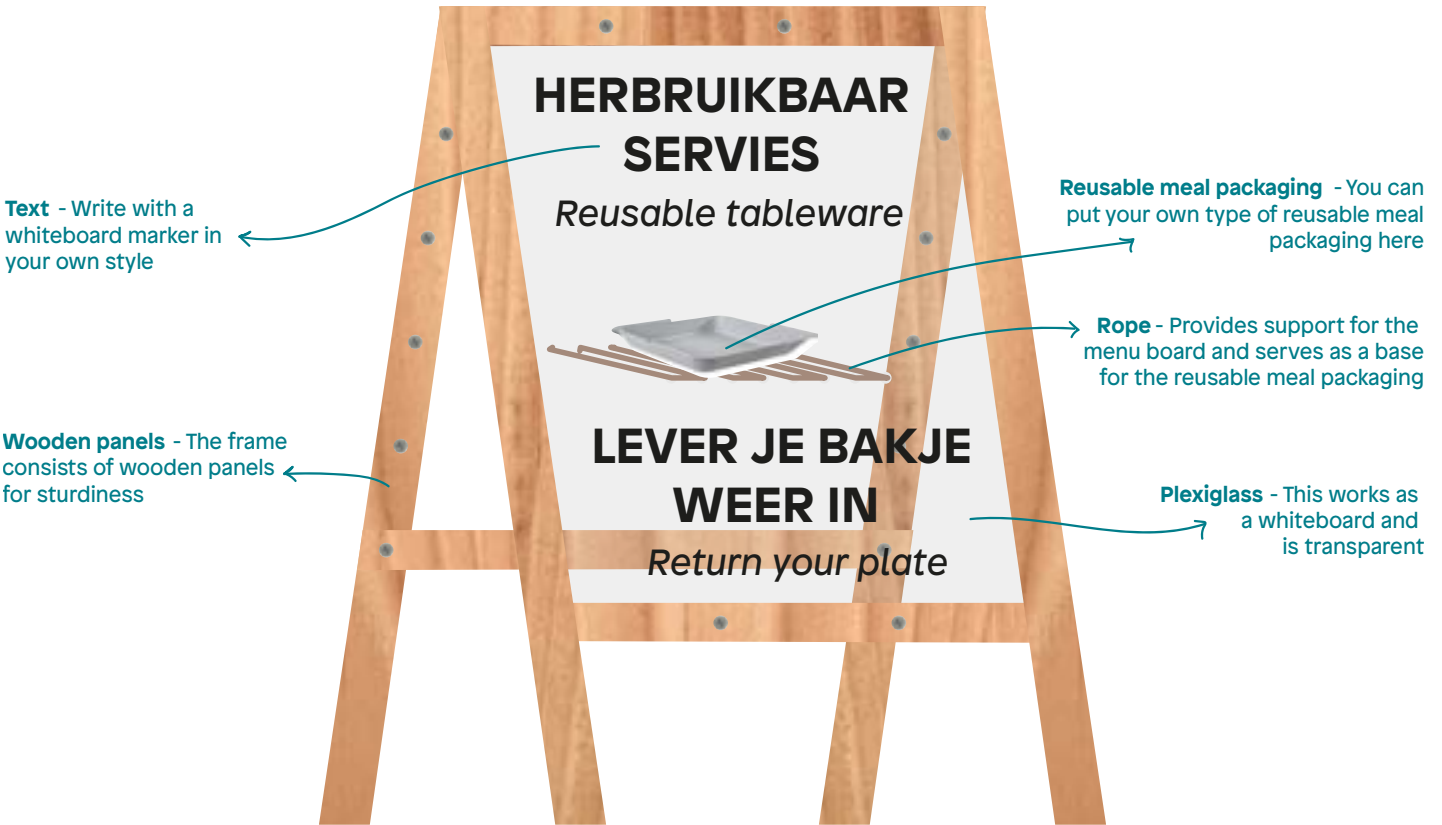
Behavioural intervention 2

The Sign Buddy

Many food stalls have counters at eye level where various elements, such as a payment terminal or a menu board, attract the attention of visitors. To leverage this, the Sign Buddy has been developed. This intervention can be strategically placed on the counter, preferably next to the menu board of the caterer or payment terminal, places where visitors naturally focus their attention while ordering at the counter. This increases the visibility and effectiveness of the intervention.

The Sign Buddy consists of a mannequin with a hanging sign. The mannequin was chosen because many visitors mentioned it would be helpful if the caterer could explain that the meal packaging is reusable when ordering food. However, caterers often don't have time to do this when it's busy or forget to mention it since their focus is on serving food. Therefore, the mannequin represents the caterer. The sign is attached to the mannequin with ropes, making it easy to detach and replace. This way, each caterer can hang their own sign that matches their branding. The sign is shaped like an arrow, and below it, the type of meal packaging can be displayed. The arrow directs attention to the packaging, so visitors know which type of packaging they need to return. The Sign Buddy is shown in Figure 64.

Text - Write with a whiteboard marker in your own style

Wooden panels - The frame consists of wooden panels for sturdiness

HERBRUIKBAAR SERVIES
Reusable tableware

LEVER JE BAKJE WEER IN
Return your plate

Reusable meal packaging - You can put your own type of reusable meal packaging here

Rope - Provides support for the menu board and serves as a base for the reusable meal packaging

Plexiglass - This works as a whiteboard and is transparent

Figure 63. The Menu Board

Mannequin - Represents the caterer

Lever dit servies weer in
Return this tableware

REUSABLE

Rope - The sign hangs on a rope

Sign - A sign in the shape of an arrow with the message

Reusable meal packaging - You can put your own type of reusable meal packaging here

Figure 64. The mannequin with a sign

Behavioural intervention 3

Fresh on your plate

A table centerpiece is an object placed on the table, typically to make the table visually appealing or to create a specific atmosphere. To leverage this, the Fresh on your plate has been developed. This centerpiece takes the form of a flower arrangement, but instead of flowers, it contains fresh herbs. Visitors can pick herbs to enrich their dish. The 'Fresh on your plate' serves as a striking decorative element that also plays a functional role: it reminds visitors that the meal packaging is reusable and should be returned, as the message is displayed on the intervention.

The Fresh on your plate consists of two wooden panels connected by hinges at the top. This allows the panels to be separated and stand upright. The panels have openings through which fresh herbs can be displayed. The roots of the herbs are placed between the two wooden panels. Since caterers can choose which fresh herbs to use, this intervention is reusable for every event and every caterer. The Fresh on your plate is shown in Figure 65-66.

Front view

Wooden panels - The wooden plates serve as frame

Text - Communicates the message

LEVER JE HERBRUIKBARE SERVIES WEER IN
Return your reusable tableware
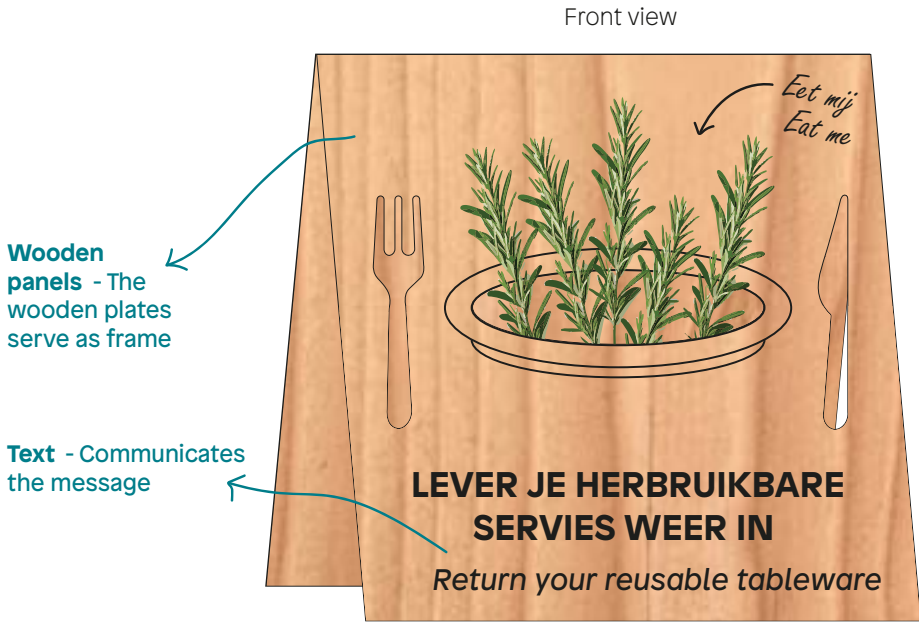
Figure 65. The Fresh on your plate (front)

Side view

Fresh herbs - You can choose which herbs you want to add

Glass of water - To keep the herbs stay fresh
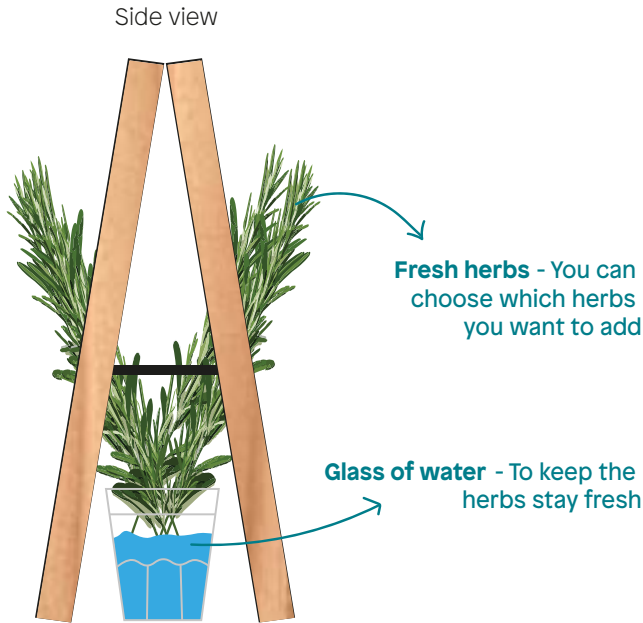
Figure 66. The Fresh on your plate (side)

Behavioural intervention 4

Reusable + return symbol

Currently there is no universal symbol for reusable meal packaging although having one would help users recognize that the meal packaging is reusable. After testing various symbols the one shown in Figure 67 was selected.

Placing this symbol on each reusable meal packaging ensures consistency making it easier for visitors to identify the reusable meal packaging regardless of the event or location. The reusable meal packaging offers space for this message allowing the instruction to be communicated directly to users without relying on additional communication channels like signs or staff.

Lever mij in
Return me

Text - In Dutch and in English

Hand - Gives a playful twist and attracts attention

REUSABLE

Reusable - This word is often used in the professional world
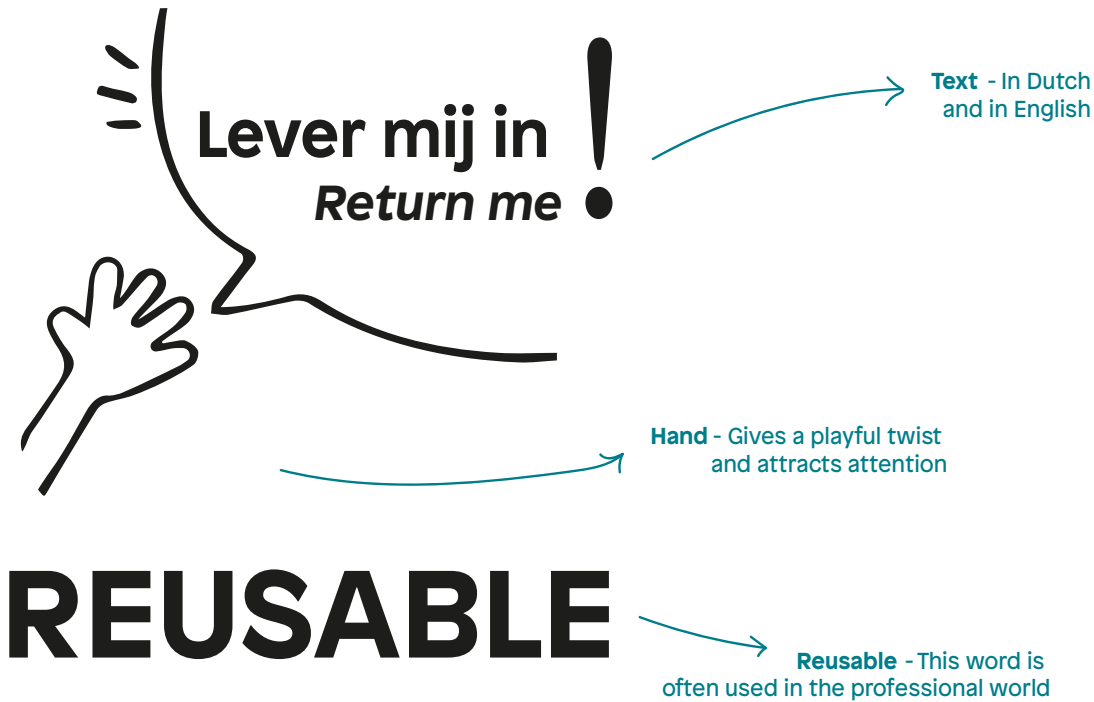
Figure 67. The 'reusable and return' symbol

Symbol placement - Place the symbol in a clearly visible location on the reusable meal packaging
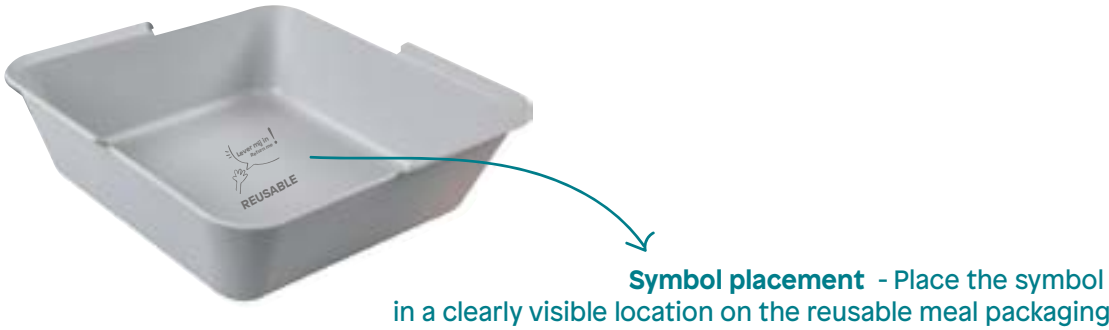
Figure 68. An example of the 'reusable and return' symbol on a meal packaging

Behavioural intervention 5

The Green Gallery

Since single-use meal packaging is still widely used at events and the transition to reusable meal packaging often involves plastic, people tend to see plastic reusable meal packaging as having no value and throw it away out of habit. However, this is not the intended behavior. To address this, the Green Gallery has been developed. The Green Gallery is a glass display case. To nudge people before they discard the reusable meal packaging in a waste bin, the display case is placed next to waste stations with the packaging inside. When visitors see this, they notice the same type of packaging in their hands and hopefully realize that the packaging they hold has value, as people tend to associate items in a display case with value. This helps change the perception of reusable meal packaging and encourages people to return it at designated points instead of throwing it away.

The Green Gallery is a display case on a pedestal. The pedestal also features a message reminding people to return the reusable meal packaging. Caterers can place their own reusable meal packaging inside the display case, making it adaptable to any event. The Green Gallery is shown in Figure 69.

Glass display case - Radiates a feeling of value

Reusable meal packaging - You can put your own type of reusable meal packaging in here

Ik ben herbruikbaar, lever mij in
I am reusable, return me

Text - In Dutch and in English

Wooden pedestal - A base on which the display case can be placed

Figure 69. The Green Gallery

6.2 The framework

The wishes and expectations of visitors at events with a reusable meal packaging system have been analysed and presented in a framework, see Figure 70 on the next page. This framework acts as a checklist with guidelines to follow when implementing such a system. It supports the system and focuses on optimising the visitor experience, making it easier and clearer for event organisers to ensure that visitors' use of the reusable meal packaging system is straightforward.

The framework will develop over time through an iterative process. It can be optimised based on experiences and pilot events, as well as monitoring results. This initial version of the framework is based on existing data from pilot programmes with reusable meal packaging, conversations with visitors and field experts, and observations during events. In the future, the framework can be further refined based on new insights and experiences.

The framework is in Dutch because the final design is intended for the province of Noord-Brabant, which communicates externally in Dutch.

6.3 The guide

The REUSABLE MEAL PACKAGING AT OPEN EVENTS guide provides practical guidelines and recommendations on visitor behaviour within a reusable meal packaging system. It includes both the intervention package and the framework. This guide serves as a practical tool for event organisers, helping them to set up the reusable meal packaging system from the visitors' perspective, taking their needs and expectations into account.
The complete guide can be found in Appendix J.

The guide consists of three parts:
• The five behavioural interventions
• The framework
• Extra tips

Explanation of my approach
A guide has been created so that the behavioural interventions and the framework are included in a separate document from this report, serving as a practical resource for those looking to implement a reusable meal packaging system at their event. So this is an add-on that I came up with at the end of this project

The guide is in Dutch because the final design is intended for the province of Noord-Brabant, which communicates externally in Dutch.

Figure 70. The framework

Bezoekersgericht framework voor herbruikbare maaltijdverpakkingen

Richtlijnen voor evenementenorganisatoren in duurzame organisaties

Bezoekersinformatie

Duidelijke communicatie
Zorg voor duidelijke en heldere communicatie door stapsgewijze instructies te geven, visuele middelen en meertalige instructies te gebruiken en duidelijke bewegwijzering te plaatsen. Zorg dat de informatie bij elk eetkraam vermeld staat. Voldoende informatie en uitleg over het inleveren van het servies zijn essentieel, omdat onvoldoende communicatie ervoor kan zorgen dat bezoekers dit niet opnemen.

Geef de uitleg over het herbruikbare servies systeem evenveel zichtbaarheid als het menu
Zorg ervoor dat informatie over het systeem net zo groot en opvallend is als het menu bij de cateraar om effectief het inleverproces eenvoudig en consistent blijft.
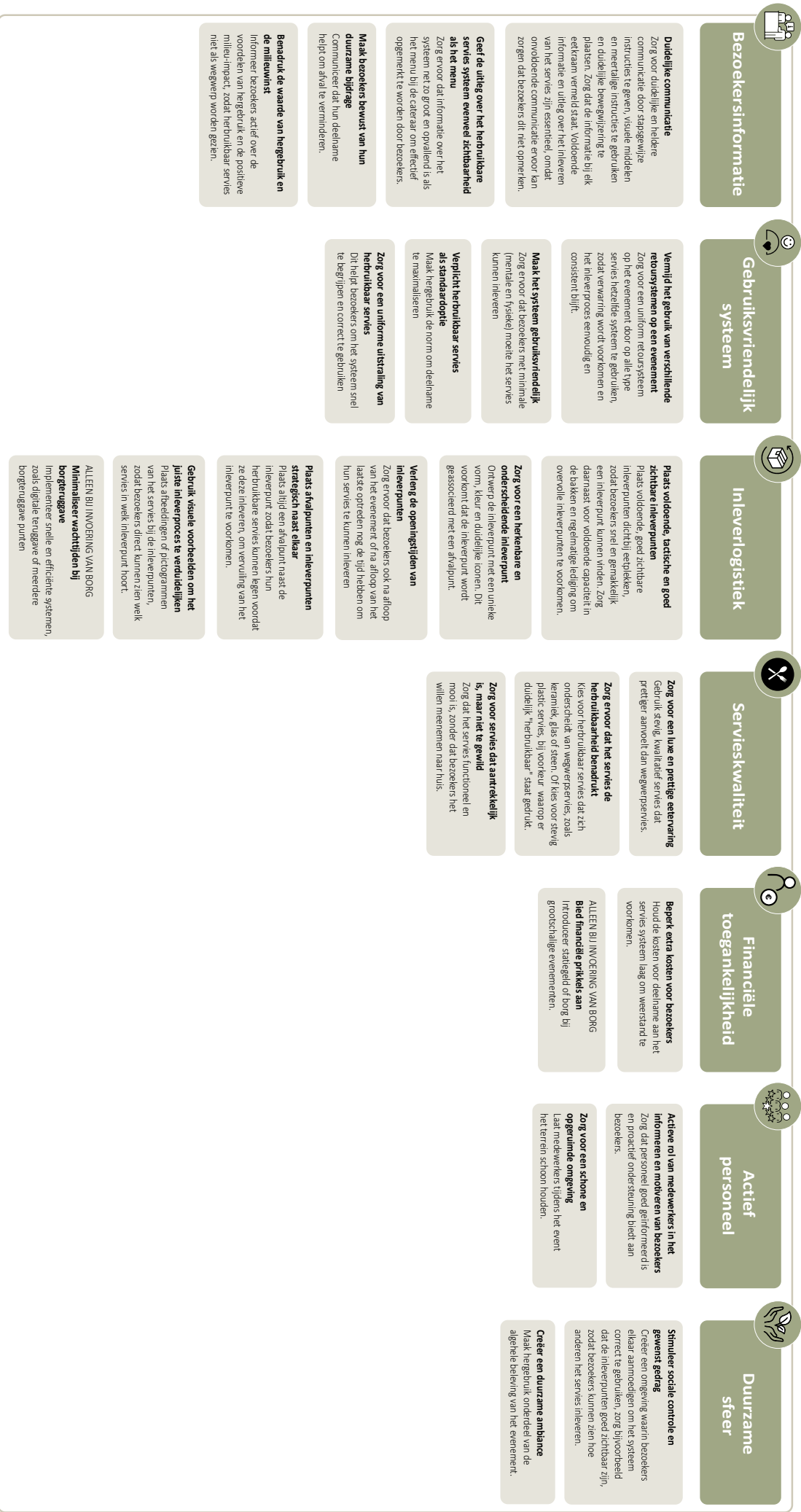
Maak bezoekers bewust van hun duurzame bijdrage
Communiceer dat afval te verminderen helpt om afval te verminderen.

Benadruk de waarde van hergebruik en de milieuwinst
Informeer bezoekers actief over de voordelen van hergebruik en de positieve milieu-impact, zodat herbruikbaar servies niet als wegwerp worden gezien.

Gebruiksvriendelijk systeem

Vermijd het gebruik van verschillende retoursystemen op een evenement
Zorg voor een uniform retoursysteem op het evenement door op alle type servies hetzelfde systeem te gebruiken, zodat bezoekers snel en gemakkelijk een inleverpunt kunnen vinden. Zorg daarnaast voor voldoende capaciteit in de bakken en regelmatige lediging om overvolle inleverpunten te voorkomen.

Maak het systeem gebruiksvriendelijk
Zorg ervoor dat bezoekers met minimale (mentale en fysieke) moeite het servies kunnen inleveren

Verplicht herbruikbaar servies als standaardoptie
Maak hergebruik de norm om deelname te maximaliseren

Zorg voor een uniforme uitstraling van herbruikbaar servies
Dit helpt bezoekers om het systeem snel te begrijpen en correct te gebruiken.

Inleverlogistiek

Plaats voldoende, tactische en goed zichtbare inleverpunten
Plaats voldoende, goed zichtbare inleverpunten dichtbij eetplekken, zodat bezoekers snel en gemakkelijk een inleverpunt kunnen vinden. Zorg daarnaast voor voldoende capaciteit in de bakken en regelmatige lediging om overvolle inleverpunten te voorkomen.

Zorg voor een herkenbare en onderscheidende inleverpunt
Ontwerp de inleverpunt met een unieke vorm, kleur en duidelijke iconen. Dit voorkomt dat de inleverpunt wordt geassocieerd met een afvalpunt.

Verleng de openingstijden van inleverpunten
Zorg ervoor dat bezoekers ook na afloop van het evenement of na afloop van het laatste optreden nog de tijd hebben om hun servies te kunnen inleveren

Plaats afvalpunten en inleverpunten strategisch naast elkaar
Plaats altijd een afvalpunt naast de inleverpunt zodat bezoekers hun herbruikbare servies kunnen langs voordat ze deze inleveren, om vervuiling van het inleverpunt te voorkomen.

Gebruik visuele voorbeelden om het juiste inleverproces te verduidelijken
Plaats afbeeldingen of pictogrammen van het servies bij de inleverpunten, zodat bezoekers direct kunnen zien welk servies in welk inleverpunt hoort.

ALLEEN BIJ INVOERING VAN BORG
Minimaliseer wachttijden bij borgteruggave
Implementeer snelle en efficiënte systemen, zoals digitale teruggave of meerdere borgteruggave punten

Servieskwaliteit

Zorg voor een luxe en prettige ervaring
Gebruik stevig, kwalitatief servies dat prettiger aanvoelt dan wegwerpservies.

Zorg ervoor dat het servies de herbruikbaarheid benadrukt
Kies voor herbruikbaar servies dat zich onderscheidt van wegwerpservies, zoals keramiek, glas of steen. Of kies voor stevig plastic servies, bij voorkeur waarop er duidelijk "Herbruikbaar" staat gedrukt.

Zorg voor servies dat aantrekkelijk is, maar het te gevoild
Zorg dat het servies functioneel en mooi is, zonder dat bezoekers het willen meenemen naar huis.

Financiële toegankelijkheid

Beperk extra kosten voor bezoekers
Houd de kosten voor deelname aan het servies systeem laag om weerstand te voorkomen.

ALLEEN BIJ INVOERING VAN BORG
Bied financiële prikkels aan
Introduceer statiegeld of borg bij grootschalige evenementen.

Actief personeel

Actieve rol van medewerkers in het informeren en motiveren van bezoekers
Zorg dat het personeel goed geïnformeerd is en proactief ondersteuning biedt aan bezoekers.

Zorg voor een schone en opgeruimde omgeving
Laat medewerkers tijdens het event het terrein schoon houden.

Duurzame sfeer

Stimuleer sociale controle en gewenst gedrag
Creëer een omgeving waarin bezoekers elkaar aanmoedigen om het systeem correct te gebruiken, zorg bijvoorbeeld dat de inleverpunten goed zichtbaar zijn, zodat bezoekers kunnen zien hoe anderen het servies inleveren.

Creëer een duurzame ambiance
Maak hergebruik onderdeel van de algehele beleving van het evenement.

6.4 Recommendations

Several recommendations have been made for the behavioural interventions. This is followed by a section on how the project can be scaled up, as expanding the reusable meal packaging system to a larger scale can increase its sustainability impact.

The behaviour interventions recommendations

- For behavioural intervention 4, it is still unclear whether packaging producers will implement the symbol on reusable meal packaging. Although the symbol has been designed and tested for clarity, further evaluation by a logo expert is necessary to ensure its professional suitability.

- Most interventions have been designed with storage and transport efficiency in mind. However, behavioural intervention 5 takes up more space than the others. A potential improvement would be to design the pedestal and display case as separate parts, allowing for flat transportation. However, this would require more setup time compared to the other interventions.

- Research has already been done on how the different behavioural interventions can be more aligned with each other. This will help create recognition among individuals, so they will understand that all these interventions are related and trigger the thought, "Oh, this is related to reusable meal packaging." Further research can be done on the visual coherence of the interventions to improve this alignment.

- Most of the interventions are made from scrap materials, and it is recommended to continue creating them using these materials. The interventions do not need to look identical, as long as the core design remains consistent. For instance, if one intervention uses slightly different coloured wood compared to another design of the same intervention, it is not a problem. Given the abundance of scrap materials in the world, it is not necessary to use new materials for the behavioural interventions.

The framework recommendations

- The framework remains in continuous development. It is flexible and can be adjusted based on new insights and experiences. It still needs to be discussed with multiple event organisers, both those who have already adopted a reusable meal packaging system and those who have not. This will help gather comprehensive feedback on its clarity, how they would like to see it structured, and whether any additional elements should be included.

The guide recommendations

- This is the first version of the guide and the information is still limited. There are certainly some valuable additions that can be made. For example, it would be useful to explain how the behavioural interventions were developed as this is unclear to the reader and the interventions may seem random. Additionally, more images could be added as visuals often communicate more effectively than words and can convey the message more clearly.

How to scale this up

This project focused on open events. The pilots were carried out at a small-scale open event, where it was shown that the behavioural interventions were effective due to the high return rate. The interventions were tested on a relatively small number of visitors. However, it remains uncertain how effective these interventions would be if implemented on a larger scale. There is interest, including from the province of Noord-Brabant, to explore how this can be scaled up for a large-scale event.

The behavioural interventions were designed with the understanding that the events sector has limited funds. This is why nudging was chosen, as it is a cost-effective and simple way to encourage visitors. Additionally, as mentioned in the recommendations for the behaviour interventions, the interventions can be made from scrap materials. Therefore, cost should not be an issue when scaling up the interventions for a large-scale event.

To scale up the behavioural interventions developed for small-scale events, several factors should be considered:

- **Creating the interventions**: For large-scale events, multiple units of each intervention are needed. This will take time to produce. Plan in advance how many units are needed for each intervention. Consider finding volunteers who enjoy DIY projects or explore partnerships with social enterprises to assist with production.

- **Visibility**: Larger events tend to have larger crowds. To ensure the interventions remain visible, consider their size. For example, make the menu board twice as large to ensure the message is still visible, even in the midst of a crowd.

- **Damage proof**: The interventions have not been tested in environments with drunk visitors. At larger events, some people may drink and engage in rowdy behaviour, which could lead to damage. Ensure the interventions are damage proof and easy to set up again if knocked over.

- **Cost considerations**: While the interventions are designed to be cost-effective, scaling up could increase costs in terms of materials, production and staff management. Evaluating the cost-effectiveness of producing larger quantities (especially with scrap materials) is necessary. However, using scrap materials and ensuring the interventions are reusable can help mitigate some costs.

- **Training and engagement**: Scaling up may require additional training for event staff and volunteers to properly manage the interventions. This could include educating staff on their purpose, maintenance and how to encourage visitor participation.

- **Data collection and feedback**: At larger events, collecting data on the effectiveness of the interventions is crucial. This helps assess environmental impact (e.g., waste reduction, return rates) and provides insights for future improvements. Consider assigning volunteers to observe how people interact with the interventions while also allowing them to enjoy the event.

Figure 71. Eating a pita falafel from a reusable meal packaging during one of the pilots
Source: Photo by author

CHAPTER 7
CONCLUSION

Conclusion

In the conducted pilots the behavioural change, initiated by the interventions, starts with raising awareness among visitors, through clear and consistent communication to inform that the renewed meal packaging is intended to be reused. Due to this increased awareness, the visitors start to handle the reusable meal packaging as intended in a more careful manner. As icing on the cake the meal packages are returned at the designated return points, instead of being thrown away or sneakily left aside.

The designed behavioural interventions evidently showed the desired effect by repeatedly realising a return rate above 90%. As stated in the design goal, the return rate of the meal packages is a key target for event organisers when initiating reusable meal packaging systems. The qualitative data from the three pilot rounds indicates that the interventions in the reusable meal packaging system, creates an intuitive environment for visitors to return the reusable meal packages. Additionally, the visitors expressed an urge and desire for other events, either open and closed, to initiate a transition to a similar reusable meal packaging system.

Overall, the proposed behavioural interventions, incorporated in the reusable meal packaging system, are simplistic, inexpensive to create and logistically straightforward to implement. This down-to-earth nature of the behavioural interventions lowers the threshold for all open event organisers to jumpstart the transition towards a reusable meal packaging system. Although the interventions are feasible for a wide range of events, the interventions are especially suitable for open events since they can be set up without additional support, such as electricity and human supervision. The created final prototypes are the perfect example of the fact that the interventions can be made from scrap materials. From now on, the event organisers' budgets will no longer be a valid reason for phasing out the stimulation of visitors' sustainable behaviour. The transition towards a reusable meal packaging system will eventually result in long-term cost savings and enable the event organisers to showcase their commitment to sustainability.

The performed desk research and contextual inquiries clarified various other barriers and complementary values of sustainable consumer behaviour in and out of the context of events. Due to the larger scope of the reusable meal packages as a system, not all takeaways could be integrally addressed in the design of the behavioural interventions for the visitor. As a result, a practical framework has been developed for the event organisers full of guidelines that accompany the behavioural interventions. This framework can act as a checklist to ensure an optimised reusable meal packaging system envisioned throughout multiple phases of the system.

The framework and the behavioural interventions are bundled in a guide that serves as a practical document for event organisers and lowers the threshold to transition towards an optimal reusable meal packaging system. This result is in line with the objectives of the Noord-Brabant province towards a circular economy. The province of Noord-Brabant is already actively promoting sustainable events, but by encouraging reusable meal packaging systems it can further strengthen the province's position as a role model of sustainable innovation.

The project provides support to the province itself in achieving the committed policy goals related to sustainability, like: reducing reliance on non-renewable fossil fuels and lowering CO_2 emissions. In conclusion, the final design offers all key stakeholders and especially the province of Noord-Brabant, the opportunity to realise both ecological and economic benefits. It has the potential to stimulate the local economy and further strengthen its position as a sustainable and innovative region. Additional improvements will always be welcome, since this may only be the starting point of a new set of sustainable behavioural patterns of visitor on open events.

CHAPTER 8
DISCUSSION

Discussion
Behavioural strategies
This research focused on nudging and aligning with existing practices as key behavioural strategies. Other strategies, such as offering financial incentives were not explored in depth, despite their potential to influence behaviour. Future research could examine how these strategies might enhance the current interventions or lead to new behavioural approaches.

Pilot execution
The pilots were conducted three times at the same event, ensuring reliable results. Testing the interventions multiple times under similar conditions with comparable outcomes confirms their effectiveness. However, the effectiveness of these interventions in different settings remains uncertain, as they were only tested within a specific event environment.

Additionally, the target group primarily consisted of environmentally conscious individuals ('green people'). As a result, the collected data reflects a limited perspective. A broader sample, including 'light-green' and 'non-green' individuals, could provide a more representative conclusion, as the event's audience does not fully reflect the diversity of visitors at open events.

Another limitation is that only one type of reusable meal packaging was tested. If the system were scaled up across an entire event, various types of reusable meal packaging would likely be introduced. This raises the question of whether visitors would still find it easy to return all types of packaging.

Furthermore, not all variables were fully controlled during the pilots. Factors such as interactions between visitors and explanations given by staff about the reusable meal packaging may have influenced the results.

Lastly, visitor sobriety played a role in the pilot. The event primarily attracted sober attendees, meaning the interventions were not tested on intoxicated visitors. Since intoxicated individuals may behave more unpredictably, no definitive conclusions can be drawn about their responses to the interventions.

Scaling up the interventions
Scaling up these interventions is desirable from a sustainability perspective, particularly for large-scale open events where a reusable meal packaging system could have a significant impact. However, behavioural interventions alone are not sufficient at such a large-scale open event. At larger events, you also have to deal with crowds and

chaos. These factors were not present during the pilots, so further research is needed to determine how well the behavioural interventions stand out in a large, busy crowd. This project focused specifically on the visitor experience and their needs on small-scale open events, while scaling up requires addressing the entire system, including logistics and cleaning, which fell outside the scope of this study.

Long-term effects
The interventions were tested over a limited period, meaning long-term effects were not assessed. It remains unclear whether the encouraged behaviour would become automatic over time. Future research could explore the sustainability of these behavioural changes in the long run.

CHAPTER 9
REFLECTION

Reflection

I started this graduation project with great enthusiasm. Along the way, I discovered that it was a true rollercoaster of ups and downs. Despite the challenges, I look back with satisfaction at everything I have learned and the inspiring people I have met. This project has only deepened my interest in the circular economy and I am pleased to be concluding this phase of my student days.

Although I began this project full of energy, I encountered a major challenge that I had to overcome:

Challenge in finding a test location

From the start, one of my personal goals was to test the interventions in practice. I wanted to create something tangible and effective, rather than just a theoretical recommendation that might never be implemented. However, I quickly realised that testing was more difficult than expected. Finding test participants was not an issue, as I am personally connected to a network of event attendees. However, securing a realistic test environment proved to be a significant challenge. I knew that the results would be highly context-dependent, so I was determined to conduct tests in a real-life setting, an open environment with a food stall using reusable meal packaging. This, however, turned out to be difficult to arrange. It was not the event season, and many food stalls had not yet switched to reusable meal packaging. I spent a lot of time searching for a suitable location, which at times led to a drop in motivation. Fortunately, persistence paid off, and I eventually found a suitable test location. In the future, I should either begin searching for a test environment earlier or be more flexible in considering alternative options.

Besides this challenge, I have certainly gained valuable lessons from this project for the future:

Testing in a real-world setting

One of the most enjoyable and educational aspects of this project was testing my intervention prototypes in a real-world setting, observing how people interacted with them. Seeing how a prototype functions in practice provides insights that cannot be gained from a theoretical model.

At the same time, this was also a challenge. I often found myself wanting to wait until everything was 'perfect' before testing, but I have learned that perfection does not really exist. In the future, I want to experiment and gather feedback more quickly so I can improve my designs earlier in the process. Every test generates a response and the sooner you test, the sooner you can adjust and refine your design for better results.

Proactively reaching out to people

I have learned how important it is to take initiative and actively approach people. Calling is often faster and more effective than emailing and sometimes it is necessary to follow up multiple times, politely, of course! I also discovered that informal contact with experts is often more accessible than expected. People with extensive knowledge are still just people; they are usually helpful and friendly, and if they do not have time, they will simply let you know. This insight has made me more confident in reaching out to others.

Inspiring encounters

Through this project, I have met many interesting people and gained valuable knowledge. Without this experience, I probably would not have connected with professionals in the circular economy. In fact, this project has strengthened my interest in this field so much that I am now actively exploring career opportunities in the sector.

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