

**Master's thesis**

**NTNU**  
Norwegian University of Science and Technology  
Faculty of Architecture and Design  
Department of Design

Muthita Torteeka

# **Integrating waste reduction features into the online food delivery service interfaces:** *A case study of Thailand*

Master's thesis in Interaction Design

Supervisor: Casper Boks

Co-supervisor: Yavuz Inal

June 2022



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Science and Technology





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**By Muthita Torteeka**

Supervisor: Casper Boks , Co-Supervisor: Yavuz Inal

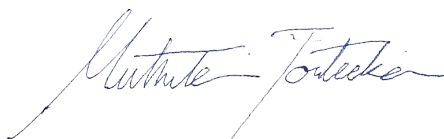


# Preface

This report is a thesis for completing the Master's degree in Interaction Design (MIXD) at the Norwegian University of Science and Technology in Gjøvik. The project planning and literature review, which are described in some parts of chapter one and two, were started in the autumn semester of 2021. The rest of the project was done in the spring semester of 2022.

Throughout my master's degree, I have learned several relevant design methods. I would like to incorporate this knowledge into my master's thesis as well as explore new methods that I have never done before. As I have personal interests in environmental issues, it was my intention to conduct design research related to sustainability. Although digital technology has great benefits, some may forget that using it can also have a negative impact on the environment. My goal was to comprehend how designers, like myself, can utilise our competence to develop a better digital solution that helps protect our planet.

This report describes the research methods, obtained data, and results. I also incorporate the illustration of people's characters that were purchased from Vector\_Art (2019) as a decoration, with the aim of making the report more enjoyable to read through. I hope that this report would be a good design research and framework for others who may be interested in the sustainable digital design topic.



Muthita Torteeka  
Gjøvik, 01.06.2022

# Acknowledgements

The completion of this master's thesis could not have been possible without the support I received from many people throughout the entire process.

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And many, many thanks to my friends back home, my friends from the international student community and MIXD classmates for their emotional support and wonderful memories. In addition, I would like to thank Lilian van den Bos for proofreading and revising.

Lastly and most importantly, I would like to thank my family, especially my brother, Napas Torteeka and my sister-in-law, Napassara Torteeka, for their involvement and support in many steps of this project from the beginning to the end.

# Abstract

In the digital age today, millions of users regularly order food delivery through mobile applications. The meals are packed in single-use containers that are used only for a short period and then thrown away. This packaging waste contributes to the increase in waste pollution. The current solution that has been used in several online food delivery service (OFDS) platforms is to add an opt-in button for cutlery. By implementing this button, the default choice is to exclude cutlery from the delivery package. Therefore, it can reduce the use of disposable cutlery and its waste.

Similarly, the goal of this master's thesis is to improve the OFDS applications interfaces that can lead to a reduction of packaging waste. The research utilised the double diamond framework combined with the user-centred design approach. The insights in this research were gathered from relevant stakeholders which are the service providers, the couriers, the expert, the restaurants, and the end-users. However, the primary users were the restaurant-user and the end-user of the OFDS application.

The study discovered the reason behind the users' environmental unfriendly behaviours and then worked towards finding a way to eliminate those barriers. The results suggested new design features that can be applied to OFDS interfaces to assist users in making eco-friendly decisions and reducing each order's packaging waste.

# Sammendrag

I dagens digitale tidsalder bestiller millioner av brukere jenvlig matlevering gjennom mobilapplikasjoner. Maten blir pakket i engangs-emballasje som kun blir brukt i en kort periode, og deretter kastet. Avfallet fra denne emballasjen bidrar til økt avfallsforurensning. Den nåværende løsningen som har blitt brukt i flere plattformer for nettbaserte matleveringstjenester har vært å legge til en knapp som gir mulighet for å kunne velge bort ekstra bestikk i bestillingen. Ved å implementere denne knappen er standardvalget å ekskludere bestikk fra leveringspakken. Derfor kan det redusere bruken av engangsbestikk og dets avfall.

Målet for denne masteroppgaven er å forbedre applikasjons-grensesnittene for den nettbaserte matleveringstjenesten som kan føre til reduksjon av emballasjeavfall. Forskningen som har blitt benyttet i denne oppgaven er rammeverket til den doble diamanten kombinert med en brukersentrert designtilnærming. Innsikten i denne forskningen ble samlet inn fra de relevante interessenter som er tjenesteleverandørene, de som bringer maten, eksperten, restaurantene og sluttbrukerne. De primære brukerne var imidlertid restaurantbrukeren og sluttbrukeren av matleverings-applikasjonen.

Studien oppdaget årsaken bak brukernes miljøvennlige adferd, og arbeidet videre for å finne en måte i eliminering av disse barrierene. Resultatene antydte nye designfunksjoner som kan brukes på matleveringstjenestens grensesnitt som hjelper brukere med å ta miljøvennlige avgjørelser og redusere emballasjeavfallet for hver eneste ordre.



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Chapter 1

# **Introduction and Background**

## 1.1 Introduction

In the era of digital disruption, it cannot be denied that people's behaviours have changed following digital services. One of which is the platform-to-customer food delivery services where mobile applications act like a middleman connecting customers with restaurants and delivery drivers. *Figure 1* illustrates how online food delivery services (OFDS) operates. These OFDS have changed the way users seek their meals ever since (Maimaiti et al., 2018). There are already plenty of online food delivery applications all over the world, and new players seem to enter the field continuously. Statista (2021) predicted that the platform-to-customer delivery worldwide revenue will reach almost 170 million dollars in 2022, which dramatically increased from 2019 by 91.5%. The number of users who are using these platforms is also growing rapidly. The number of users worldwide surged by 50% from 2019 to 2020 and is expected to reach 1200 million users in 2025.

The undeniable factor of these increments is the pandemic. People rely on these applications more than ever as in some countries it was not allowed to dine at the restaurant due to the COVID-19 regulations. For example, Thailand was under a lockdown policy from 22 March to 17 May 2020. The citizens must stay home, the mall and public places were closed and dine-in at the restaurant was not allowed. Due to this reason, the number of delivery order from OFDS were expected to grow by 30% according to The Thailand Pollution Control Department (Wongprapinkul and Vassanadumrongdee, 2021a). Although many users started using the OFDS because of COVID-19, it did not mean that these numbers will reduce after the

restrictions get lifted. Research in South Korea, Hong Kong and Thailand shows that users are likely to continue using the application afterwards (Janairo, 2021; Wongprapinkul and Vassanadumrongdee, 2021).

Although the impact of these platforms on the environment have always had raised big concerns, the sustainability issue seemed to be less prioritised after the COVID-19 hit (Janairo, 2021). The most crucial points during a pandemic are health and safety. The restaurants tend to overcompensate in order to ensure that the customers' orders are free from COVID-19. Not only do they prefer to use plastic containers, but they also wrap the cup, straws, lids, cutlery, and napkins in their own plastic bags (Sietsema, 2020). The research by Wongprapinkul and Vassanadumrongdee (2021b) found that 62% of the customers in Thailand believe that single-use plastic packaging is necessary to use during the COVID-19 pandemic. It is unimaginable how many orders are delivered in a day and how much disposable packaging is being used. Without a doubt, the food delivery service has generated a great deal of single-use plastic waste. If this waste could be reduced, the impact would be significant.

This master's thesis aimed to reduce single-use packaging waste from OFDS applications through interaction design by seeking to find a way to enhance the interfaces that can support eco-friendly behaviours. The research utilised user-centred design methods such as surveys and interviews to get an insight from relevant stakeholders and experts then used them to develop the final solutions.

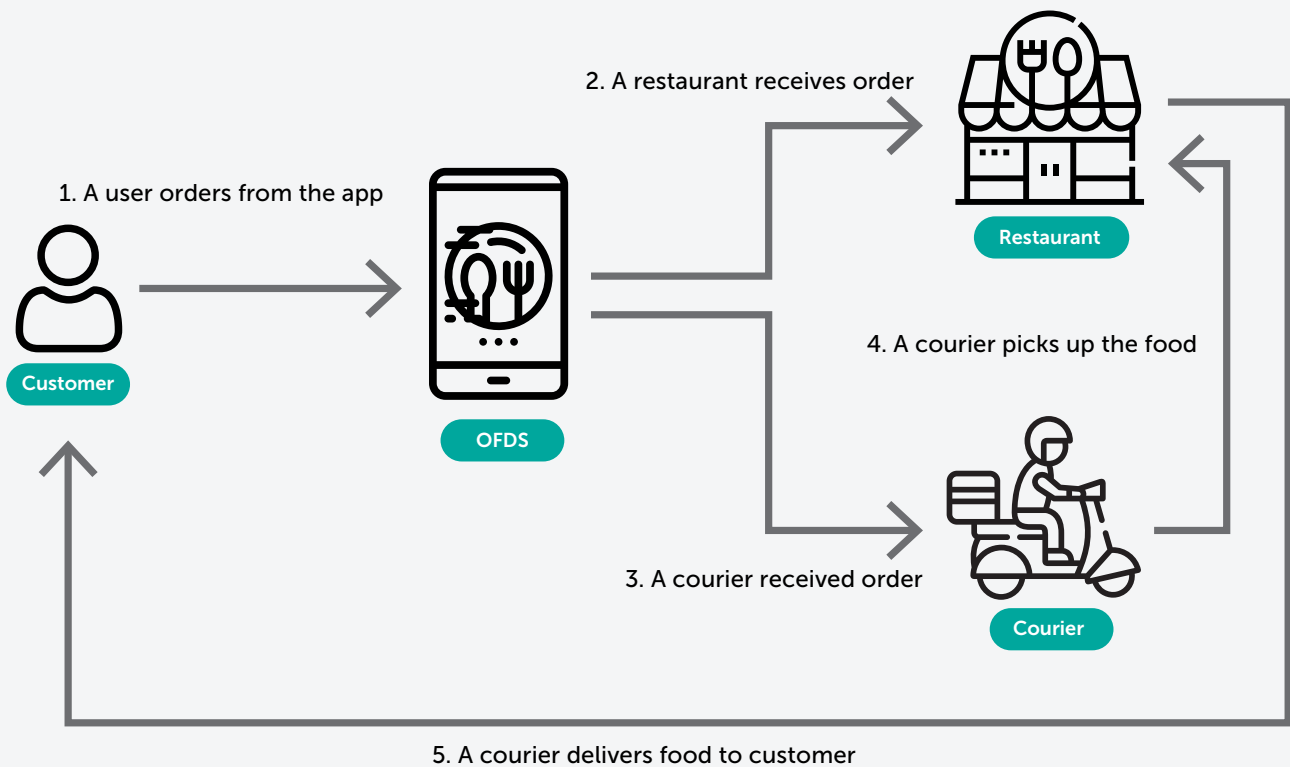


Figure 1: Online Food Delivery Service (OFDS) business model

The details of the project were described in seven chapters as followed:

- Chapter 1** Introduction and Background
- Chapter 2** Methods
- Chapter 3** Discover
- Chapter 4** Data analysis and Defining users
- Chapter 5** Ideations and Design Development
- Chapter 6** Design Selection
- Chapter 7** The Final Design and Discussion
- Chapter 8** Epilogue

## 1.2 Background and Theories

### 1.2.1 The impact of packaging from OFDS on the environment

Food containers can be made of various materials, including, but not limited to, plastic (PP, PS and PET), aluminium foil, paper, sugarcane pulp and bioplastic (PLA). As each material has different properties, they require different disposal methods. Conventional plastic is commonly used as takeout packaging as it is microwavable, heat resistant, strong, cheap, and presentable. Unfortunately, they are also usually found in marine litters (Janairo, 2021, Marsh and Bugusu, 2007). Another popular material is paper. However, to retain food, paper is usually coated with a plastic layer which is called paper plastic laminates (PPL). Even though these paper cups and paper bowls may look eco-friendly, PPL is difficult to recycle and negatively affects the environment as it can release of micro-plastic when in contact with hot water (Janairo, 2021).

The eco-friendly alternatives are biodegradable packages such as sugarcane, bagasse, and bioplastic like PLA. However, the benefit of these materials is still debatable. To biodegrade, the PLA requires high temperature-controlled and industrial facilities (Janairo, 2021). Meaning that there would not be many benefits if they are left in regular landfills or on coastlines. Whereas, the moulded sugarcane bowl may contain toxic substances that can be released into the soil (Chua, 2019).

Although some of these materials, such as plastic and aluminium, are technically recyclable, the challenge of recycling food packaging is that they are most likely contaminated with food residue. Research in

China shows that 67.2% of users do not clean or separate food waste from their packaging and are likely to throw everything together. Most of these wastes are likely to end up in landfills, or worse, in the environment due to illegal dumping (Song et al., 2018). Unlike developed countries, waste management systems in developing countries usually do not include sorting. Instead, everything is thrown away in one bin. A well-designed waste management system, the existence of recycling infrastructures and a lower growth rate of online food delivery businesses can minimise negative environmental impact (Li et al., 2020).

The expansion of OFDS generated a massive carbon footprint. The packaging waste in China increased by 700% from 0.2 m metric tons(MT) in 2015 to 1.5 MT in 2 years (Song et al., 2018). Researchers found that each delivery meal in Beijing produces 0.1185kg of solid waste with a 0.68kg CO<sub>2</sub> eq/kg Global Warming Potential (GWP) (Li et al., 2020). Meanwhile, Chu et al. (2021) claimed that each order consumes on average 2.8 plastic items which approximately weigh 54 g. While in Thailand, Wongprapinkul and Vassanadumrongdee (2021a) estimated that the number of waste from food delivery applications will increase from 1120-3080 billion pieces in 2020 to 2,325-6395 billion in 2025 which weight approximately 34,883-95928 ton. Thailand development research institute (TDRI) estimated that a single food delivery order averagely generated at least seven pieces of plastic such as containers, condiment sachets, plastic cutlery and its bag, and plastic bags (Thampanichvong and Wibulpolprasert, 2020).



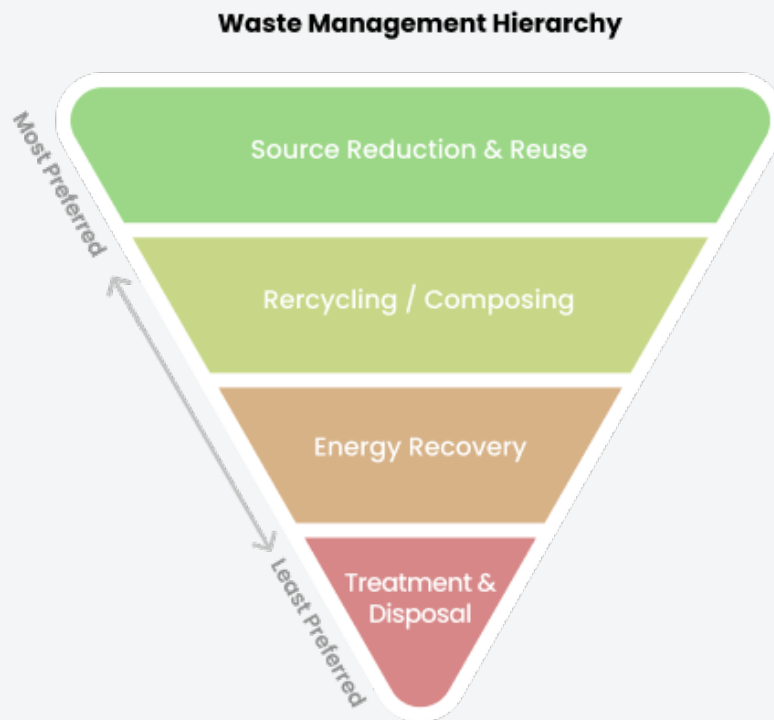


Figure 2 Waste Management Hierarchy diagram, Redrawn from (USEPA)

## 1.2.2 Waste management and prevention

The United States Environmental Protection Agency (USEPA) provided the waste management hierarchy that ranks the waste management strategies from the most environmentally preferred to the least one. The diagram appears as an upside-down pyramid illustrating the four-step waste hierarchy as shown in *Figure 2*. The top is the most desirable method which is source reduction and reuse. This is a prevention step that may include any related activities that prevent waste from being produced such as reducing packaging, redesigning products, and using fewer materials in design and manufacturing. The second step is recycling and composting where the waste is sorted and processed into new raw materials and new products. The third step is energy recovery where the non-recyclable waste was converted into usable heat, electricity, or fuel.

The least preferred method is the disposal in landfills and the treatment prior to disposals such as shredding, incineration and anaerobic digester.

Unfortunately, in Thailand, most of the municipal waste is mainly disposed of in landfills. The official waste management methods in Thailand are open dumping, sanitary landfill, secure landfills and incineration (Sillapasuwat, 2014). The report from Thailand Pollution Control Department (2021) published that the total amount of municipal waste in 2020 was reduced from the previous years due to the COVID-19 restriction. However, the portion of single-use plastic waste was increased because people had changed their behaviours to buy food and products from online platforms. The report (Thailand Pollution Control Department, 2021) also shows that, in 2020, out of 25.3 million tons of total municipality waste, only 8.36 million tons were recycled.

Thai government actively promotes the 3Rs method of reducing, reusing, and recycling. Although the citizens were encouraged to sort and recycle, waste sorting at the household level is still optional. People can still throw away their garbage in one bin. All kinds of waste whether they are plastic, paper, metal, glass or organic are collected in one garbage truck. The recycling system is mainly operated by the private sector. Those who want to recycle must find their own ways to send waste to the recycling points. They can sell the recyclable plastic to a local waste collector or a waste buyer store in their area. However, these buyers do not buy all kinds of plastic. For instance, they mostly buy plastic such as PET water bottles but not PET plastic coffee cups. The buying criteria is varied from one buyer to another which makes it difficult for people to recycle.

TDRI suggested that the residents can help reduce packaging waste from OFDS by “reducing” and “sorting”. “Reducing” refers to reducing the use of single-use items such as cutlery and straws by informing the restaurant to not provide them. “Sorting” means to sort, rinse and dry single-used packaging waste so it can be sent to the recycling drop-off points (Thampanichvong and Wibulpolprasert, 2020). In May 2020, Thailand Responsible Business Network (TRBN) has launched the campaign “Sending the plastics back home” (โครงการส่งพลาสติกกลับบ้าน) and set up nine drop-offs recycled points in the central area of Bangkok (Sitthika, 2020). The campaign accepts two types of cleaned plastic which are the “stretchy” type and the “hard” type. For instance, the stretchy plastics are plastic shopping bags, bread bags, sugar bags, etc. While the hard plastics are plastic coffee cups and plastic food containers. The non-recyclable waste can be sent to private businesses such as N15 Technology to be converted into refuse-derived fuel for cement kilns (Thampanichvong and Wibulpolprasert, 2020).



Figure 3 Recycle drop off point from “Send plastic back home” Campaign (Sitthika, 2020)

### 1.2.3 Food delivery packaging in Thailand

Unlike Norway where takeaway and delivery food packaging were mostly packed in eco-friendly packaging such as paper containers. In Thailand, many restaurants still pack their food in plastic. In January 2022, I, as the author of this research, went to Thailand to take a prior observation of the packaging received from food delivery on daily basis and compared them with what I received in Norway. *Figure 4* (top) depicts food delivery packaging in Norway, while the bottom figure depicts food delivery packaging in Thailand.

The figures make it clear that there are differences between the packaging in Thailand and Norway. For instance, the food in Norway is often delivered in a paper bag while in Thailand the food is mostly in a plastic bag. Although both paper and plastic containers are found in Norway, most are paper. Whereas in Thailand, it is common for the food to be packed in a transparent food grade plastic bag and tied with a rubber band. The dry content is likely to be separated from the liquid content. Sometimes the food was sealed in a plastic bag first before it was put into a plastic box. For some kinds of food such as noodle and rice meals, they are normally served with condiments such as fish sauce, vinegar, and chilli. It is the norm for the restaurant to provide cutlery with the takeaway and delivery food.

Norway



Thailand



Figure 4 Food packaging in Norway (Top) and food packaging in Thailand (Bottom)





Figure 5 Image of single-use packaging (Sietsema, 2020)

### 1.2.4 End users' frustrations and their attitude towards sustainability

As receiving food delivery became part of everyday life, seeing gruesome amounts of disposable plastic packaging piled up may cause distress for some customers. There are a couple of articles online expressing frustrations among customers over receiving unwanted containers and cutlery. One of which is written by Chua (2019) on Vox.com. She called the drawer where she kept all plastic cutlery and wooden chopstick “drawer of shame” and mentioned that it reminded her of all the plastic waste from the food delivery applications that she had thrown away. She believes that the cause of this is the obsession with convenience. Another article was written by Sietsema (2020) in The Washington Post. He felt that since people stayed home and ordered meals during the pandemic, the amount of plastic waste that we usually throw away and forget had piled up in our homes and had been more noticeable than ever. He metaphorically mentioned it as “The problem is literally knocking at our door. We have to answer it”.

Wongrapinkul and Vassanadumrongdee (2021b) conducted an online survey with 497 customers in Thailand and found that 72.6% of the participants agreed that plastic packaging comes with food delivery orders is way more than necessary. In addition, more than 60% of the participants usually have their own cutlery where they received delivery orders. Most of them (68.7%) also appreciate restaurants that pack food in biodegradable packaging as the restaurants are responsible for the environment. However, one-third of the participants do not understand what biodegradable means. For instance, how does it degrade? How long will it take to degrade? And is it good for the environment?

Consumers nowadays are more concerned about the environment and expect businesses to provide more sustainable packaging and despise excessive packing. They also prefer other materials such as paper over plastic (Otto et al., 2021). Research in Germany (Rhein and Schmid, 2020) categorised consumers' attitudes towards plastic packaging waste into five types of awareness which help to identify their willingness to change and to identify suitable strategies, as shown in Table 1.

Type of awareness	Willingness to change	Suggested approach
<b>Awareness of environmental pollution</b> Consumers who are concerned about waste pollution.	<b>Type A:</b> Aware of their responsibilities and willing to do more, change habits, or even pay more for sustainable alternatives. <b>Type B:</b> Believe that the waste pollution is caused by other developing countries and therefore do not see themselves as responsible and as needing to change habits.	As this group is already aware of the problem, the approach needs to be more specific and oriented towards individual responsibility by focusing on what actions they can take.
<b>Awareness of intensive use of plastic</b> Consumers who think that the current packaging can be excessive and unnecessary.	Prefer less packaging but believe that it's businesses' responsibility and that there is nothing they can do.	Providing products with less or no plastic packaging can increase the consumer's purchasing power. Businesses should reduce unnecessary packaging.
<b>Awareness of consumers' influence</b> Consumers who know they have power and can influence companies to change packaging.	Believe that change is their responsibility and that businesses only change following consumer demand.	Embrace consumers' awareness, channel it into action and maintain their motivation by, for example, giving incentives or illustrating environmental achievement associated with their actions.
<b>Awareness of consumers' powerlessness</b> Consumers who are aware of the problem but think that it is impossible to change because they have to buy anything that is available.	The current situation is their comfort zone. They do not want to change their behaviour due to laziness and inconvenience and because it's time consuming and impractical.	Raise awareness of individuals' influence and the impact of their consumption habits.  Reduce the attractiveness of plastic by increasing tax and improving alternative packaging solutions.
<b>Awareness of the need of using plastic</b> Consumers who are aware of the benefits of using plastic.	Prefer the practicality of plastic and are not willing to change their behaviours except when there are comparable substitutes.	As they probably dispose plastic correctly, their recycling efforts should be embraced.

Table 1: Five types of consumers' packaging waste awareness (Rhein and Schmid, 2020)

Therefore, to successfully convince customers to change their behaviours, different approaches for each mindset are needed. For instance, consumers who are already aware and want to do more to protect the environment may be willing to pay more for sustainable packaging. OFDS could also provide search features in their applications that would allow consumers

to look for restaurants that use environmentally friendly packaging. Consumers who are aware of their influence may be interested in the gamification approach where they can see their achievement and turn it into rewards. On top of that, OFDS could assist consumers who prefer plastic packaging with the relevant disposal information of the packaging.

### 1.2.5 Changing user behaviours through design and interface

A well thought out sustainable design can influence consumers to behave in accordance with circular economy goals which are maintenance, reuse, refurbishing and recycling (Daae et al., 2019). There are several techniques that have been used to encourage environmentally friendly behaviours, including, but not limited to, providing information, setting goals for a better future, social comparison, pledging commitments, using rewards and penalties, and giving feedback. Each technique has a different degree of effectiveness depending on the context (Froehlich et al., 2010). Designers can utilise the user-centred design approach – a method to discover users’ insight from the in-depth study of their behaviours, needs and characteristics – to shape consumers’ behaviours and improve product sustainability (Wever et al., 2008).

There are several related studies that successfully implemented eco-feedback to the design, which then resulted in changes in behaviour. For instance, Mozo-Reyes et al. (2016) tested WeRecycle smart bins with an LED eco-feedback display counting the items that went into the bin. The result showed a significant increase in recycling activities. Additionally, Fang and Sun (2016) utilised eco-visualisation to trigger emotional responses and to improve water-saving behaviour. Although these studies present how eco-feedback can be applied to tangible products, there is a possibility to apply those strategies in digital interfaces as well.

While using online platforms, consumers’ decisions can be affected by how the interface is designed. Schneider et al. (2018) stated that the digital environment can influence users’ behaviours by nudging them towards certain choices. They proposed a digital nudging





heuristic that may influence consumers' decisions. The first technique is the status quo bias, which is the set-up of default settings where users need to make binary choices or discrete choices with the help of radio buttons or drop-down menus. Users tend to prefer the default settings that are given. This is the same technique implemented in several OFDS applications where the slide button was set to no plastic cutlery by default.

The second bias is the decoy effect, where the designer presents the preferred option alongside the worse one. This would make the preferred option more attractive and make it seem more reasonable to choose. There are also other heuristics that can make a choice more desirable such as the scarcity effect where an option is presented as being available in limited quantity, the primacy and recency effect where users tend to remember the first or last option presented to them the most, and the appeals to norms which means that users' behaviours can influence other users' decisions. However, to implement these heuristics, the designer should test their effectiveness because, since they are based on the subconscious mind, they should not be too obvious or not obvious enough (Schneider et al., 2018).

In addition, Hankammer et al. (2016) suggested that mass customization can improve the sustainability of service. The interface can reduce waste by providing options to eliminate unneeded components as well as presenting the environmental impacts of the user's choices in order to prevent unsustainable choices. Digital platforms can address information gaps, especially when it comes to specific details that are often misunderstood by consumers such as how to sort mixed material packaging waste (Ramanujan et al., 2020). Additionally, Delnevo et al. (2021) suggested that gamification can be used to increase user involvement and encourage them to sort waste.

## **1.2.6 State of the art of good practices to reduce waste from OFDS**

The recent study by Janairo (2021) examined potential actions from different stakeholders that may help reduce the use of OFDS plastic packaging. The results determined that government initiatives and the OFDS providers would have the highest influence. Governments should invest in infrastructure and recycling facilities, review the relevant laws and policy and raise awareness through education and awareness campaigns. Meanwhile, OFDS can motivate restaurants to use sustainable packaging by rewarding them with financial incentives to subsidize what they spend on the packaging. OFDS have the power to negotiate with manufacturers to order large amounts of packaging at more affordable prices and distribute them among their partner restaurants.

Janairo (2021) suggested that restaurants should provide options for taking out containers for users who are willing to pay more so they can choose sustainable packaging. However, these solutions are only the suggestions from the researcher. They have not yet been checked with the restaurants or the end-users whether these suggestions are appealing and feasible.

Wongprapinkul and Vassanadumrongdee (2021b) conducted an online survey that asked OFDS customers in Thailand for their opinions on four suggested eco-friendly strategies which are A) Reducing single-use items by setting up opt-out cutlery as a default B) OFDS platforms provide affordable eco-friendly packaging to restaurant C) Implementing eco-label into an interface to differentiate restaurants that use eco-friendly packaging D) Providing service that supports reusable packaging. The results show that the most favourable strategies are eco-label and affordable eco-packaging while reusable packaging is the least desirable solution from customers' perspectives.

### o Current solution from popular OFDS platforms

Not only the end-users are concerned about waste pollution issues. Many OFDS providers, especially in Asia, currently show responsibility by adding the possibility to opt-in for cutlery into their application interfaces (Li et al., 2020), which means that the default choice is typically set to no utensils. So, users have to opt-in instead of opt-out. Grab, an OFDS based in Southeast Asia, claimed that in 2020, it reduced the use of almost 380 million disposable cutlery sets through its activities in Singapore alone (Grab, 2021). Nevertheless, there was evidence that even though the customer selects the no cutlery option, restaurants may still provide them as it is troublesome in the busy restaurant environment to distinguish whether orders include cutlery or not (Li et al., 2020).

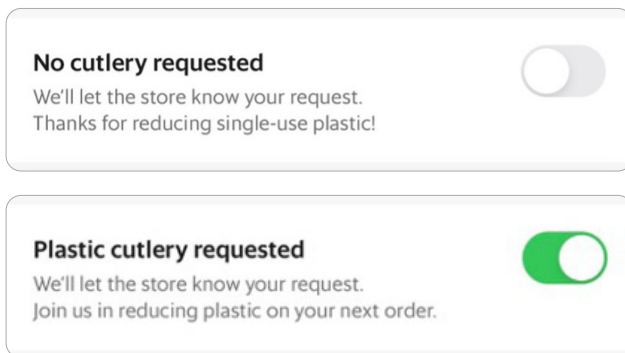


Figure 6: No cutlery requested was set as a default. Customers need to opt-in for cutlery instead.

Apart from this button that is being used on multiple platforms, each OFDS may have its own strategies to promote its sustainable responsibility and tackle the waste pollution issue. Each region may have different food cultures, packaging preferences and waste sorting behaviour. The following section discusses the selections of good practices from different OFDS around the globe. These applications below were selected among one the most used in their own geographical areas; China, Southeast Asia and Europe.

Ele.me (Pronounced as Uh-luh-muh, which means "Are you hungry?"), the popular food delivery platform in China has launched the "Blue Planet" strategy to cut down on the waste they have generated (Sietsema, 2020). One thing they did was award customers with points when they selected to opt-out of unnecessary disposable items. These points can be exchanged for a tote bag or planting a tree (Chen, 2018). Meanwhile, Meituan, another application in China, introduced the "Green Hills" plan, where they cooperated with over 100,000 partner restaurants to change their packaging to more environmentally friendly alternatives. It also funded a tree-planting project (Li et al., 2020). The Shanghai Association of Food Contact Materials and three major delivery applications started a trial of different types of packaging to align with industry standards for food delivery containers. However, the result was disappointing. Only half of the partner restaurants used the paper bowl due to its cost. As they encourage partners to use biodegradable packaging on their platform, Ele.me is also establishing a composting facility project for those containers (Chen, 2018).

Grab is an online multi-service transportation platform that also offers OFDS called Grabfood. Although its headquarter is in Singapore, they operate in eight Southeast Asian countries: Singapore, Malaysia, Cambodia, Indonesia, Myanmar, Philippines, Thailand and Vietnam (Wikipedia, 2019). After signing the NO Plastic in Nature by 2030, a Regional Plastic ACTION Platform (PACT) with the World Wildlife Fund, they have been working towards a greener eco-system with their partner restaurants and assisting them in adapting and becoming more environmentally friendly. Grab Food Malaysia introduced a new eco-friendly merchants category where restaurants that meet the sustainable criteria can join and get higher visibility in the application (Grab, 2020a, Grab, 2020b). Meanwhile, Grab Singapore has



partnered with Muuse and Barepack to integrate an external reusable container service into Grab Food (Grab, 2020c). Both Grab Food Malaysia and Grab Food Singapore also partnered with local packaging suppliers to provide affordable and sustainable packaging to their partner restaurants. However, these implementations are not available in other countries.

Delivery Hero, a German multinational online food delivery company operating on four continents in over 50 countries, recently launched a global sustainable packaging program (DeliveryHero, 2021; Wikipedia, 2020). They provide affordable and high-quality eco-friendly packaging to restaurants. The company had searched and ensured that the new material is functional, eco-friendly, free from unwanted chemicals and can be printed with natural plant-based ink. Currently, the program is piloted in eight countries but they aim to expand it worldwide (Grob, 2021). Apart from its global campaign, each local brand also has its own sustainable approach. For instance, Foodpanda Hong Kong – Foodpanda is an OFDS brand in Asia owned by Delivery Hero – collaborates with Baguio Door2Door recycling service to collect packaging waste from customers and recycle them. They also encourage users to do so by giving them the chance to win a voucher for their application (FoodPanda, 2021).



### ◉ *Alternative applications*

Several other start-ups, such as Go Box, Ozzi, Vessel and Suppli, are launching their own services to reuse food delivery containers where customers need to return the reusable container to any one of the designated sites. The service provider is responsible for collecting, cleaning and distributing the containers to restaurants. Although they may have similar systems, each of them may have slightly different business models. For instance, Go box charges users a monthly subscription of 3.95\$ for the service while Ozzi uses a token system to encourage returns. Vessel, which focuses only on reusable cups, is free to use. They only charge if the cup is not returned (Chua, 2019). Most of these applications operate in small areas in the US and partner up with a limited number of restaurants. Moreover, it's still doubtful whether such services are worth it as they may generate a bigger carbon footprint than disposable packaging through the collection, cleaning, and distribution of reusable containers.

Another related alternative mobile application, Jybe, has launched in 2020. Jybe is a review-based platform that focuses on what packaging restaurants provided. Users may take photos of their meal packages and upload them to the platform. This information can help other consumers to make better decisions and emphasize the power of the consumer. They also provide information to educate both restaurants and end-users about the sustainability and packaging materials (Ho, 2021).

Meanwhile, in Sweden, there is a start-up application named "♻Repeat". ♻Repeat website reported that even though Sweden has a high recycling rate of 85% of plastic such as PET and aluminium can, less than 15% of takeaway packaging was recycled (andrepeat.io). The report compiled by ♻Repeat and EY Nordics (Haag, 2021) depicts that people are reluctant to sort these packaging because, after all, the

purpose of ordering a takeaway is convenient. It is difficult to clean the food residue off the packaging for recycling and much easier to throw it away. Moreover, not all packaging can be recycled such as the packaging that is made off PLA and rPET. The dark colour plastics and packaging with mixed materials are also not suitable for recycling as it is difficult to sort. In addition, the main reasons people do not recycle are because there is no recycling bin nearby and there is too much food left inside which is why plastic packaging is barely sorted in the office, businesses and public places.

To motivate people to recycle more, &Repeat launched the app that co-operated with business and public places, schools and universities and add more recycling points. They also encourage recycling by using a deposit-return system. Users will get credits by scanning QR-code when they drop off single-used packaging. These credits can be redeemed as a discount with their partnered restaurants. (Haag, 2021)

Up to this point, OFDSs and related applications are putting in place multiple solutions to reduce the consumption of single-use food delivery containers. However, most of these solutions are either still in the trial period or operating only in small areas. Even though the major OFDS firms often operate in several countries, their sustainable plans only focus on where their headquarters are located or in developed countries. Although these solutions can be expanded to developing countries, there is no evidence of how effective they can be there. As developing countries may have different packaging preferences, budgets, waste sorting habits and infrastructures, and consumer perceptions, further studies of each stakeholder in those countries are needed. In addition, these solutions are mostly discussed as strategic proposals, but they do not focus on designing the interface to ensure smooth and user-friendly experiences.

## 1.3 Motivation

With a graphic designer background in the restaurant business and a regular user of OFDS for several years, I have experienced so much guilt for being part of the problem. As someone who is passionate about sustainability, I understand the frustration of receiving unwanted plastic packaging. On the other hand, as a designer, I experienced the process and limitations of packaging choices that small businesses face. I was driven by a feeling of desperation when I went to the coffee shop with my reusable cup during breaks then went back to work and ordered 50,000 disposable paper cups for my workplace, which I knew would be finished in a few months.

As I lived in three countries; Thailand, Oman, and Norway, I noticed the difference in sustainable behaviours and OFDS consumption. Developed countries like Norway have much better waste management and procurement infrastructures and a much lower demand for online food delivery services. Meanwhile, in some developing countries like Thailand, people's lifestyles rely much more on OFDS while waste management is still deficient. Therefore, the problem of waste pollution caused by OFDS in developing countries seems to be more significant.

Thus, I am interested in researching OFDS users' behaviours in order to find out how to apply the discipline of interaction design to reduce single-use packaging waste from OFDS. There were no expectations that the outcomes of this research would solve the global waste issue, but I hope that the solutions proposed in this research could lead to changes at the individual level and lead to better outcomes.

## 1.4 Scope

The research is interested in OFDSs' relevant stakeholders' behaviours and what can motivate them. As mentioned earlier, different countries may have different lifestyles and cultures, this thesis focuses on finding insights from relevant stakeholders in Bangkok, Thailand. Although in some parts of this research, such as the literature review and the state of the arts of good practices, the research expanded to the international level to discover what solutions have been done, the primary research on users' perspectives and insights were conducted with the participants in Thailand. The main users of this project are the management of the restaurants, cafés and coffee shops that open their stores on OFDS platforms and the customers who order food through OFDS applications.

All research activities that interacted with Thai participants were done in Thai. However, as this research is part of the master's programme in English, the final design solutions were suggested in English.

## 1.5 Research question and Goal

This master thesis aims to explore what else — what other design interventions — apart from the no-cutlery button can be realistic to implement in the OFDS's interfaces. Although there is no information on who invented this button, the earliest article found so far mentioned that Deliveroo launched this button in 2018 (Spencer, 2018). It has spread to multiple applications and reduced the use of single-use utensils ever since. This one simple slide button is easy to implement on any OFDS application worldwide, smoothly inserting itself into the ordering flow and successfully inducing users to reduce the use of cutlery effortlessly. Correspondingly, I believe that the solution lies more in developing the current popular application and finding out what design

improvements can have a significant impact and is applicable to any OFDS application. As they already have a large user base, it is better than creating a new application that only a few people will download.

Unlike previous research that focused mainly on suggesting broad strategies based on the researcher's opinion (Janairo, 2021) or only based on end-users viewpoints (Wongprapinkul and Vassanadumrongdee, 2021b), this research looked into the perspective of different stakeholders on either side of the service in order to find feasible solutions. The goal is to propose new design strategies for the OFDS platforms that can persuade the various stakeholders to reduce the consumption of single-use packaging. The study focused on the relevant stakeholders' insights and investigated what can influence users' decisions and change their behaviours to become more environmentally friendly. As different stakeholders may have different standpoints, it is the designer's responsibility to see where dilemmas lie in implementing options and find the logical solution that would work for the entire system. The stakeholders' insights gathered from literature, surveys and interviews were incorporated to redesign the mobile application interface.

Therefore, this master thesis wants to answer this research question; What are the factors that hinder OFDSs users to be more engaged in environmentally friendly behaviours? and how can we eliminate those barriers through user interface design and assist eco-friendly behaviours that can reduce single-use packaging waste? Rather than proposing board strategies, this study focuses on interaction design oriented solutions that can be implemented on most of the popular platforms and how they could be designed to support eco-friendly behaviours.

“

What are the factors that hinder OFDSs users to be more engaged in environmentally friendly behaviours?

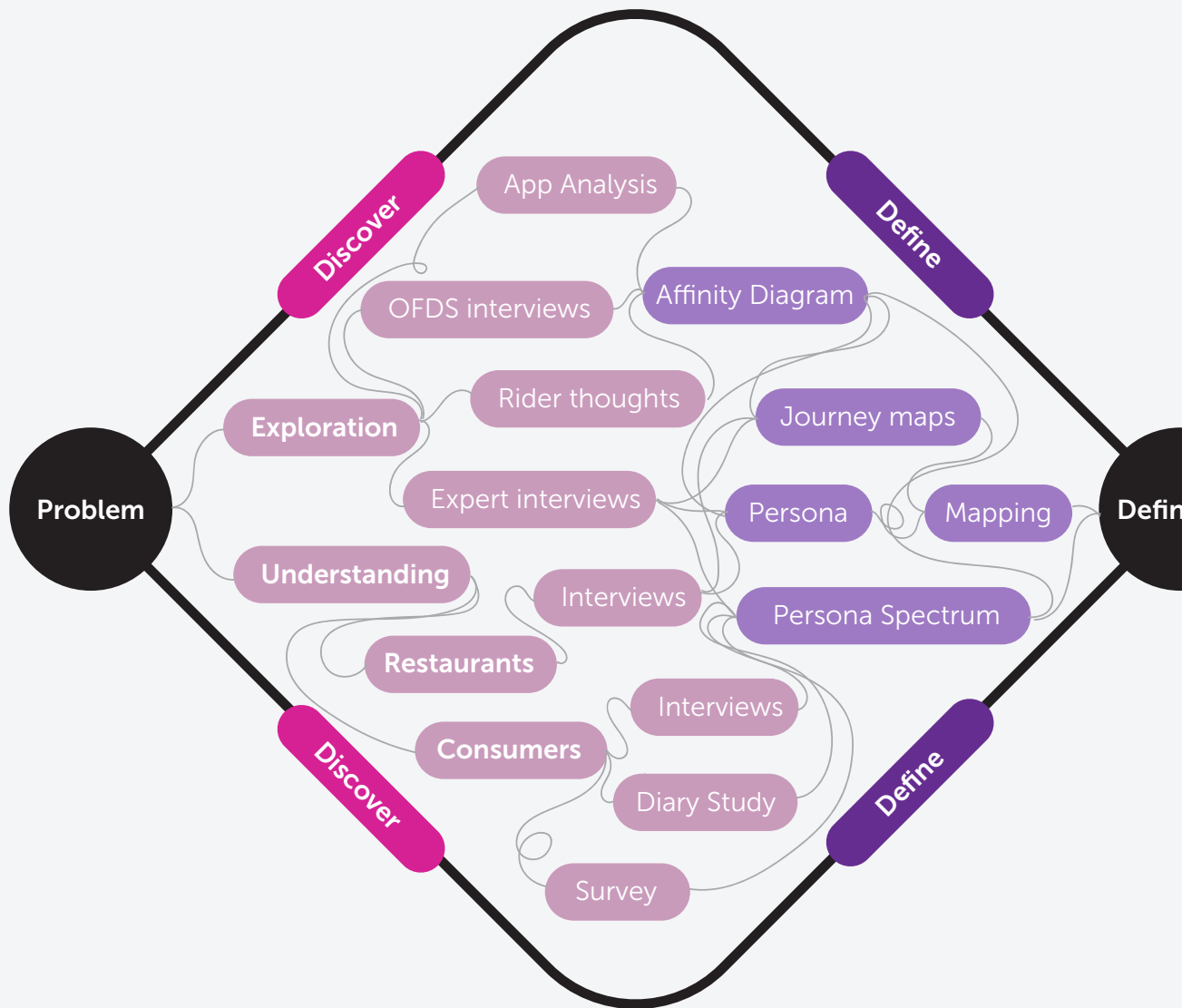
“

How can we eliminate those barriers through user interface design and assist eco-friendly behaviours that can reduce single-use packaging waste?



Chapter 2

# Methods



This chapter describes the methods that were utilised in this project. The research applied the double-diamond method combined with user-centred design principles. The focus of this research is to gather insights from the main users and relevant stakeholders and develop the final solutions based on those insights.

The double diamond design methodology is the framework by the UK design council to tackle complex problems and develop services. The process has been divided into four phases; Discover, Define, Develop and Deliver (Design-Council, 2019). The first phase, "Discover", is where the problems were explored through several user-centred design methods such as surveys, interviews, and diary studies with relevant stakeholders. Then, in the "Define"

phase, all the findings were analysed through graphic mapping methods such as affinity diagram, persona, journey map, etc. These first two phases were used to identify the accurate problem statement in accordance with each stakeholder's context. After that is the "Development" phase where the potential solutions were ideated by creating low-fidelity and high-fidelity prototypes. In the "Deliver" phase, the ideas were tested with focus group through the workshop in order to gain feedbacks and selecting the solution. Finally, the final design solutions were finalised based on the feedbacks from the workshop. All these steps were not linear and required several iterations. The project framework is shown in *Figure 7*.

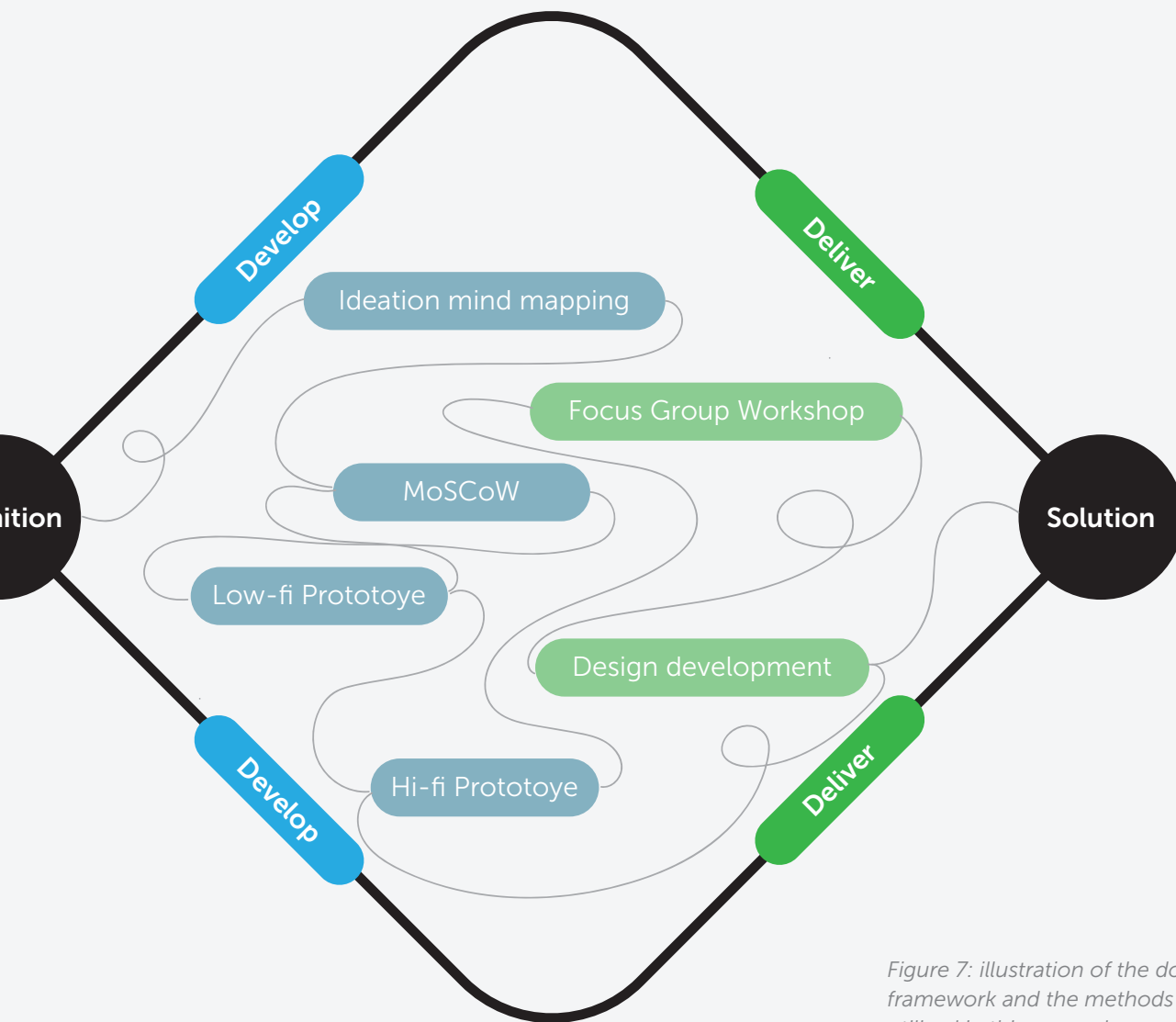


Figure 7: illustration of the double diamond framework and the methods that were utilised in this research

The outline of this chapter is as follows:

- 2.1 Discover
  - 2.1.1 Understanding the situations
  - 2.1.2 Understanding users
- 2.2 Define
- 2.3 Development
- 2.4 Delivery
- 2.5 Ethical Considerations

## 2.1 Discover

The research began with the first phase of the double diamond, “Discover”. This is the stage to understand the problem by speaking or spending time with relevant stakeholders (Design-Council, 2019). In this project, the process started with exploring the problem area and trying to understand the situation through several methods such as analysing the application flow, and reaching out to OFDS providers, riders, and the expert.

The next step is to understand the main users, which are the “end-users” and the “restaurant-users”. The end-users are the customers who order food from the OFDS application. Their insights were gathered by survey and multiple interviews. While the restaurant-users are the representative of the restaurant, café, coffee shop, or any merchant who opens their stores on the OFDS platform. The restaurant-user can be different actors who work in the restaurant which may include but are not limited to, the owner, the worker who receives the order, the one who packs the food, the cook, etc. These actors may be the same or different persons depending on each restaurant’s operation. The restaurant insights were gathered through interviews and secondary sources.

### 2.1.1 Understanding situations



#### o End-user Application Analysis

**What:** Downloaded 3 OFDS applications in Thailand which are Grabfood, Foodpanda and Lineman and observed the application structures, user flow and how they integrate sustainable strategies to their interfaces.

**Used for:** Discovering the state of the art of packaging waste reduction features that have already been done on OFDS platforms.

**Tools:** Smartphone, Grabfood app, Foodpanda app, Lineman app and FigJam web application

#### o Restaurant-user Application Analysis

**What:** Conducted contextual observation with the cafe in Bangkok by observing how they used two OFDS applications: GrabFood and Lineman, as well as how they prepared the order. The café staff were asked to perform two tasks; one was to receive the order while another task was to add a new item to the menu. The mobile screen was recorded while the staff performed the tasks.

**Used for:** Understanding the user flow and features of the restaurant-user application.

**Tools:** Smartphone, Grabfood app, Lineman app and FigJam web application

#### o Interview OFDS service provider

**What:** Interview with two OFDS providers. Although ideally, the OFDS companies that are operated in Thailand were preferred as the research subjects, unfortunately, they did not reply so the research was expanded to OFDS providers in other countries. The two companies that agreed to an interview were Foodpanda in Hong Kong and Wolt in Sweden. The questions that were prepared for the service provider interview can be found in [Appendix A.1](#). As the participants and the interviewer are living in different countries, the interviews must be done through an online platform. The participants were allowed to choose any platform that were convenient for them. The interviewee from Foodpanda preferred to have interview through online call while the interviewee from Wolt requested to answer questions through email instead. The questions were about their existing features that were found during literature reviews, what else they are doing, and their future approach towards waste pollution issues.

**Used for:** Understanding the business point of view toward sustainability and to what extent they are willing to contribute.



**Tools:** Email, Google Meet, Interview guide and Microsoft Word

### o Inquiry to couriers

**What:** The five questions inquiry were posted on the courier Facebook group which is shown in the [Appendix A.3](#). The questions were related to their perspective on eco-friendly packaging. Although the couriers are not the key stakeholders of this research, they are involved in the OFDS service system so their thought could be valuable.

**Used for:** Discovering the courier's perspective on eco-friendly packaging.

**Tools:** Facebook



### o Expert interviews

**What:** Online semi-structured interview with the founder of the campaign Maikorrib was conducted. Maikorrib is a local campaign launched in 2020 with the goal to reduce packaging waste from OFDS applications. One of the founders was contacted through Facebook messenger and was asked for an interview. The interview questions can be found in [Appendix A.2](#). The interview started with questions regarding their campaign such as their process and the problems they found during the campaign. After that were the questions about the feedback from restaurants and end-users and ended with questions about their future plans and what they think could help the campaign to be more successful.

**Used for:** Discovering the expert's experiences while they conducted a campaign with the same goal and finding out what solutions worked and what did not, what could be problems and what were the results and users' feedback from the campaign.

**Tools:** Facebook, Google Meet, Interview guide and Microsoft Word

## 2.1.2 Understanding users

### o Discover restaurant insights from a secondary source

**What:** Reviewed the online video from the Greenative channel where they interviewed the representatives of the restaurant owner, designer and the recycling facility.

**Used for:** Discovering insight from restaurants' perspectives as well as uncovering the solutions that were suggested by the experts in the relevant areas.

**Tools:** Facebook

### o Restaurant-users semi-structured interviews

**What:** Contacted three restaurants that participate in OFDS applications using the convenience sampling method and conducted semi-structured interviews. There were fixed questions for all restaurants to answer combined with open questions for further meaningful discussions. The interview questions can be found in [Appendix A.4](#). The interview began with the question about their restaurant and their operations, followed by the question about their attitude towards eco-friendly and their feedback on the solutions that were found during literature reviews.

**Used for:** Discovering what are their reasons and processes behind the selection of packaging and what can influence them to change their packaging to be more eco-friendly and what prevents them from doing so.

**Tools:** Google Meet



### o End-users survey

**What:** An online questionnaire asking general questions about end-users' experience with the OFDS application, their packaging preferences, and their attitudes towards sustainability. To find participants, the survey was promoted through Facebook ads by targeting users in Bangkok, Thailand.

**Used for:** Gathering quantitative data of end-users' attitudes towards sustainability.

**Tools:** Google form and Facebooks ads

### o *End-user semi-structured interviews*

**What:** An online semi-structured interview with five OFDS end-users who were recruited through the convenience sampling method. While doing the semi-structured interviews, the interviewees were asked closed questions combined with open-ended questions to participants (Baxter et al., 2015). The questions investigated specific contexts regarding personal experiences and opinions towards OFDS and sustainability. The prepared question list can be found in [Appendix A.5](#).

**Used for:** Obtaining in-depth user insights about their attitudes towards sustainability and what can motivate them to be more engaged in eco-friendly practices.

**Tools:** Google Meet, Interview guide and Microsoft Word.

### o *Diary study*

**What:** The diary study is a long-term qualitative survey to uncover user experiences over a period of time (Salazar, 2016). The diary study for this project was conducted with three participants over three weeks period. The participants were asked to submit their experiences by answering a series of questions through an online questionnaire when they ordered and received meals from the OFDS application. The participant had to submit the photos of the packaging they received and answer multiple choice questions and open questions about how they think the packaging can be more eco-friendly.

**Used for:** Gathering information on how the food was packed and what users think could be possible solutions to reduce packaging waste from each order.

**Tools:** Google Form and Google Drive

## 2.2 Define

After discovering more about the situations and users' insights, all the data from the discovery stage was analysed through several methods which is discussed in this section. This stage includes summarising, clustering, and mapping the insights for the purpose of identifying the precise problem area.

### o *Affinity diagram*

**What:** A diagram showing the data from interviews and surveys that were broken down into small post-it notes and grouped similar problems together (Baxter et al., 2015).

**Used for:** Identifying key insights

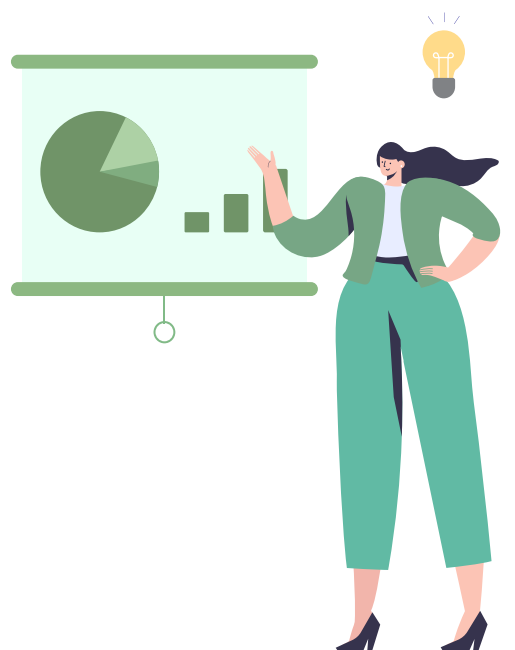
**Tools:** FigJam and Figma web application

### o *Users Journey Map*

**What:** A diagram organising key insights from an affinity diagram into a step-by-step user's journey.

**Used for:** Understanding user flow and their insight on each step.

**Tools:** Affinity diagram, User flow, Persona and Figma web application



### o *Persona*

**What:** A fictional character that was created from restaurant owners' insights that were gathered from interviews and a secondary source. Although due to a small sampling, this persona may not be representative of all restaurant owners in Bangkok. However, the character illustrates detailed information about issues that likely exist with other restaurant owners.

**Used for:** Defining restaurant users and their key insights.

**Tools:** Affinity diagram, Figma web application

### o *Persona spectrum*

**What:** A diagram defining users from their motivation instead of character (Magaret, 2018). The persona spectrum can be used when there is no consensus on the insights that were gathered from the participant's (Tsai, 2018), but their behaviours and thoughts fell into the pattern along with the range of spectrum (Roman, 2019).

**Used for:** Defining end-users and their key insights

**Tools:** Affinity diagram, Figma web application

### o *Mapping intervention points*

**What:** A mind-mapping diagram

**Used for:** Identify possible solutions and intervention points

**Tools:** Journey map Persona, Personas Spectrum, and Figma web application

### o *MoSCoW*

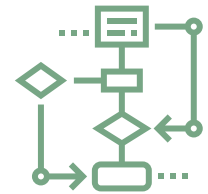
**What:** MoSCoW is a method to prioritise design requirements into four categories which are "must-have", "should-have", "could-have" and "won't-have".

**Used for:** Framing the design requirements by evaluating potential solutions and intervention points that were generated through a mind-mapping diagram.

**Tools:** Requirement mapping and Figma web application

## 2.3 Development

As the data were narrowed down into specific problems and design frameworks in the define stage, the next stage is the development stage where the solutions to those problems were ideated and deliberated.



### o *User flow*

**What:** A diagram showing a step by step of the page user visited while using the app. The design requirements that were specified using the MoSCoW method were mapped into the user flow diagram to see where they can be integrated.

**Used for:** locating on which page each potential feature can be applied.

**Tools:** Requirement mapping and diagram web application (App.diagram.net)

### o *Low fidelity sketches*

**What:** Preliminary sketches of how each idea can be applied to the interface.

**Used for:** A quick exploration of design alternatives to be used as a foundation to develop the high-fidelity prototype.

**Tools:** Pencil and papers

### o *High fidelity prototype*

**What:** A mock-up of the new design interfaces with potential improvements.

**Used for:** Applying solution that was elaborated in the requirements mapping into the OFDS mock-up interfaces and exploring the possible user interface design variations for the new solutions

**Tools:** Figma web application



## 2.4 Delivery

The design alternatives that were created as high-fidelity prototypes were tested with a focus group in order to gather users' feedback and develop the final solutions.

### o Focus group testing

**What:** A workshop with a focus group. There were four users participated in the workshop; three of them were regular customers of OFDS applications while another one was the owner of a coffee shop in Bangkok that opened the stores on OFDS applications. The details of how the workshop was designed and conducted were discussed in [Chapter 6.1](#).

**Used for:** Obtaining users' feedback

**Tools:** High fidelity prototype, FigJam web application and Google meet

### o High fidelity prototype of the final solutions

**What:** The final design suggestion of how the proposed packaging waste reduction features can be integrated into both OFDS end-users and restaurant-user interfaces.

**Used for:** Illustrating the final design solutions

**Tools:** Figma web application

## 2.5 Ethical Considerations

As the participants should feel as comfortable as possible, all of them were informed about the project and how their data would be confidentially handled either in writing (for the survey) or verbally (for interviews). The participants were treated anonymously. They were informed that they are free to withdraw at any time without penalty. For qualitative methods such as interviews and workshops, the participants were contacted in advance to describe the activities and the expected duration. They could select their available time slots as well as their preferred meeting channel. There were no audio and video recordings of the participants while performing the activities. The researcher manually took notes without noting any personal data that could be linked back to them. Participants were only generally identified in the paper using relevant descriptions such as "the restaurant owner in Bangkok".

Chapter 3

# Discover

This chapter discusses the information and insights that were gathered during the discovery phase of the double diamond. The goal is to understand the situations around the topic area and gather insights from relevant stakeholders. The data obtained from this stage was used as the foundation for designing the final solutions.

The outline of this chapter is as follows:

- 3.1 OFDS applications and how it works
- 3.2 The Interviews with OFDS provider
- 3.3 Rider thoughts
- 3.4 Expert interview with the local campaign Maikorrub
- 3.5 Restaurant-user insights
- 3.6 End-user insights
- 3.7 Diary study
- Chapter conclusion

## 3.1 OFDS applications and how it works

This section discusses the result of the OFDS applications analysis. As the restaurant-user and the end-user have their own interfaces, the analyses were divided into two sections. The objective of this analysis is to understand how the application works and the flow of the interface. The analysis also uncovered what are the eco-friendly features that have been implemented on these OFDS applications.

### 3.1.1 End-user interface

Although different applications look visually different as they have their own user interface (UI) design following their brand identities, the structure of the application and user flow are

relatively similar. Starting from the home page, it is where users start browsing for restaurants through the promotions and suggestion carousels. *Figure 8* depicts the comparison of three different OFDS applications in Thailand: Grabfood, Lineman and Foodpanda. Although the colours and design of these apps may appear to be different, they were constructed in a similar way. All three apps have the delivery address and the search bar on top on the page. Under it is the promotions section, followed by the feature carousels suggesting restaurants in the same categories such as “Popular restaurants”, “Free delivery”, “Promotions”, etc. Some of the restaurants have a promotion label over their cover image which make them stand out from others.

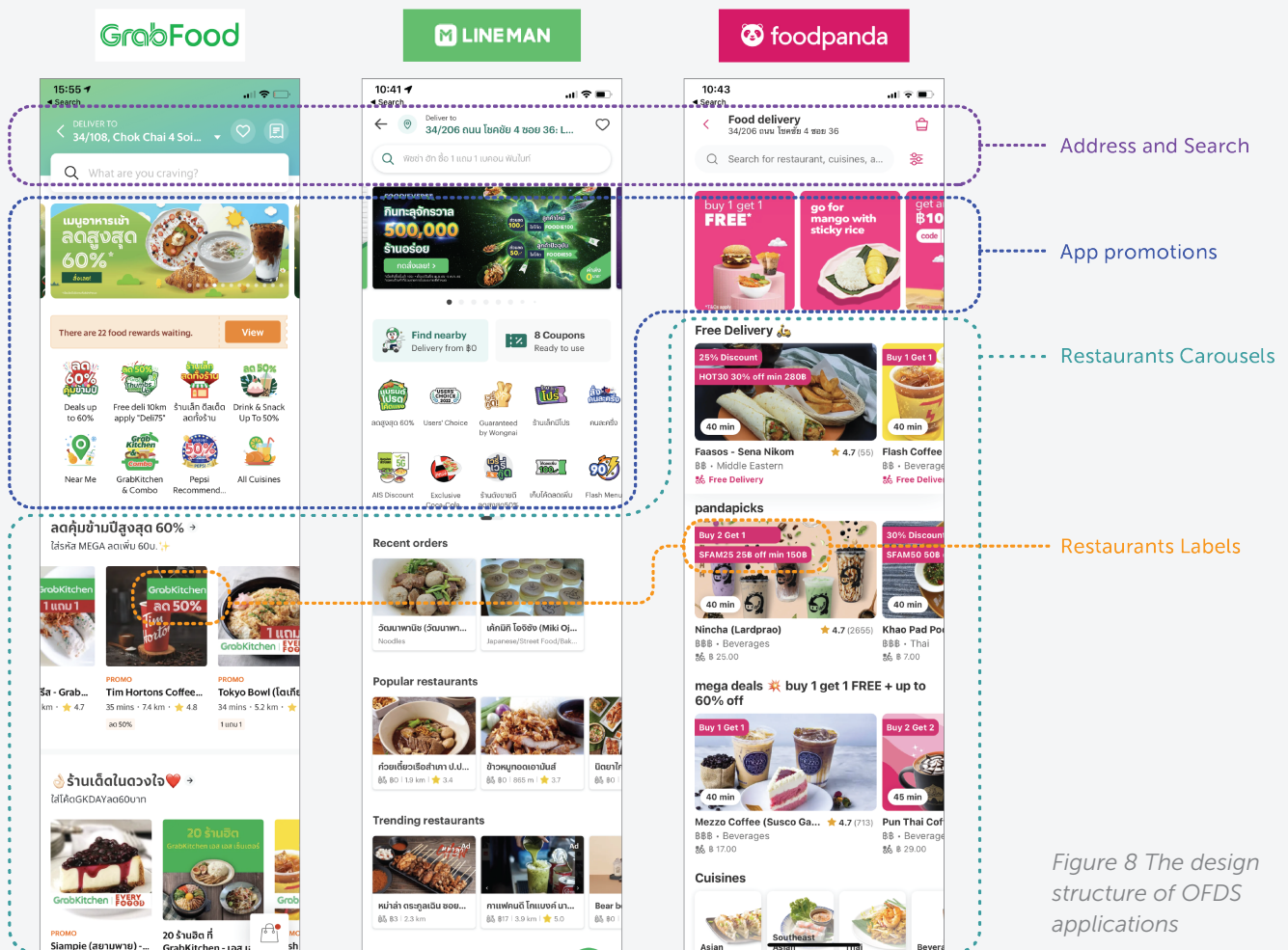


Figure 8 The design structure of OFDS applications

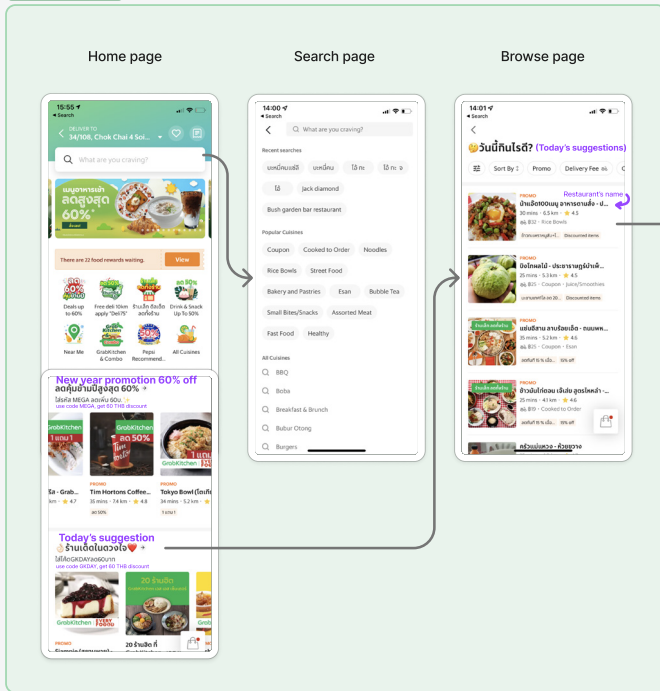
On the homepage, a user may either use the search bar or click one of the carousels to go to the “*browse page*” where it shows the list of relevant restaurants. Once the user selects the restaurant, they will be directed to the “*menu page*” where they can see restaurant information, rating and their menu a price and image. The menu is set up by the restaurant and is often divided into different categories. After selecting the item, they will see the “*product page*” where the user can customise the food through provided options or add custom note to the restaurant. After they add item to cart, they can review their order on the “*checkout page*”. This page summarises their order details including a delivery address, contact information, selected items and their

customisations, additional request, payment information and the button to request cutlery.

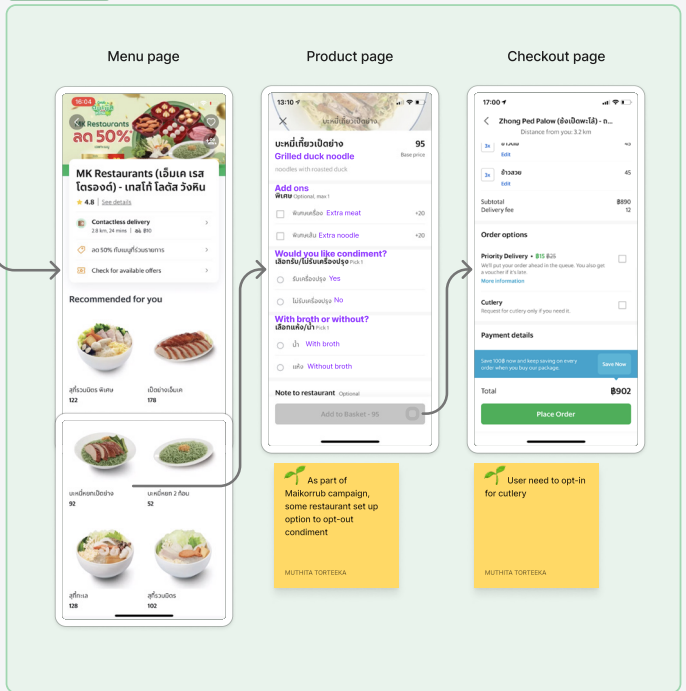
After placing the order, users can track their order whether it is being prepared in the kitchen, ready to be picked up or on the way to delivery. Once users received the meal, they will be notified to review and rate their meal. *Figure 9* illustrates the flow diagram of the GrabFood application. Although there are minor differences, the other apps have a similar flow to the GrabFood application. These similarities in the app structure and users flow suggested that the proposed solution of this thesis should be able to apply to any OFDS application with only a slight tweak in the design.



**Browse phase**



**Order phase**



**Review phase**

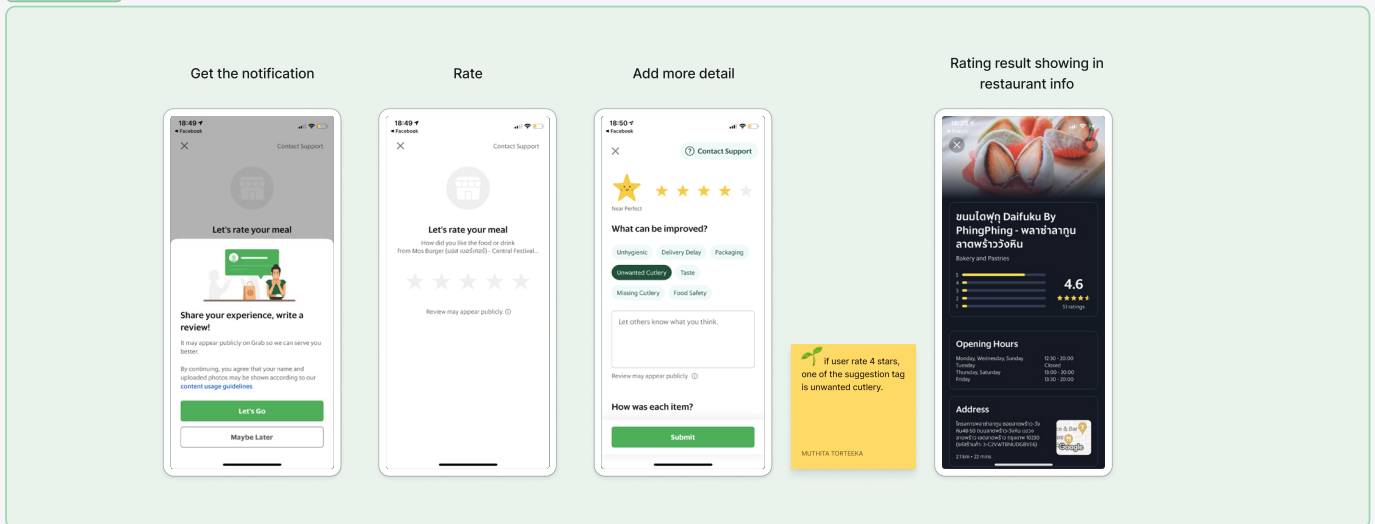


Figure 9 illustrates the user flow of how end-user place an order on OFDS application



All three applications integrated the “request for cutlery” button into their interfaces on the checkout page. Although the functionality of the button is the same, the design techniques are different. Both Grabfood and Lineman utilise the check box design. The difference is the checkbox on the Grabfood app appears unchecked with the caption “Request for cutlery only if you need it”, while on the Lineman app, the box default was checked with the caption “I prefer not to have plastic cutlery (if any)”. Meanwhile, Foodpanda utilised the toggle switch and used the caption “We will not bring cutlery, thanks for helping us”.

Regardless of what the designs are, the default of all applications is to not give the cutlery, so the user must click the button if they want cutlery. In addition, another eco-friendly option that was found on Grabfood is the suggestion on the review page to report unwanted cutlery. Interestingly, the suggestion tag only appears when the user rates a restaurant four out of five stars. This implies that the app suggested the penalty of providing unwanted cutlery as a one-star reduction.

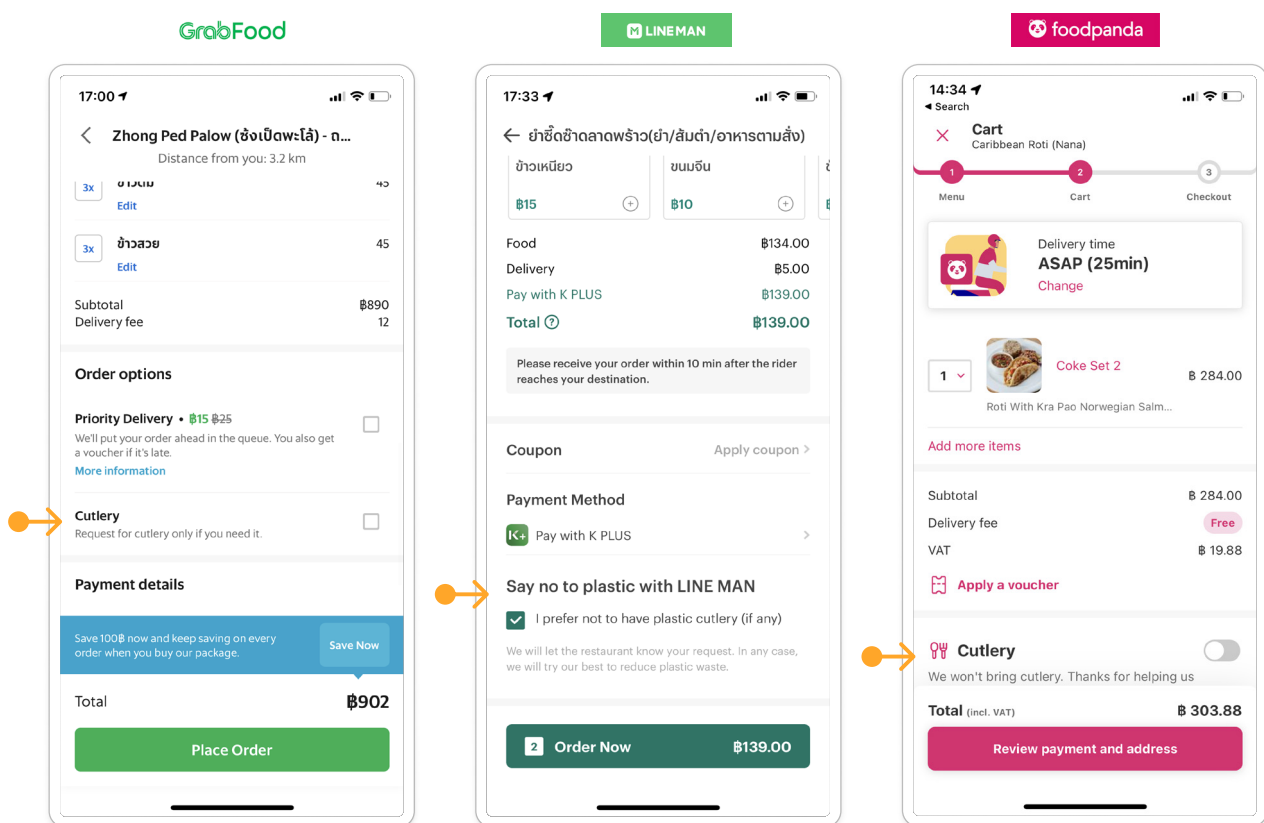


Figure 10 compares the “request for cutlery” button on three application which are Grabfood, Lineman and Foodpanda

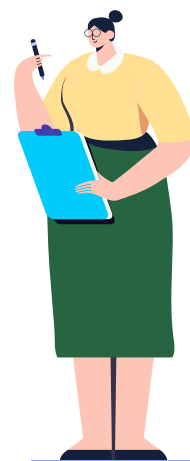
### 3.1.2 Restaurant interface

The restaurant-user has a completely different interface from the end-user. The restaurant application is more complicated as it is equipped with several functionalities such as setting up the menu, editing restaurant information, receiving orders, joining promotion campaigns, checking the review, checking total sales, and seeing data analytics. However, the two main features that are most relevant to this project are setting up the menu and receiving orders. I conducted a field study by visiting a café in Bangkok and asked for access to two OFDS applications that they are partnered with through on their phone. The two applications are Grabfood and Lineman. I then observed how these two features would work in both apps as well as how the staff interacted with the apps and prepared for the order. Similar to the end-user interface, both applications depict a similar design structure and user flow.

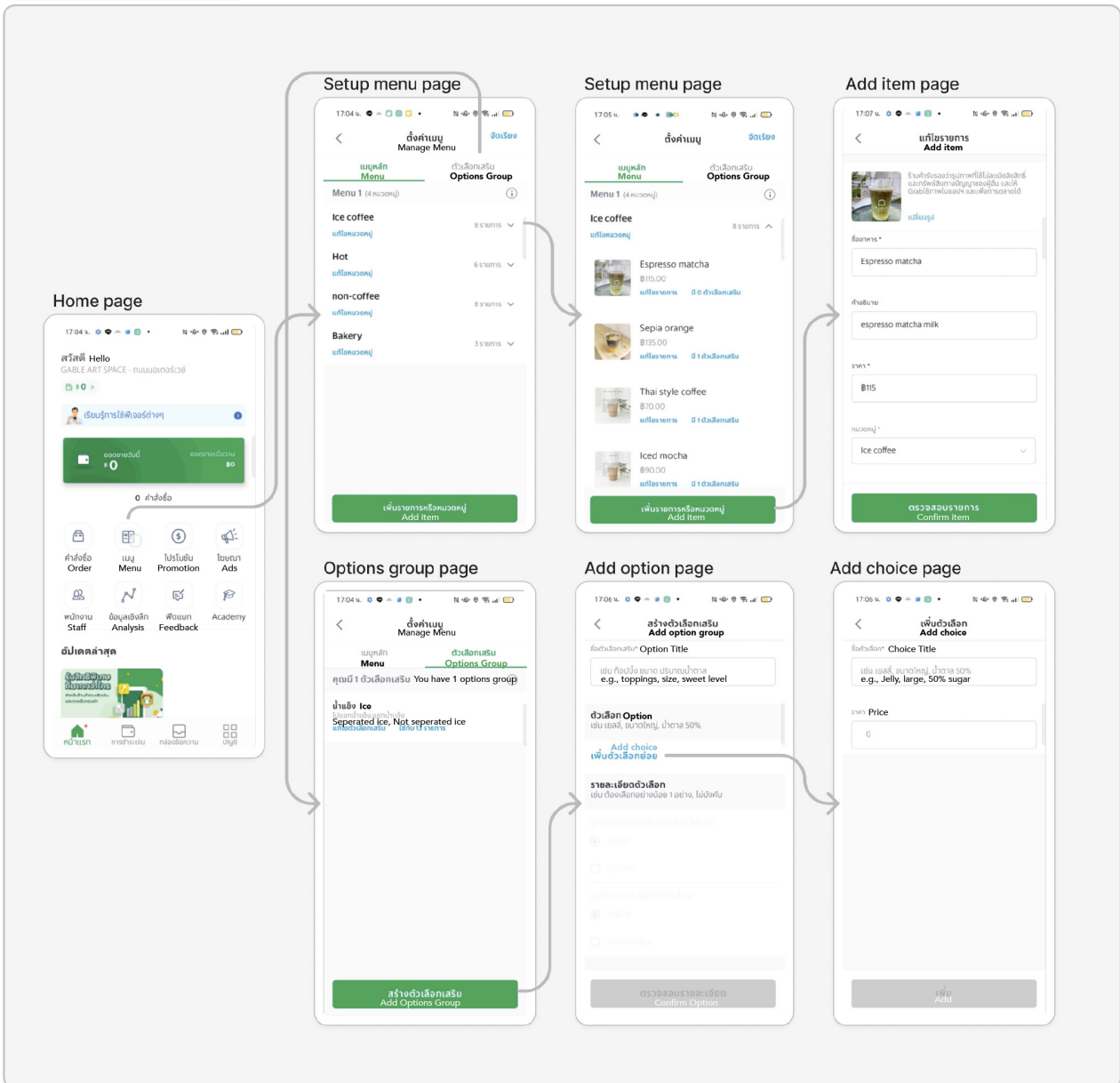
As shown in *Figure 11* (top) the steps to create a menu starts from the menu icon on the *“home page”* that directs the user to the *“setup menu page”*. On this page, there are two tabs which

are the *“menu”* and the *“option groups”*. The *“menu tab”* is where users can see the list of their items. They can also modify and add more items on this tab. While the second tab is called the *“options group”*. This is where the users can set up the customisation option of how their items can be modified. For instance, they may want to provide options for users to select the size of the meal or add toppings. These options can be set whether it is mandatory for customers to choose or not, as well as if the choices can be selected more than once.

To receive orders, the restaurant will get notifications and can check them by clicking on the order icon. On the *“order page”*, the new coming order will appear with the order code on the first tab indicating that the order is in preparation. Restaurant staff can click on each order to see items along with their customization and special requests. The *“no-cutlery”* request is highlighted on top of the order section. When the order is ready, the staff may click on the *“ready-to-deliver”* button to inform the rider. The order will then move to the ready to deliver tab.



Add new item and option



Receiving order

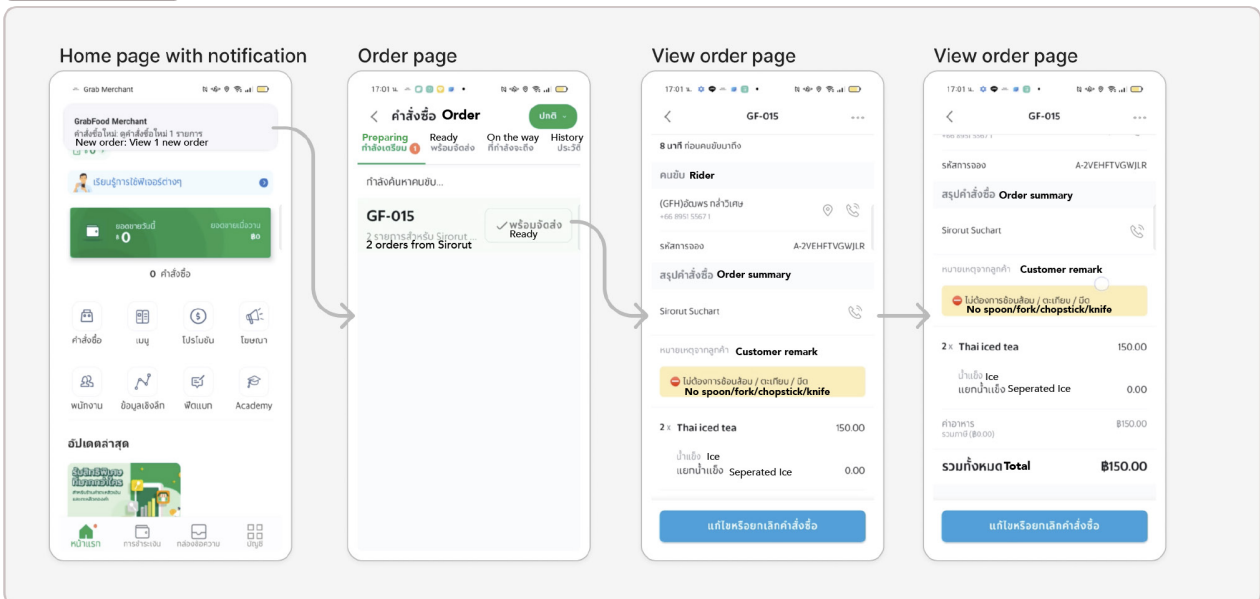


Figure 11 illustrates the user flow of how restaurant-user add new item (top) and receive order (bottom)

## 3.2 The Interviews with OFDS provider

The goal of the interview with the service providers is to understand their points of view towards waste pollution, their challenges and what are they currently working on. Ideally, OFDS offices in Thailand were preferred subjects. Unfortunately, none of them replied. However, two companies from other countries agreed for the interview. The first company is Foodpanda in Hong Kong while another one is Wolt in Sweden.

Foodpanda is the OFDS company operating in 16 countries mainly in Southeast Asia and South Asia. They also operate in Thailand. As mentioned in [Chapter 1.2.6](#), Foodpanda is owned by Delivery Hero in Germany. Hong Kong is one of the pilot countries that received the eco-friendly packaging developed by the team in Germany. The interviewee said that their restaurant partners responded very well to the packaging scheme. However, the problem is that the packaging was designed in the country with much higher waste management standards. Most of the waste in Hong Kong is still going to the landfill and there is no information on how it affects the environment so the Hong Kong office is currently developing a system that can support reusable packaging.

The challenge of the large global application company is that the process of changing the app interface consumes a large amount of time and they do not have the resources, especially the manpower to focus on the eco-friendly aspect. Currently, there are two ways of integrating eco-friendly features into the application, either the platform developed them internally or they collaborate with external companies. While

Foodpanda in Hong Kong preferred to develop internal service on their own as they believe that it gives more control and seamless user experience, other offices, such as Foodpanda in Singapore preferred to cooperate with external companies to handle additional features such as reusable or recycle services.

Another concern, that the interviewee mentioned they are currently struggling with, is the problem of “request for cutlery” buttons as restaurants do not oblige with the no cutlery request. Their current solution is that customers can report the restaurant through a web portal if they received unwanted cutlery.



**Our goal is to inspire, influence and make it possible for our partners and customers to make more sustainable decisions.**

Meanwhile, in Sweden, Wolt is actively working with its local partners to support recyclable and reusable packaging. For instance, Wolt in Norway and Germany has a partnership with Vytal to provide reusable packaging. While Wolt in Sweden has recently launched a partnership with &repeat to make it possible to recycle packaging and gives the customer credit in return.

In their views, food delivery application is not the cause of packaging waste as it would be the same amount of waste from takeaway anyway. The main cause is the growth is convenience. And even though the service provider will continue adding eco-friendly features, restaurants and users themselves have to want to reduce waste. The goal of the application is to make sure that the app has initiatives in place and make it possible for the users to participate in eco-friendly practices by supporting them and encouraging them to make more sustainable decisions.

“

I like eco-friendly packaging because it's much stronger than plastic!



### 3.3 Rider thoughts

The most common vehicle to deliver food in Bangkok is a motorcycle. Over there, the courier is called a “rider”. A “rider” is an individual who registered with the app provider to deliver the food. They work on commission, using their own equipments and are not hired by the company as employees. As their role is only to hand over the food which has little involvement with how the food is packed and sorting of waste, they are not the main stakeholder of this project. However, as they are still relevant to the OFDS service system, the small survey was conducted by asking 5 questions (as shown in [Appendix A.2](#)) on the rider Facebook group. The goal was to check their thought on eco-friendly packaging whether they resent these packaging and found it to be troublesome to deliver and would they be able to deliver the food without using plastic bags.

Interestingly, the answer from the riders indicated that they preferred paper packaging such as the paper bowl over plastic. This is because it is much stronger and not easily open as cheap plastic containers.

Although the practices may be different from one rider to another. Some of the riders mentioned that they always check how the food was packed. If they felt that the seal was not good enough and might be leaked, they would find a way to secure the package and be more careful on the road. They also mentioned that it is possible for the rider to deliver the food without a plastic bag as they usually have their own delivery bag attached to their motorcycle. But they also said that it is up to the restaurant as the restaurant owners may still want the food to be packed nicely to demonstrate the quality of their service.

As the customer can rate and review the rider, they believed that they are the one who often got blamed first when something goes wrong such as leakage of the food or missing cutlery. This is the reason why some of the rider may grab the single-used cutlery from the counter (if applicable) even though the customer opt-out of cutlery because they thought the opt-out request might be by mistake.

### 3.4 Expert interview with the local campaign Maikorrub

Maikorrub (ไม่ขอรับ) is a local campaign in Bangkok, Thailand that tried to reduce packaging waste from food delivery applications. The name "Maikorrub" can be translated into "Don't give me". The campaign was created by a group of five individuals who are passionate about the environment and received a small fund from the Thai Health Promotion Foundation to launch the campaign. They started the project by sending out questionnaires to discover what people would willing to participate in order to reduce waste packaging. After that, they narrowed it down to four main courses of action to apply to the campaign. The four solutions are A) Request for no spoon, knife, fork, or chopstick B) Request for no condiment C) Allow customer to pay extra to change to eco-friendly packaging D) Reduce excessive packaging.

After establishing the core activities that they would like to promote, the campaign team personally contacted local restaurants and asked if they would want to participate in the campaign. The restaurant could freely execute any of the solutions. They could participate in all four activities or simply choose any options that they are comfortable partaking in. According to the interviewee, not all restaurants that were contacted wanted to be part of the campaign, as some of them believed that they must provide the best to their customers. They thought that the cutlery and condiments should always be included. Despite a few resentments, they succeeded to collaborate with 10 restaurants (14 branches). The project ran for 18 days from 25 June to 12 July 2020. The restaurants who joined would receive a guideline on how to set up the options in the app so customers can opt-out cutlery and condiments. For the one who wants to provide the additional eco-packaging option, they would receive a certain amount

of free eco-packaging. These restaurants must charge an additional fee to the customer if they request eco-packaging so they will have the budget to buy their own once the stock runs out. The team also trained the restaurant on how their package could be less excessive but more efficient.

The result of the campaign exhibited that the most successful solution is the opt-out option for condiments. The use of condiments was reduced by 1600 pieces from 6 participated restaurants. The interviewee also mentioned that the restaurants were very happy about the result. They were sceptical in the beginning as they worried how the customer would react. But after the campaign, not only they received good feedback from customers, but the number of orders that opted-out of condiments was exceed the expectation. As 27.7% of the total orders selected no condiment option, it is noticeable that their cost was reduced. On the other hand, even though the results from their initial survey depict that there are substantial numbers of customers who were willing to pay more for the eco-packaging, in reality, the results of paying extra for the eco-packaging option was disappointing as there were only 67 boxes that were paid for which accounted for only 6.6% of the total order. *Figure 12* illustrates the result of Maikorrub campaign

The key takeaway from this campaign is that even though restaurants may be interested to be more eco-friendly, they lacked taking initiative on their own, owing to a lack of awareness and understanding. They did not know how they should pack the food and how to set up their online store. They were also concerned about how their customers would react if they changed the norm of always providing complimentary items such as



condiments and cutlery. Anyhow, the campaign strategies that asked restaurants to collect and submit data daily helped them realise that these customisation options worked, as the results were measurable and visible. However, even though launching a small campaign can encourage some restaurants to change their operations, the interviewee expressed concern that the impact is only in a small area. It will be more effective if the popular app providers are the ones who run the scheme. Unfortunately, when they contacted the OFDS company, although some of them seems interesting in the idea, the campaign was launched in late 2020 during the pandemic, and the company's main priority was hygiene and not sustainability.

The interviewee also mentioned that it would be impossible to get rid of plastic packaging in

the OFDS business. Eco-friendly materials such as sugar cane bagasse or paper, are not suitable for all types of food. However, what we can do is to focus on how to reduce the use of these single-use packaging as much as possible. Although the solution of training restaurants how to pack may help, it would be challenging if the scale of the campaign is larger. As this solution required the expert to assess each restaurant on how they pack each meal and suggest how it can be better. Nonetheless, after the campaign ended, even until now, there are still new restaurants that contacted them asking to join the campaign and asked for suggestions on how they can be more eco-friendly. This indicates that restaurants need support and are interested to participate in the eco-friendly campaign.



Figure 12 The results of Maikorrub Campaign (Path, 2020)

## 3.5 Restaurant-user insights

Restaurant-user insights were gathered by two methods; the first one was by reviewing a secondary source which is an online video discussing the OFDS waste reduction topic and the second one was a semi-structured interviews with the owners of the restaurant, café and coffee shop in Bangkok. Although the insights were obtained from the owners, the restaurant-user includes different actors who work in the restaurant such as the worker who receives the order, the cook, the person who packs the food, etc. The results from both methods were discussed below.

### 3.5.1 Greenative talk

Greenative is an online channel on YouTube and Facebook promoting eco-friendly creative ideas and business. In November 2021, they organised a talk interviewing the representative of the restaurant owner, the designer and the owner of the recycling plant on the topic: "Ideas against food delivery waste overflowing the city" (ไอเดียสู้ปัญหาคูหา 'ขยะ Food Delivery' ล้นเมือง). The show discussed several topics such as the reasons why restaurants overly packed their food with many layers of plastic, the effect of the pandemic, and how to reduce the waste from food delivery applications.

From a restaurant's perspective, the reasons behind excessive packaging are because of low quality and availability of the packaging in the market. The restaurants mostly purchased their packaging from online websites or local suppliers. It appears that cheap and low-quality packaging is much easier to find compared to good quality or eco-friendly ones, probably because of its popularity. The restaurants were unable to test the quality of the packaging before purchasing and learnt later when customers complained that the lid was not sealed properly

and leaked during delivery. To solve this issue, they had to add more layers to the packaging, whether wrapping the container with plastic film or putting the food in a bag before putting it in the box. Another uncontrollable factor was the attention of the staff who pack the food. Not everyone took good care and made sure that the lid was sealed properly, especially during busy hours. So, the management rather solved the problem by using tape to seal the lid. The tape could also be printed with their logo which increases awareness of the brand.

Moreover, the other issue is the expectation of the customer. The packed meal needs to present the value of the food and the packaging should represent the image of the brand. For instance, the restaurant owner in the interview owns hot pot restaurants where he sells different kinds of fresh meat along with broth and vegetables. The customers have to boil them together in the hot pot. When he tried to reduce the packaging by packing the meat together in one box, some customers complained that the portion seemed to be smaller, and the meal was not worth the money, even though it was the same portion of food as when he packed different meat in the separated boxes. However, when he changed back to separated boxes, he also received the comment that there were too much packaging and plastic. He considered changing to eco-friendly packaging a few years ago but when the pandemic hit, the packaging turned to be part of the cost of every order and became the main expense. The eco-packaging would double the cost of normal packaging which he could not afford. He also mentioned the problem of the "request for cutlery" button that customers who wanted cutlery did not notice that it was automatically opt-out, so they complained when they did not receive it.





Figure 13 The packaging from the hot pot restaurant that each meat was packed separately. (Penguinatshabu, 2021)

The talk also discussed a good example of a healthy food delivery brand, Slim delivery. In the beginning, they packed their food in sealed plastic bags but received complaints that the package is not ready to eat. So, they inserted the sealed bags in a large plastic box. Even though some customers were happy with this solution, some were not as they said the empty boxes took up so many spaces in their homes. The brand then added the option of asking whether customers need the box for their order or not. The person who did not want the box would receive a small incentive, such as a discount for the next order or premium gifts. This solution helped reduce a lot of plastic as the results show that 30-40% of the order did not want the box.

The restaurant owner agreed that this is a great idea to reduce waste as it is simple and feasible. The problem right now would be that many restaurants will not be able to come up with this solution on their own as they are busy with their day-to-day operations. There should be a campaign suggesting how they can add these options in the app or show a successful case, like slim delivery, in order to encourage restaurants to take action. He believed that

many restaurants would love to join as it helps add value to the brand while reducing their costs. The most important thing is that it needs to be easy to implement e.g., simply adding options in the app to change how the food is packed.

Regarding the recycling matter, one issue with recycling food packaging is that some types of plastics are difficult to recycle since some local recycling stores refuse to take them, even though they are technically recyclable. For instance, most of the local plants would take PET water bottles but not PET coffee cups. Only a small number of businesses receive and recycle these unwanted plastics. As a result, those who are passionate about properly separating garbage and recycling might go over the top to recycle their waste. Not only they would clean and dry every piece of plastic before sending it for recycling, but they also made unreasonable choices such as shipping the box of plastic waste by mail from the south of Thailand to a receiver in Bangkok. To solve this issue, the show suggested that restaurants can be the local drop-off point and share the profits of selling recyclable plastic among the staff.



Figure 14 Slim delivery packaging (Yindeedesign.com, 2020)

### 3.5.2 Restaurant Interviews

The semi-structured interviews were conducted with three participants who are the owner of the restaurant, cafés, and coffee shops in Bangkok. The outcomes of the interviews were divided into two parts. The first one is about their perspective towards sustainability and their choices of packaging. While another one is about their willingness to participate in the eco-friendly practices and motivation.

#### o *Restaurant perspective toward sustainability and their choice of packaging*

The results from semi-structured interviews with three restaurants were mostly aligned with the insights from the Greenative talk. All three restaurant owners show interest in sustainability. One of them is more passionate than the others as she is the only one who invested in eco-friendly packaging materials such as sugarcane bagasse and biodegradable plastic cups. Another two participants mentioned that they checked for eco-friendly packaging options, but in the end, the decision lay more on their budget, functionality and the presentation of the food. The eco-packaging such as sugar cane bagasse and biodegradable plastic cups were more expensive than the normal ones which were over their budget. However, the preference for the packaging is subjective. While one participant thought that paper packaging looks more premium, another felt that a paper box seems less luxurious compared to a hard premium plastic box.

From restaurants' point of view, they are not only serving the food, but they are serving experience. In a physical store, they can communicate their value through interior design and services, but for a delivery meal, the packaging is the most significant component to represent their brand image. They need to make sure that customers are satisfied with the value of the products, receive everything

they need and enjoy the meals throughout the whole journey. In addition, the packaging should be compatible with various dishes on their menu so they do not have to stock many types of packaging which can increase their cost and take up storage spaces. The choice of packaging also depends on the availability of the packaging from their local suppliers. Two of them purchased their packaging from local stores nearby and another one purchased them online. They usually rely on the information provided by their suppliers regarding the material whether the plastic is biodegradable or not. However, they did not know the specific detail such as type of plastic or how to sort it after use. They were more concerned about the appearance of the packaging. For instance, the plastic should be transparent and strong to make the food look appealing.

Although paper packaging was preferred over other materials for all participants, some items such as dressings and dipping sauces still needed to be packed in plastic containers as there was no other alternative available.

Even though the participants could not afford eco-friendly packaging, they tried to be more eco-friendly in their own way to the extent they were comfortable with. For instance, one participant reported to print the logo on a sticker instead of direct printing on the PET cups as he believed that it was easier to recycle as they were removable. He also mentioned that sometimes the regular customer asked him to not attach the sticker at all as they already know his brand. Although the biodegradable cup was over budget, he purchased biodegradable plastic for the items that he could afford such as bags and straws instead.

The other participant mentioned that she changed the wasabi packaging from a small plastic box to a small Ziplock bag instead as she thought the bag has less plastic. These solutions

were based on their assumptions and may or may not be aligned with scientific facts. One participant also said that it was difficult to know what the best eco-friendly options would be. He tried to search briefly but was still uncertain what was right. For instance, is biodegradable plastic good? Is a paper bag better than a bio-bag? What type of plastic cup (e.g., PP, PET or PLA) is the most eco-friendly option in Thailand waste management context?

One participant said that his coffee shop is currently providing three packaging options for his iced beverages. The first option is “ready to drink” which is served in a PET plastic cup with a lid. The second option is “separated ice”, in which the ice is packed separately in a Ziplock bag while the coffee is in the plastic cup. And the last option is “in the bottle” where the drink is filled in a plastic bottle without ice. The customer who orders the “in the bottle” option will get a small discount. The discount only applies for the users who order on the Lineman application as other applications do not provide a price reduction feature. For the customer who visited the physical store, he also tried to provide the option of serving the drink in a reusable glass bottle so customers can return the bottle and get a discount however he said there were not many customers who were interested in this option.

Two participants reported that their restaurant always provide wooden cutlery or chopstick to every order, even though the cutlery was opt-out. They believed that the request for no cutlery could be by accident. There were cases when they did not provide the cutlery and received bad reviews. The ratings that show in the app are very important to them because it is an important factor in how customers select their restaurant over other competitors. They have to follow the convention of providing everything and making the delivery meal ready to eat. There is a common belief in the service

industry that there is no harm in giving more but they should not give less than what customers expect. They also felt that the wooden cutlery is not harmful to the environment as much as plastic cutlery.

### ○ *Their wiliness to participate and motivation*

The suggested waste reduction solutions from literature reviews, such as changing packaging to eco-pack, getting support from the app providers and adding customisation options to their menu, were presented to the participants. They were asked for their thoughts and feedback about these solutions. Two of them said they would change their packaging to be more eco-friendly if the business made more profit but now, especially during the COVID-19 pandemic, it was not an option. However, if the OFDS providers supply them with affordable packaging they would be very interested to change. They were also interested if the app could promote restaurants that use eco-friendly materials or provide them with some intensive such as a lower commission or more visibility.

When asked about the solution that the restaurant provided two packaging options and let customers be the one who pays more for eco-friendly packaging, they did not quite agree. One participant said that even if the customer pays for the packaging, it is still a risk for the restaurant to buy two types of packaging as they need to invest in both in advance. It will also take up storage spaces. However, they like the idea of providing options that allow customers to customise how the food is packed. One informant said that it is difficult for them to guess what customers actually prefer, by doing it this way they can learn from the data and feedback about how customers actually like their meal to be packed. However, they do not like the idea that the customer needs to pay more if they request items that

should be free of charge such as boxes, bags, condiments and cutlery. One participant said that normally it is the restaurant's responsibility to provide these items so the customer should not get a penalty because they care less about the environment as it might paint a bad image of the brand. On the other hand, they would prefer a positive approach by providing a discount for the customers who do not want these items instead.

The challenge is the hesitation of making changes against the norm. One participant mentioned that it would be easier for her to initiate the change together with other restaurants as a group or as a campaign. The campaign would help them communicate with customers and promote their thought and reasons behind the changes so the customer understands that these actions or options are to promote sustainability and not because they are being cheap. It is also not easy to know how to set up these customisation options, not in terms of the usability of the application but more of the content itself. For example, what should be the title, what options should they provide, and how should they word the sentence. The participant who currently provided these customisation options in his coffee shop said that it took a year for him to develop how he wrote these options so the customer could understand what he means.

Interestingly, when asked interviewee why they do not put the option of opt-out for straws or cutlery in their menu, the answer was that they never thought about it. One of them even said that he liked the idea and would add it after this interview. This confirmed the insights from the Maikhorrub campaign and the Greenative talk that It is not that the restaurants do not want to be more eco-friendly, but the problem is they lack the initiative and knowledge. They need suggestions or guidelines on how they can improve their store in the OFDS application.

“

**Some customers did not realised that they opted-out for cutlery and complained when they did not receive it.**



## 3.6 End-user insights

End-users are the customers who order delivery food through the OFDS platform in Thailand. Their insights were obtained by two methods which are a survey to gather quantitative data and interviews to learn more about their in-depth insights and context. The results from both methods are discussed below.

### 3.6.1 Survey

The online survey received answers from 51 participants. Of these 51 participants, 78% are regular users of the OFDS applications as they order food delivery several times a week. They usually order food from restaurants that they ordered before, but they are also interested in restaurants that have promotion as a second priority. Most of them agreed that they are pleased with restaurants that use eco-friendly packaging more than the ones that use plastic packaging on the account of a high average score of 4.1, considering a five is that they extremely agree and a one is that they extremely disagree.

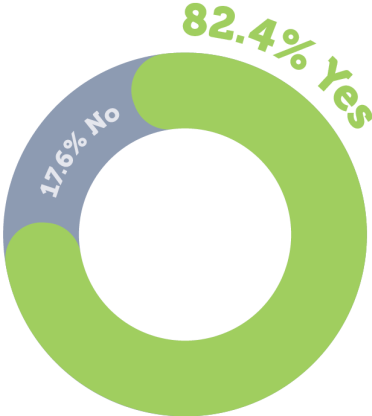
The results from the online survey also exhibit that most of the participants experienced receiving a delivery meal that they feel like it was excessively packed. What participants ranked as the most excessive way to pack the food is when a single dish got separated into several small packaging, followed by when restaurants packed the food in a plastic bag and then put the bag into the box again. However, 41 participants answered that although they do not like that the food that was excessively packed, it does not affect their next actions toward restaurants.

When asked the participants what they will be willing to do in order to help reduce food packaging waste from OFDS, the answer with the highest mean score of 4.2 is to *"inform the restaurant of the items they don't want such as condiments and cutlery"*, considering five means what they are most likely going to do and one is what they unlikely are going to do. The *"Supporting restaurants who use eco-friendly packaging"* and *"start sorting waste"* statements also received a relatively high score of 4.0, and 3.8 respectively. However, the solution of *"using reusable packaging and returning it"* is the least favourite with an average score of only 2.8.

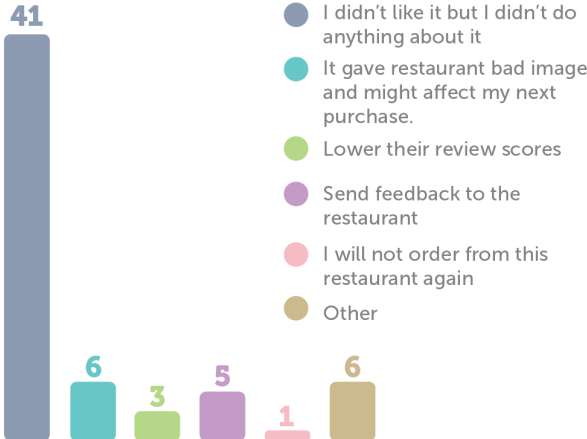
Regarding recycling issues, the reason that was selected most as the problems of sorting packaging waste from OFDS is the *"do not know where they can be sent to recycle"* followed by *"do not know what material they are made of and how to sort it"*, and *"need to clean it"*. However, the results also show that *"receiving some intensive"* and *"seeing other people doing it"* can influence them to start sorting waste. The full results of the survey are in [Appendix B](#).



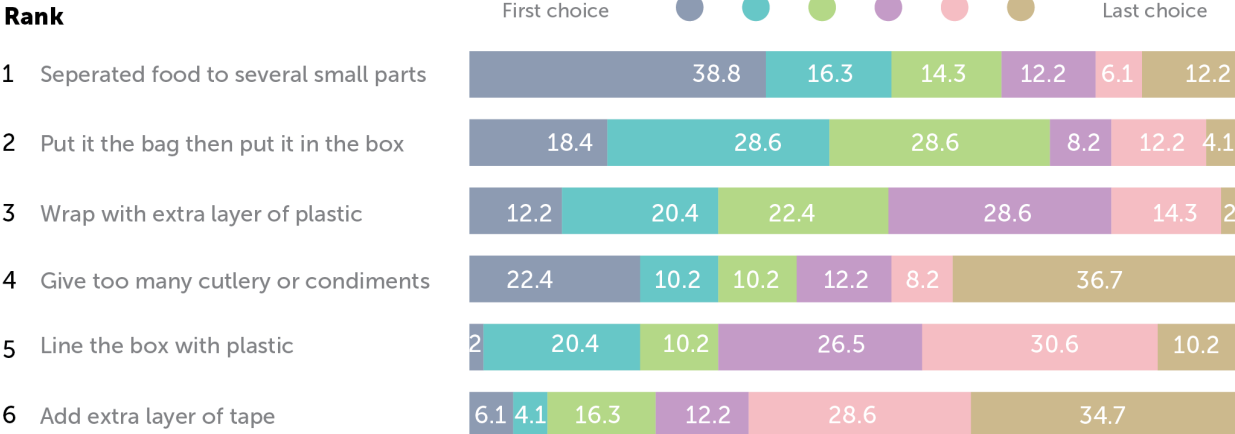
### Have you ever received the food that was excessively pack?



### What did you do when you receive excessive packaging?

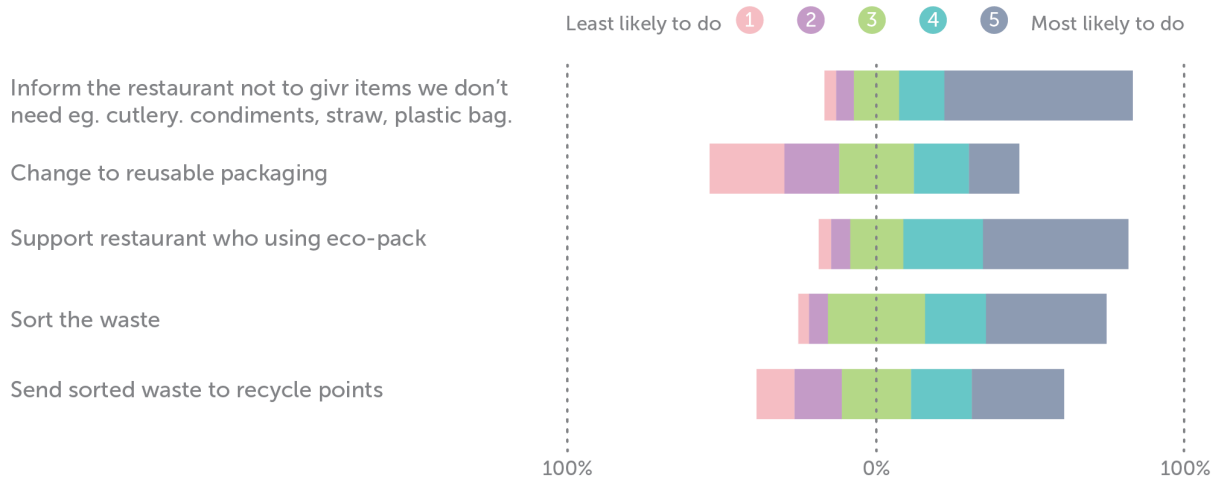


### What kind of packaging that make you think the food is packed excessively?

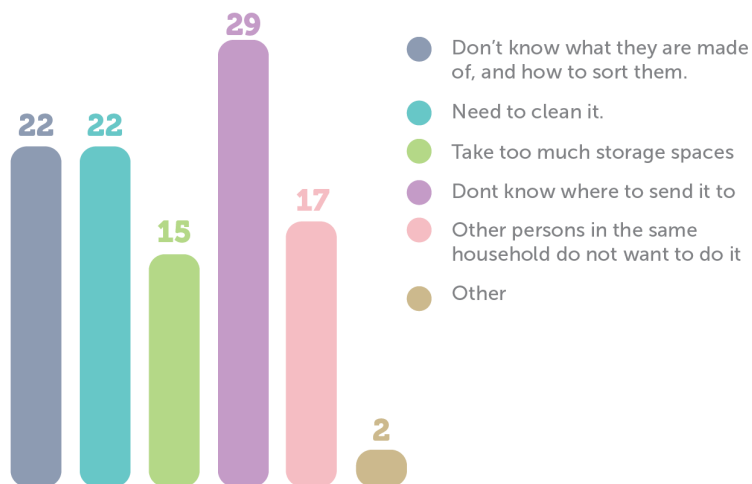




## How can you help reducing packaging waste from food delivery app?



## What are the problems of sorting waste from OFDS?



## What can encourage you to sort the waste?

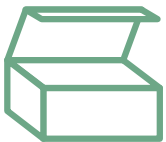
### Rank

- 1** Receive some intensive such as discount
- 2** Family or friends start doing it
- 3** Government launch policy
- 3** Have guideline on how to sort the waste
- 3** Easy sorting method
- 3** Know that the sorted are properly recycled.

Figure 15 the results of the survey

### 3.6.2 Interview with End-users

The online semi-structured interviews were conducted with five users who are regular customers of the OFDS applications in Thailand. The questions were divided into three sections, starting with the question regarding their behaviours and how they use the app, followed by their packaging preferences and their attitude towards eco-friendly and recycling. Although the questions were prepared in advance, there were additional follow up questions that were different for each participant depending on how the interview proceeded.



#### o Packaging preferences

Most of the participants ordered food delivery when they were at home. The meals could be just for themselves or for several people such as friends and family. Only one participant normally ordered when she was in the office. All of them reported having access to their plates and cutlery and preferred to eat the food from their dishes more than from the packaging, except sometimes when they were lazy then they would eat from the packaging. They all also said that they have way too many condiments and single-used cutlery stored in their homes or office as they have been ordering from OFDS regularly for several years. Some of them felt that these condiments and cutlery were troublesome and do not wish to receive more. While some others feel annoyed, but do not see it as a problem as they can simply give it away to others. For the persons who do not want more condiments, they would add “No condiment” message in the “custom note box” in the application to inform the restaurant.

All participants reported frustration with the “request for cutlery” button as sometimes they still received cutlery even though they did not request it. Two participants said they usually added additional requests in the “custom note box” that they did not want cutlery. One of them would repeat the word three times as “No cutlery. No cutlery. No cutlery” while another one would add three stars in the front as “\*\*\* No cutlery” in order to make the request more prominent. Despite all the efforts, they said they still received it anyway. One participant shared her success story of her collecting all the cutlery that she received from one of her favourite restaurants until the cutlery filled a bag. Then she drove to the restaurant and returned it to the manager while telling them; “Please listen to customer’s request”. She said after that she never received cutlery from this restaurant again.

When asked about their packaging preferences, the answers were various. They said it depends on the context whether what kind of the food it is, how far the restaurant is and when they will eat the food. They mostly preferred some dishes such as noodles and yum (Thai traditional salad) to be packed by separating the liquid content from the dry content. Though in some cases, they also liked when it mixed together in one container as it is much easier to eat, and the food was tastier. However, they did not like when the restaurant breaks down a single dish into too many parts. For instance, the salad dish was separated into one bag of green vegetables, one bag of chilli, one bag of prawns and one bag of dressing. This kind of packaging was an inconvenience because it required too much work to unpack and assemble the food which made the customers feel like they had to prep their own meals.



The problem with excessive packaging was not only that it generated so much unnecessary waste, but it is also difficult to unpack. While it may secure the food on the road, sometimes the food got spilt while the customer tried to unpack instead. Nonetheless, even though the customers preferred paper packaging over plastic packaging. It is understood by customers that for certain kinds of food, it was unavoidable to come in plastic containers and why it needed to be packed in several bags. Packaging material was not the main priority of how they chose a restaurant, the decision lay in the food. If the food was delicious and they wanted to eat it, they would order it anyway, regardless of how eco-friendly the packaging is. However, for the fancy meal, the participant expected the packaging to reflect the value of the meal. It did not matter what material it was, but it should make the food look good not just packed in a plain cheap plastic container.



### o Attitude towards recycling

Each participant depicts different levels of environmental concerns. Two out of five participants are people who were extremely passionate about the environment and waste reduction while others were not as much. The two who sorted their waste regularly were always concerned about how much waste they would create with each consumption. They would try to reduce it as much as possible and send unavoidable rubbish to recycle. When ordered from the OFDS application, they always filled in the comments to inform the restaurant that they did not want condiments, cutlery, straw, etc. However, the problem was they needed to know first what they would get along with their order in order to customise correctly. So, they could only do it with the

restaurant that they ordered before. They also needed to remember how each restaurant packed their meal and what they would receive along with the food.

There was also a problem with communication as words could be ambiguous, so the participant needed to be very specific when making the request. For instance, the pizza packaging in Thailand usually came with a Ziplock bag containing ketchup, oregano and chilli powder as shown in *Figure 16*. One participant told a story when she added a comment saying: “No ketchup”. Although her intention was to not receive all condiments in the Ziploc bag, the restaurant worker interpreted it differently and gave her a Ziploc bag with just oregano and chili powder instead. So, when she ordered it next time, she had to be more specific and mention “\*\*\* No ketchup, No oregano, No chili, No cutlery”.



Figure 16 Pizza packaging with condiments

What the two participants who are concerned about the environment also have in common is they both want to be a good example for others. They tried every possible way to influence persons around them. However, from their experiences, they said it took years of practice to change their lifestyle. And even though they could influence someone to start to think more

about the environment, eventually each person would find their comfort level and how much they wanted to participate. Some may take it seriously and continue sorting and recycling waste while others may only use a reusable cup when they ordered coffee.

This is aligned with the insights from the other three participants. One participant only sorted the waste that could be sold to local collectors such as paper and PET plastic bottles but not the food packaging waste. The other one said she used to sort garbage when there was a recycling business that came to pick it up from her house. But when the service stopped, it was too troublesome for her to go to drop-off point, so she stopped sorting waste. While another one would participate much less. She did not sort rubbish at home, but she did in the office as there were separate bins available. Although she knew she should care more about the planet, she still preferred convenience in life. When asked what could motivate her to change her lifestyle, she said it can be either incentive such as getting a discount or the influence of people around her. As she likes to follow the trendy lifestyle, if sorting waste becomes a trendy lifestyle or people around her start to do it, she is likely going to do it too.



Figure 17 the photos that were submitted by diary study participants





### 3.7 Diary study

After obtaining users' insights, it is also essential to investigate more on the environmental aspect. The diary study was conducted to uncover the possibility of waste reduction by researching how the nowadays packaging can be changed. The study was done over the course of three weeks with three participants. Each of them was asked to submit the photos of their delivery meal packaging and answered how the packaging could be changed to make it more eco-friendly. As a result, a total of 27 answers was received. The samples of the received packaging images were shown in *Figure 17*. These photos exhibit several cases of excessive packaging. The full-length results from diary study can be found in *Appendix C*.

Participants suggested multiple ways to reduce the packaging waste. These suggestions were divided into three groups as shown in *Figure 18*.

The first group is to not include items that they do not need which accounted for 44.4% of total answers. These items are included, but are not limited to, straw, chopstick, napkin, bag, stick, and condiments such as chilli fish sauce, vinegar, sugar, chilli, ketchup, sweet soy sauce, etc. The second group is to reduce branding decorations such as paper straps, stickers, and tape with the restaurants' logo. The participants felt that these decorations were unnecessary, and they needed to spend a long time removing these wraps before they could enjoy the food.

The last group is to change how the food is packed. There are several methods to do so. About half of the answers reported that the packaging could be changed to eco-material packaging and 40.7% of the answers show that some ingredients that were packed separately could be packed together. For instance, in *Figure 17*, the orange arrow pointed at the

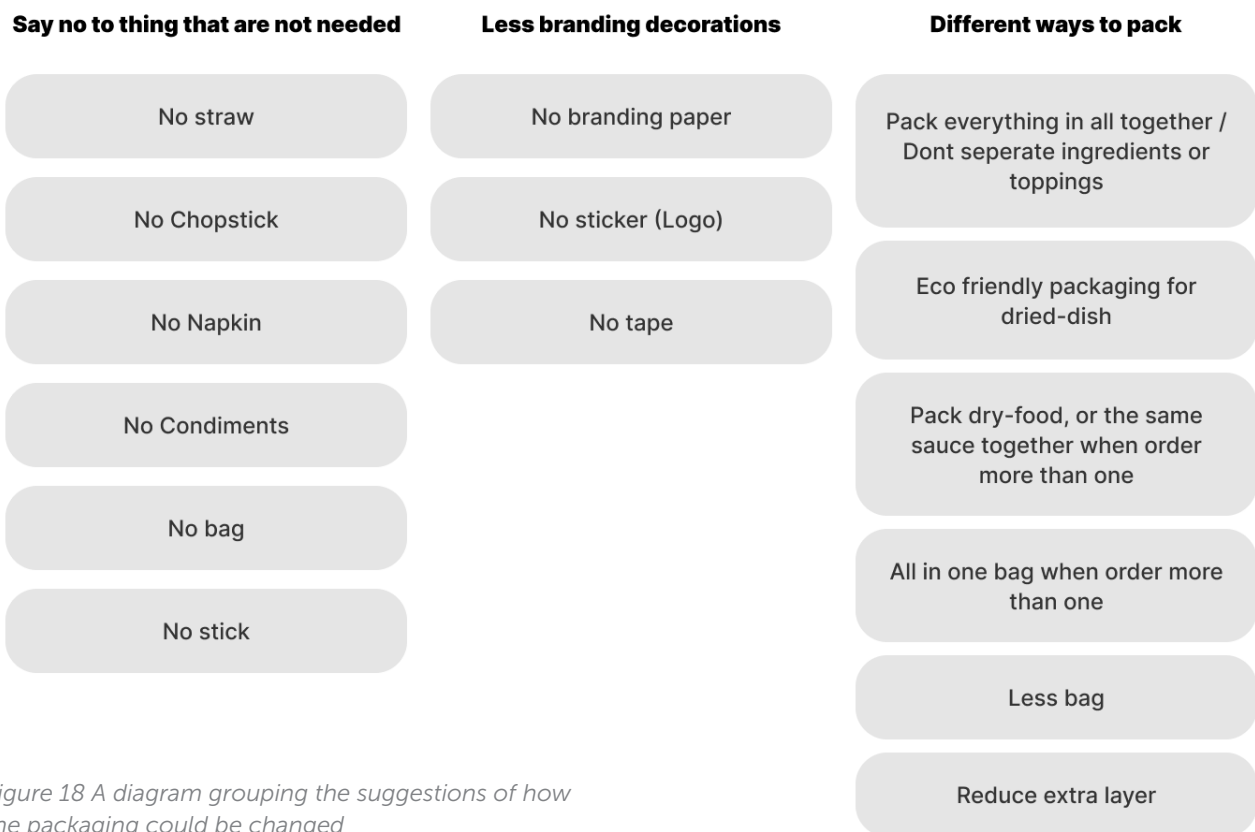


Figure 18 A diagram grouping the suggestions of how the packaging could be changed

food called Pad Thai. Although it was packed in a paper box, the toppings and vegetables were packed separately in four more plastic bags. These toppings could be packed together, and the vegetables could be in the box with the food.

The participants also suggested that different dishes such as fried chicken and fried pork could be packed together, as well as the dipping sauce (as shown in *Figure 17*, blue arrow). It should also be possible to reduce the number of plastic bags that were used on each order. For instance, the green arrow in *Figure 17* pointed at the packaging of two deep-fried banana orders. Each of them was packed separately in a paper bag. Each paper bag was put in its own plastic bag with its own cutlery before putting them together in one large paper bag. This is a good example of excessive packaging that restaurants should be able to avoid and pack their food with much less packaging.

## Chapter conclusion

Some may say that the best way to reduce single-use packaging waste from the OFDS is to stop using the app and perhaps dine in at the restaurant or cook our own meals instead. However, ordering food delivery from OFDS applications is very convenient and affordable. As it is suitable for Thailand’s lifestyle, it seems to become more popular. Although we may not be able to reduce the number of orders that were placed on OFDS, we can focus on reducing the amount of waste that is generated on each order. At least the insights show that the participants in this project – whether they were the service providers, riders, restaurant-users, or end-users – were interested in reducing single-use packaging waste from OFDS. Their insights obtained and discussed in this chapter would be analysed and used as a foundation to create the final solutions.

Chapter 4

# Data Analysis and Defining users

This chapter discusses the analysis of the insights that were obtained through user-centred design methods. The goal is to identify users' key insights and their needs in order to determine the gap and potential intervention points. As the main users of this project are the restaurant-user and the end-user, the analysis was divided into two parts.

The outline of this chapter is as follows:

- 4.1 Restaurant-user analysis
  - Affinity diagram
  - Journey map
  - Framing diagram
  - Persona
- 4.2 End-user analysis
  - Affinity diagram
  - Persona spectrums
- Chapter conclusion

## 4.1 Restaurant-user insights analysis

### 4.1.1 Affinity diagram

The qualitative data from the Greenative talk and interviews with restaurant and café owners were transformed into 80 digital post-it notes using the Figma web application as shown in *Figure 19*. These Post-its were categorised into nine groups. The first group is about their eco-friendly behaviours. The affinity diagram shows that restaurant managers were interested and had a positive attitude toward sustainability. They tried to minimize the negative impact of their restaurants to the environment at the level that they were comfortable with.

However, other groups demonstrates that there were still several issues with eco-friendly

packaging that stopped it from being a used by the restaurant. These issues are related to its functionality, availability and affordability.

The affinity diagram also shows several concerns about the know-how. Although they believed that being more eco-friendly could improve their brand image, they were uncertain of what customers would like and what would be the best eco-friendly practices. Another cluster is the problem with the current "request for cutlery" button. As some customers expected that they would receive the cutlery along with their order and did not realise that the default was set as no cutlery, the restaurant feels like the request made by this button was not trustable and could be made by mistake.





Figure 19 Restaurant-user affinity diagram

In the cluster showing their willingness to participate, it appeared that the restaurant preferred not to make the change alone. They believe that doing it as a group or as part of a campaign with other restaurants will have a greater impact. They would also like to have any sort of financial support from OFDS providers whether providing them with affordable eco-friendly packaging or providing incentives and more visibility on the app. The restaurants are also very interested in introducing customising choices to their store and allowing customers to advise them of what they do not require. This solution would be simple to implement and would help them save and reduce their costs.



## 4.1.2 Journey map

The 80 insights Post-its from the affinity diagram were minimized into 12 Post-its and organized into a step-by-step user journey map in order to understand user flow and identify their pain points on each step. The journey map was created by dividing the restaurant owner's journey into three phases. The three phases are the "preparation phase" before a customer orders food, the second phase when they "receive an order" and the phase "after the food was delivered".

The preparation phase consists of two steps. The first one is the problem when they searched and purchased packaging. During this step, the users exhibited difficulty in finding practical and affordable eco-friendly packaging. Although they wanted to buy packaging made from eco-friendly materials, they could not find the ones that were practical and affordable. This issue maybe because the perfect packaging does not exist yet and eco-packaging needs

to be redesigned to make it more suitable for Asian dishes. Although maybe the good eco-packaging was available somewhere, it was more difficult to find. The restaurant also relied on the information they receive from the supplier. They may not know whether the information was valid and compatible with the country's waste management system.

The second step is when the restaurant-user sets up their online store. The restaurant-users were only thinking about the food and how could it be customised. However, they did not think about the packaging options that could help improve their store to be more eco-friendly. The problem was not the usability of the application. They simply just never thought that they could add the options that allow the customer to customise the packaging or opt-out of condiments. They also worried that including these options would present their restaurant as being cheap instead of being eco-friendly. They also did not know what the best way would be to write these options.

### JOURNE MAP



Figure 20 Restaurant-user journey map

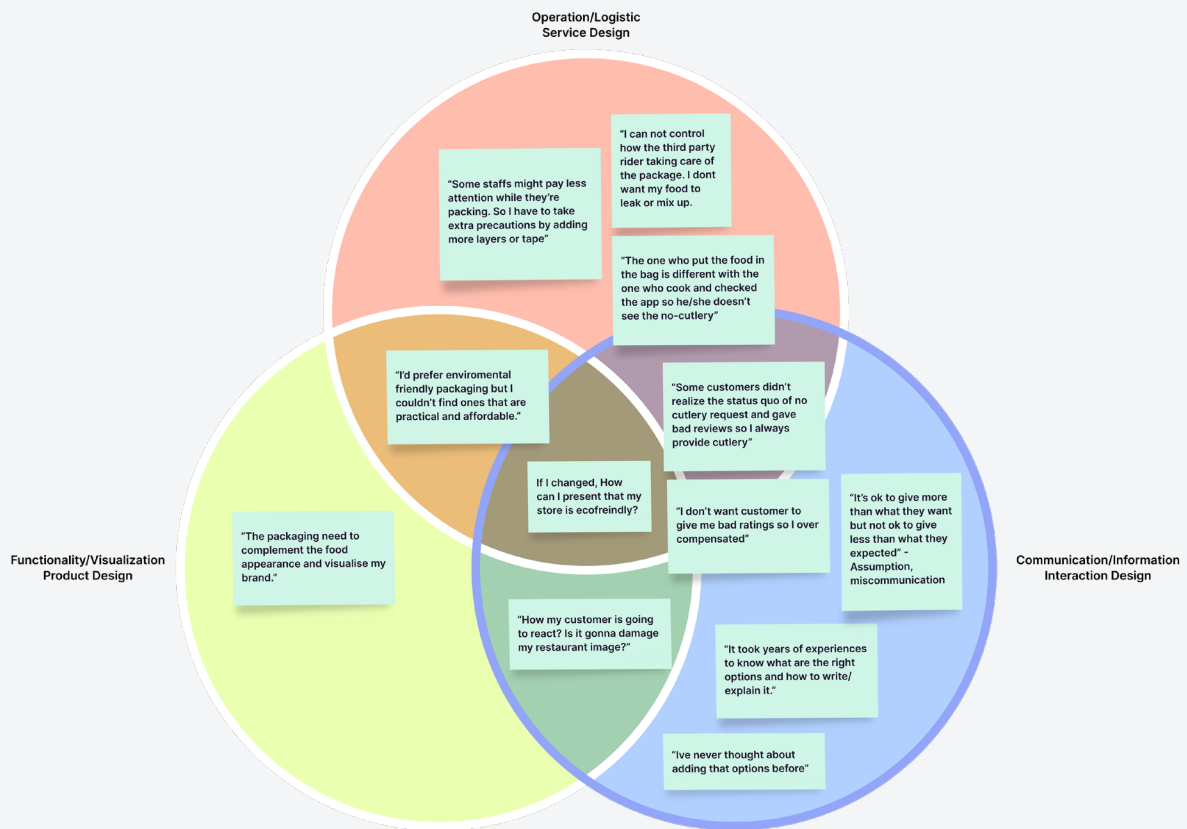


Figure 21 A diagram mapped which insights could be solved by interaction design

The third step is when they receive an order. The restaurant-user did not trust the “no cutlery” request and preferred to add the cutlery to the bag anyway. They wanted to save themselves from the bad reviews in case the “no cutlery” request was made unintentionally. The fourth step is when the worker packed the food. Due to the restaurant’s busy operation, the staff might not pay attention while packing the food which leads to restaurant management having to take extra precautions by adding more layers of tape. The person who packed the food might also be a different person from the one who received the order, so they did not know if the customer asked for no cutlery.

### 4.1.3 Framing diagram

Some of these findings that were discussed previously might not be possible to solve with merely new design interfaces as they related to the service and operations. The Post-its

from the journey map were mapped into a diagram (Figure 21) and categorised into three categories which are:

- The problem of the functionality of the packaging that should be solved by product design.
- The problem of restaurant operation and logistics that may require service design to solve the problem.
- The problem of communication and information that can be improved by interaction design

Some of the pain points may fall into two or more categories. As this master’s thesis focused mainly on interaction design, the pain points that were not related were filtered out and the focus lay mainly on the inside of the blue circle.

## 4.1.4 Persona

The persona of the restaurant owner (*Figure 22*) was created based on the insight received from participants. Although this persona may not be the representative of all restaurant owners, it demonstrates certain key insights that are likely exist with other restaurant owners.

The persona depicts the fictional character of Praewa, a 35-year-old restaurant entrepreneur in Bangkok Thailand. She opened a small restaurant 3 years ago and managed almost everything by herself with the help of her 4 employees. Her restaurant is in the centre of the city surrounded by business and residential buildings. The restaurant has its own logo and branding and sells food and drink in a medium price range. Her target group is young adults aged 24-35. She also partners up with 3 popular delivery applications. Although most of her customers were walk-in customers in the beginning, since the pandemic started, most of the orders have shifted to be from the delivery applications. She wanted her packaging to look nice, but she also has a limited budget. She purchased packaging from a supplier she knew. She checked out the sugarcane box, but they are too expensive and not practical with some of her dishes. So, she decided to use the combination of paper and plastic boxes as she believes they are the most reasonable option.

Since many of her orders have shifted to delivery and there are several differences between delivery orders and physical visits. She currently struggles with four key traits that hold her from becoming more eco-friendly and being the cause of excessively packed meals.

- First is the problem of lacking direct communication as she cannot interact directly with customers as in the restaurant. When customers visit the restaurant in person, they can experience the service and the brand through several factors such as the restaurant design, the friendly service and welcomeness of the workers or how the food is displayed on the plate. These environments help add value to the brand and the food. But when the food is served through delivery, the only way to present her brand and value now is to communicate through packaging.

- The second pain point is the different preferences of each customer. In the physical restaurant, it's easy for a customer to inform what they need. But for delivery orders, she needs to assume what customers need with the delivery meal. Therefore, she tends to overcompensate and make sure that customers will receive everything to ensure their satisfaction as she believes that there is no harm to give more items but she should not give less than what customers expect.

- The third pain point is the issue of the "request for cutlery" button that cannot be trusted. Some customers did not notice that it was opt-out as default and gave a bad rating when they didn't receive cutlery. As a result, she provided cutlery to every order, just to be safe.

- The last one is the initiative. Even though she wants her restaurant to be more eco-friendly, she lacks the initiative to incorporate this into her business. There is too much information

online however she does not have the enthusiasm to research more about packaging material property and recycling information. The OFDS is also new to her. She is learning by doing and does not know the best way would be to set up her store.

These pain points can be rendered into 4 user needs as follows;

- To maintain a good image for her restaurant and communicate with customers to present her sustainable value and not appear as just being cheap.
- Being able to communicate or know each customer's preference so she can understand her customer insights and adjust her service without personal assumptions.
- The more trustworthy "no cutlery" request interface ensures customer intention.
- A guideline of how she can improve her restaurant to be more eco-friendly.



# Praewa



Occupation  
Restaurateur



Location  
Bangkok, Thailand



Age  
35

## Biography

Praewa opened a small restaurant 3 years ago. She managed almost everything by herself with the help of her 4 employees. Her restaurant located in the center of the city surrounded by business and residential building. The restaurant has its own logo and branding and selling food and drink in medium price range. Her target group is young adult aged 24-35. She also partner up with 3 popular delivery applications. Although most of her customers are walked in their beginning, since the pandemic started, the majority of the orders has shifted to be from the delivery applications.

She wanted her packaging to look nice but she's also have limited budget. She purchased packaging from supplier she knew. She checked out sugarcane box but they are too expensive and not practical with all of her dishes. So she decided to use the combination of paper and plastic boxes as she believe this is the most reasonable option.

## Pain points

- Cutlery request button is not trustable. Some customers didn't notice that it was opt-out as a default and gave bad rating when they didn't receive cutlery that they expected.
- Lack of direct communication as they can not interact directly with customers as in the restaurant nor communicate present their brands and values.
- Customers have various preferences she can not accommodate them all but she assumes that it is much safer to give more than less than what they want, eg: overpacking, giving condiments or cutlery.
- Even though she want her restaurant to be more eco-friendly, she doesn't know how. There are too many information online however she does not know nor have time to research and acknowledge what good or bad.

## Needs

- The more trustworthy request interface to ensure customer intention.
- To maintain good image for her restaurant and communicate with customer to present her sustainable value and not appear as just being cheap.
- Being able to communicate or know each customer preference so she can understand her customer insights and adjust her service without personal assumptions.
- A community or guideline of how she can improve her restaurant to be more eco-friendly.

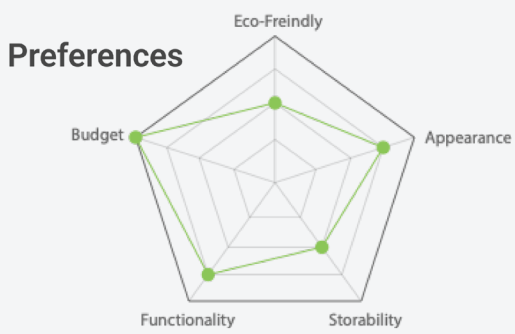


Figure 22 restaurant-user persona

## 4.2 End-user insights analysis

End-user is the customer who uses the OFDS application to order food delivery. The obtained end-user insights from five semi-structured online interviews were transformed into 86 post-it notes. Initially, the plan was to group and categorized similar insights together like the restaurant-user affinity diagram. However, the end-user perspectives and behaviour were various and difficult to group together as there is no consensus on the user data. Instead, the insights appear as a range of thought, behaviour and context that fell into the different patterns along a spectrum. So, the end-user was defined by using the method called personas spectrum.

The persona spectrum was designed based on the motive behind the behaviour of the end-users which appears as a spectrum line. On the left side of the line is the person who considers less about the environment and follows their instinct of having convenience in life. On the right is the person who is passionate about saving the environment and may sacrifice their own conveniences. There is also the group of users who is somewhere in between, which is named the context dependant. This group does not have to be exactly in the middle between the two. Some of them can be more convenience-oriented while others can be more environmental-oriented depending on their situation and context.



Figure 23 A brief persona spectrum dividing end-user into three group

Once the range was defined as shown in *Figure 23*, the affinity diagram was created by grouping the post-it notes into each persona. The affinity diagram helps to understand each user more in order to develop the final persona spectrum and identify each persona's key insights.

### 4.2.1 Affinity diagram

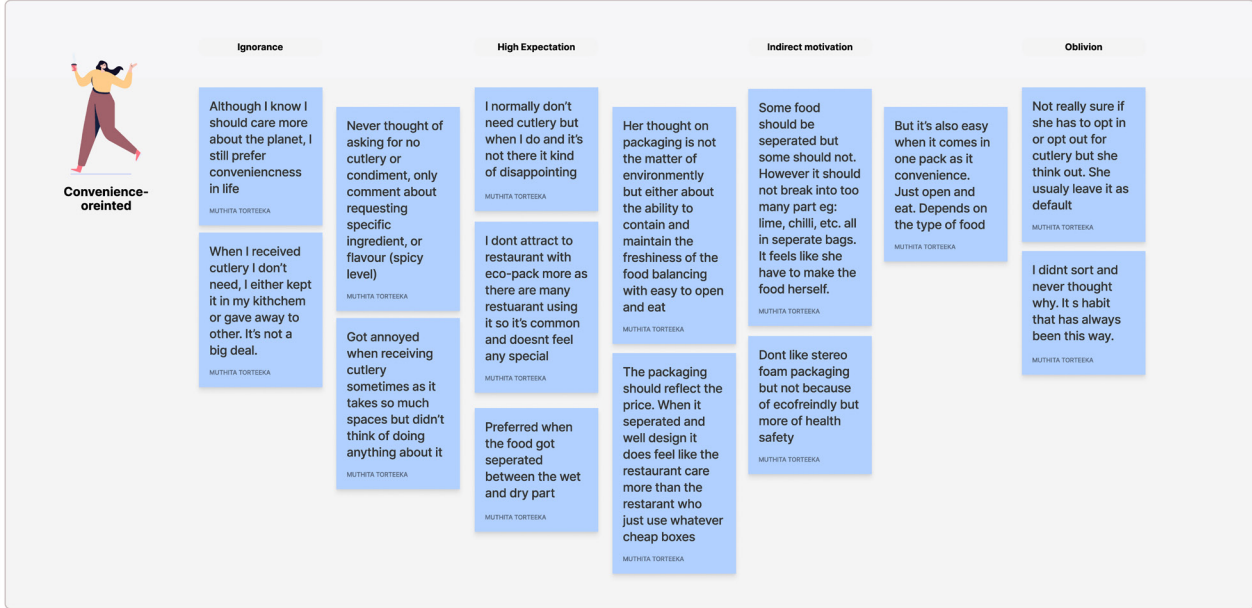
The 86 Post-its were categorised into the three user groups as shown in *Figure 24*. The insights of convenience-oriented users were grouped into four subcategories which are ignorance, high expectation, oblivion and indirect motive. People in this group often forgot to think about the environment while making their decision. They also have high expectations when paying for the service. They expect the food to be fresh, the packaging to look good and the cutlery to be there when they need it.

The context-dependent engages in eco-friendly practice occasionally and conditionally. They sort waste sometimes depending on the situation. Although their behaviours can be inconsistent, they can be influenced and motivated by either financial benefits or people around them.

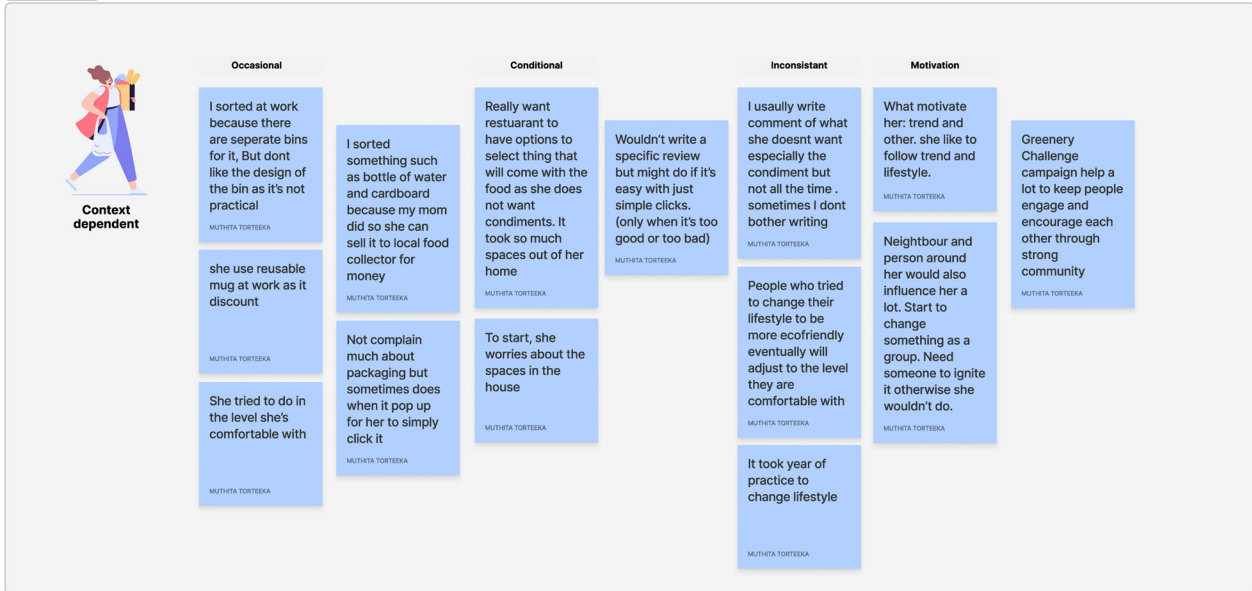
While the environment-oriented users are often faced with trouble with the country's waste management system and infrastructure as it is not standardized and extremely complicated. They also want to inform the restaurants of what they do not want to receive. The problem is it is difficult to make the request when they do not know what will come along with the order. They also want to be heard and want the restaurant to take their request seriously. The environment-oriented users do not only have their eyes on their behaviour but they also want to influence others and convince people around them to be more eco-friendly.



Convenience-Oriented



Context dependent



Environment-oriented

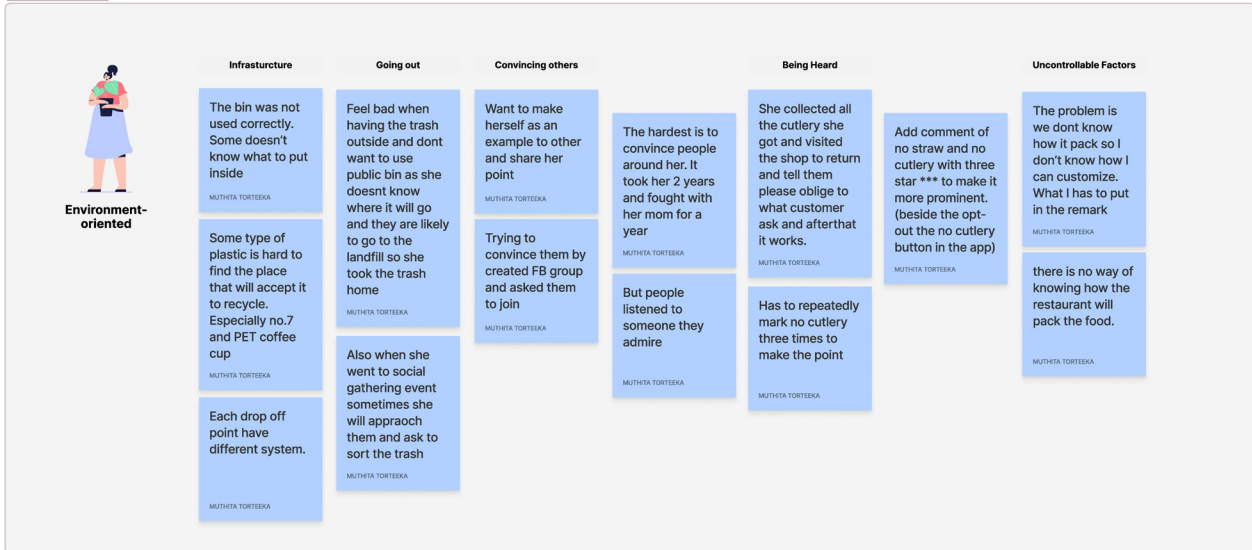


Figure 24 End-user affinity diagram

## 4.2.2 Persona spectrum

A fully detailed personas spectrum (Figure 25) was developed from key insights from the affinity diagram. The personas spectrum appears as a table identifying each persona's characteristics along with what they would do, what they would say, what they need, and possible intervention points.

The convenience-oriented user is the user who gets used to their accustomed behaviours. They do not think of change and are unable to make the connection between their behaviour and the sustainable aspect. They used to be served by the restaurant and expect the restaurant to follow the norm by providing cutlery and condiments along with their order. If they were asked why they do not inform the restaurant of what they do not need, their answer would be "Oh, I've never thought of that". When there were customisable options, they would choose the option that benefits them the most. For example, if a coffee shop has an option to choose between "separate ice" or "not separate ice", this group would choose "separate ice". They feel that the drink will be in better condition compared to the other choice. However, they would not consider the waste that would be created by choosing environmentally unfriendly option. The convenience-oriented people need to be more motivated to make a connection between their choices and the waste they create. The interface should remind them to be more aware of environment aspect.

The second group is the context-dependent. They occasionally engage in eco-friendly behaviours, depending on the context and situation. They would make an eco-friendly choice if it is not too inconvenient for them. For example, if there is an option to opt-out of condiments and cutlery, they would select

this option. However, if there is no such option, some of the people in this group, especially the ones who lean more towards environment-oriented, would fill in the custom note box that they do not want condiment or cutlery. This context-dependent group need easy access to information and simple features. They may be interested and engaged in eco-friendly practice for a while, but they are likely to stop if it gets too complicated. They need something that is consistent and would keep them motivated.

The last group is the environment-oriented group. This is the group that is passionate about the environment to the point that they are willing to sacrifice their own convenience. They sort waste and recycle it regularly. They strictly follow the 3Rs method, reduce, reuse, and recycle. They would go the extra mile to make sure that they do not receive unnecessary plastic. For instance, they will not only select the request for "no cutlery" through the button, but they will also add an additional comment in the comment box to double remind the restaurant that they do not want condiment and cutlery. They will use extra marks such as emojis or "\*\*\*\*" to emphasize their requests. They also request to customise packaging. For instance, if they ordered fried chicken, fried shrimp and cheese sticks, they may ask the restaurant to pack these three meals together in one bucket. Their goal is to receive as less single-used packaging as possible. For them, receiving more packaging means there are more items for them to rinse and sort afterwards. Nevertheless, they need to know what they will get along with the order first, so they know how they can customize the packaging and condiments.

The struggle of an environment-oriented user is, despite all their efforts, sometimes

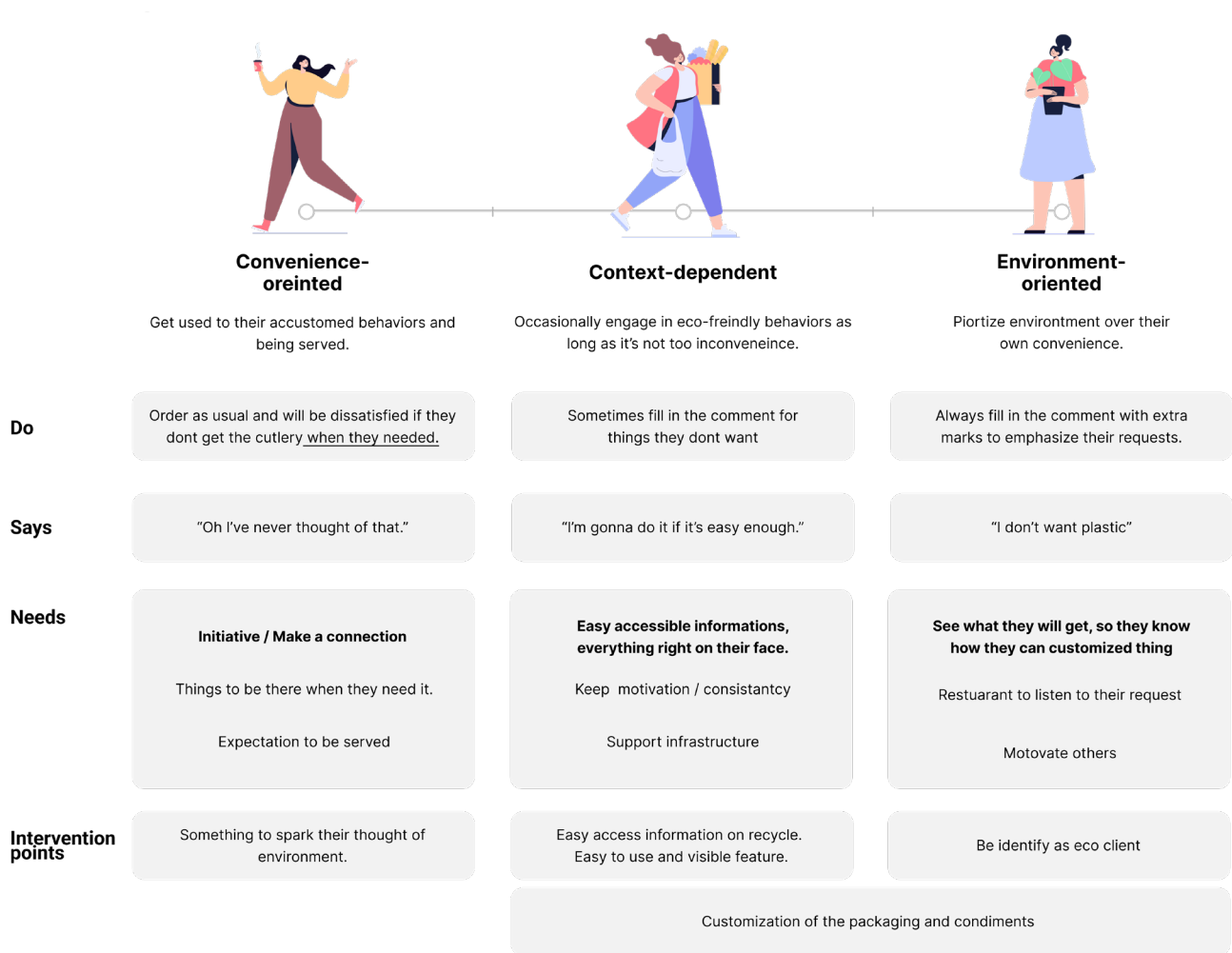


Figure 25 The final persona spectrum diagram

## Chapter conclusion

restaurant still ignore their requests and provide condiments and cutlery anyway. As mentioned earlier in [Chapter 3.5.2](#), the restaurant believed that there was no harm in giving more so they did not take these requests seriously. However, the environment-oriented want the restaurant to listen and oblige with their request as environmental issues really matter to them. In addition, they also want to be a good example and influence people around them to become more eco-friendly.

The results of data analysis rendered four types of users. One of them is the restaurant-users that were characterised using the persona method. The other three are the end-users that were classified through a persona spectrum. Each user has a different behaviour, need and motivation. The key insights of each user are summarized as shown in [Figure 26](#). These insights were utilised to generate potential ideas on how to solve the users' problems and encourage users to be more eco-friendly.



Figure 26 The summary of each user's key insights

Chapter 5

# **Ideations and Design Development**

This chapter includes the ideation process and how the designs were developed based on the key insights. The process started by determining the design requirements by brainstorming potential solutions and then evaluating them through the MoSCoW method. Following are sketches of how each feature could be integrated into the OFDS user interface as a low-fidelity prototype before developing them into multiple high-fidelity interface design alternatives on the Figma web application.

The outline of this chapter is as follows:

- 5.1 Design requirements
  - Identify potential features
  - Framing design requirements using MoSCoW method
- 5.2 User flow and intervention points
- 5.3 Initial sketches
- 5.4 Design development
  - Interface of the restaurant-user design and development
  - Interface of the restaurant-user design and development

## 5.1 Design Requirements

### 5.1.1 Identify potential features

From the key insights of the restaurant-user and the end-user in *Chapter 4*, the potential features that could be integrated into the OFDS application were identified using a mind mapping diagram as shown in *Figure 27*. So far, there are problems in two areas. The first area is the motivation and how to encourage users to become more eco-friendly. The second problem is the functionality of the application that needs to be improved in order to make it easier for a user to make an eco-friendly decision.

#### ○ Potential features to motivate users

To motivate users, there were several persuasive strategies suggested by Froehlich et al. (2010) as shown in *Figure 28*. Some of these strategies can be applied to motivate both the restaurant-user and the end-users.

#### MOTIVATIONAL/PERSUASIVE STRATEGIES

<p><b>persuasive tactics from psychology and applied social psychology disciplines:</b></p> <ul style="list-style-type: none"> <li>persuasive design</li> <li>persuasive technology</li> <li>behavioral science/economics</li> <li>environmental psychology</li> <li>game design</li> <li>social marketing</li> <li>health behavior change</li> </ul>	<p><b>persuasive tactics include:</b></p> <ul style="list-style-type: none"> <li>rewards</li> <li>punishment</li> <li>public commitment</li> <li>written commitment</li> <li>loss aversion</li> <li>kairos</li> <li>encouragement</li> <li>descriptive norms</li> <li>scarcity principle</li> <li>framing</li> <li>anchoring bias</li> <li>defaults</li> </ul>	<ul style="list-style-type: none"> <li>goal-setting</li> <li>narrative</li> <li>likeability</li> <li>reputation</li> <li>competition</li> <li>social proof</li> <li>authority</li> <li>emotional appeals</li> <li>door-in-face</li> <li>unlock features</li> <li>endowment effect</li> <li>collection building</li> </ul>
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Figure 28 Motivational strategies (Froehlich et al., 2010)

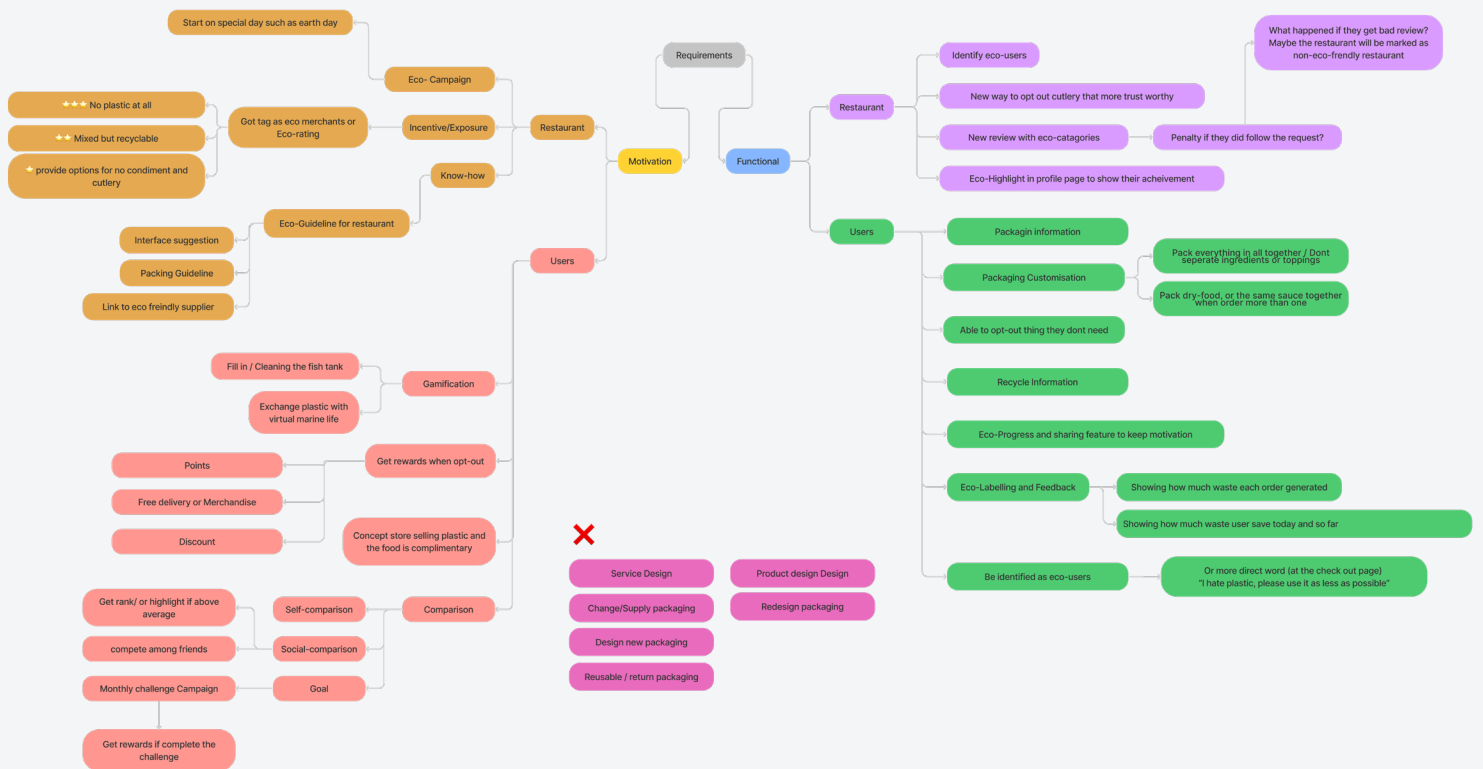


Figure 27 A diagram brainstorming potential features

The restaurant-users are interested in joining social marketing such as an eco-campaign that is launched by the service provider. They can also be motivated by getting incentives or exposure such as having an eco-merchant tag to make their restaurant stand out from others. They also need support on the eco-friendly guidelines. This could be an interface suggestion on how to set up the app, a guideline on how to pack their food sufficiently or a connection with an affordable eco-friendly packaging supplier.

For motivation of the end-users, the tactics such as game design and competition can be used to persuade users. Rewarding them with a discount or redeemable points is a

good strategy to encourage end-users to choose eco-friendly options. Another strategy is to present comparative eco-feedback on their progress which may help maintain their consistency. For instance, the app interface could display how much they have opted-out of cutlery throughout the year and allow them to compare it with their own results from the previous years, or compare it to other users. The OFDS providers can also apply an unlock feature and create a monthly challenge such as saving 5 straws and getting a 5-Baht discount, saving 15 straws and getting a free delivery coupon. If they save more, they will get better benefits in return. They can share their achievements with friends to keep their motivation high and in addition, be a good example for others.



### o Potential features to improve the functionality of the app

In terms of functionality, the restaurant needs the “no cutlery” request to be more trustable. In addition, their profile could present that they are an eco-friendly restaurant with a highlight of their achievement — how many single-use plastics they have reduced. The page could also show the review with eco-categories.

The end-user, especially the environment-oriented user, wants to know the packaging information of what they will receive. They should be able to customise these packaging whether by asking restaurants to not separate ingredients or combining some dishes together. They also want to know what they will receive along with their order so they can opt-out of what they do not need. For those who genuinely do not want the cutlery and condiments, they should be identified as eco-user, so the restaurant knows that their request to not receive plastic is serious and not by mistake. To remind them of the impact of their order on the environment, the app could present the fact of how much waste each order generates and show how much waste is reduced. It could also assist them on recycling by providing information of what kind of materials the packaging is and how they can manage its afterlife.



## 5.1.2 Framing design requirements using MoSCoW method

Based on the potential ideas from *Figure 27*, each requirement was evaluated using MoSCoW method to prioritise which features must, should, could and won't be included in the design.

### o Must

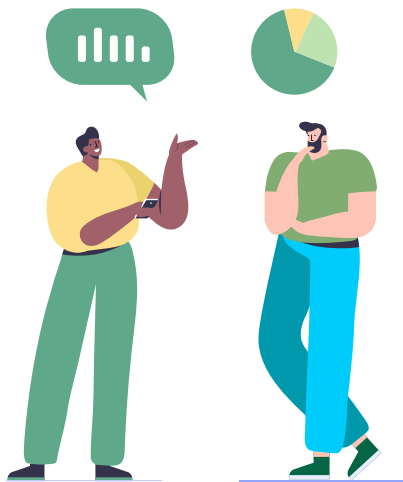
The solutions that must be included in the final design are the features that are relevant to interaction design and can resolve users' pain points by redesigning the user interface. The solution must be feasible for all stakeholders and can help reduce waste.

Therefore, the restaurant-user interface MUST include:

- Interface suggestions on how they can add eco-friendly options to their restaurant.
- A new way to request no cutlery that is more trustworthy.
- An identification of the customers who are environment-oriented.

The end-use interface MUST include:

- The packaging information of what they will receive along with their order.
- The packaging customisation
- The function that can send request for the different dishes to be packed together
- The function to opt-out the items they do not need
- The feature to motivate end-users to make the eco-choice
- The feature to identify themselves as an eco-customer



### o *Should*

The solutions that should be included in the final design are the features that indirectly support or encourage eco-friendly behaviours. They may add value to the design and user experience but not directly reduce waste pollution.

Therefore, the restaurant-user interface SHOULD include:

- The tag indicates that they are an eco-friendly restaurant.
- The highlight on their profile shows how much waste they have reduced.

The end-user interface SHOULD include:

- The display shows how much waste they have reduced that can be compared and shared with others.
- Recycling information
- The tag showing which option is eco-friendly
- The eco-feedback showing how much waste each order generates and how much waste they would reduce by making eco-choice.

### o *Could*

The solution that could be included in the final design is the feature that may temporarily boost eco-friendly behaviours and the features that support eco-friendly activities before or after the ordering phase. Although these solutions are desirable but not critical to be included in the design.

Therefore, the restaurant-user interface COULD include:

- Eco campaign for the restaurants to launch the changes together.
- A guideline on how the restaurant should pack their food.

The end-use interface COULD include:

- Gamification to motivate the user to be more eco-friendly
- A rating or a review on how eco-friendly a restaurant is.

### o *Won't*

As mentioned earlier that this master thesis focuses on interaction design, the solutions that can not be solved solely by interface design and were not favoured by the users from surveys and interviews would be left out.

The solutions WON'T include

- Designing new packaging
- Focus on service design solutions such as providing affordable eco-packaging to the restaurants
- The solution to support reusable packaging as according to the results from the literature reviews, surveys, and interviews, the reusable packaging solution was not favoured by the end-user.

### 5.1.3 User flow and intervention points

Once the design requirement and potential solutions were identified and prioritised, these features were mapped into the user flow diagram to see where they can be inserted into the application.

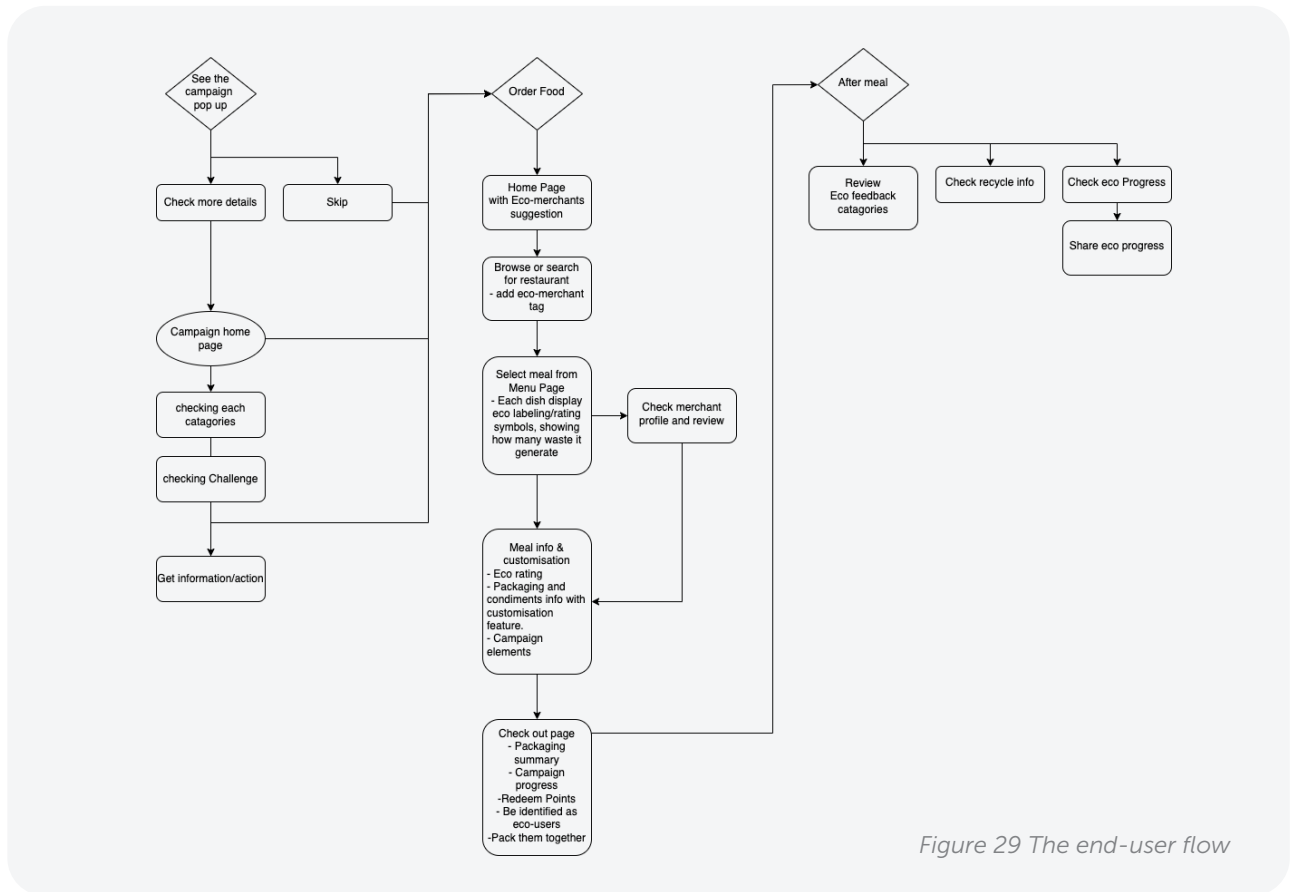


Figure 29 The end-user flow

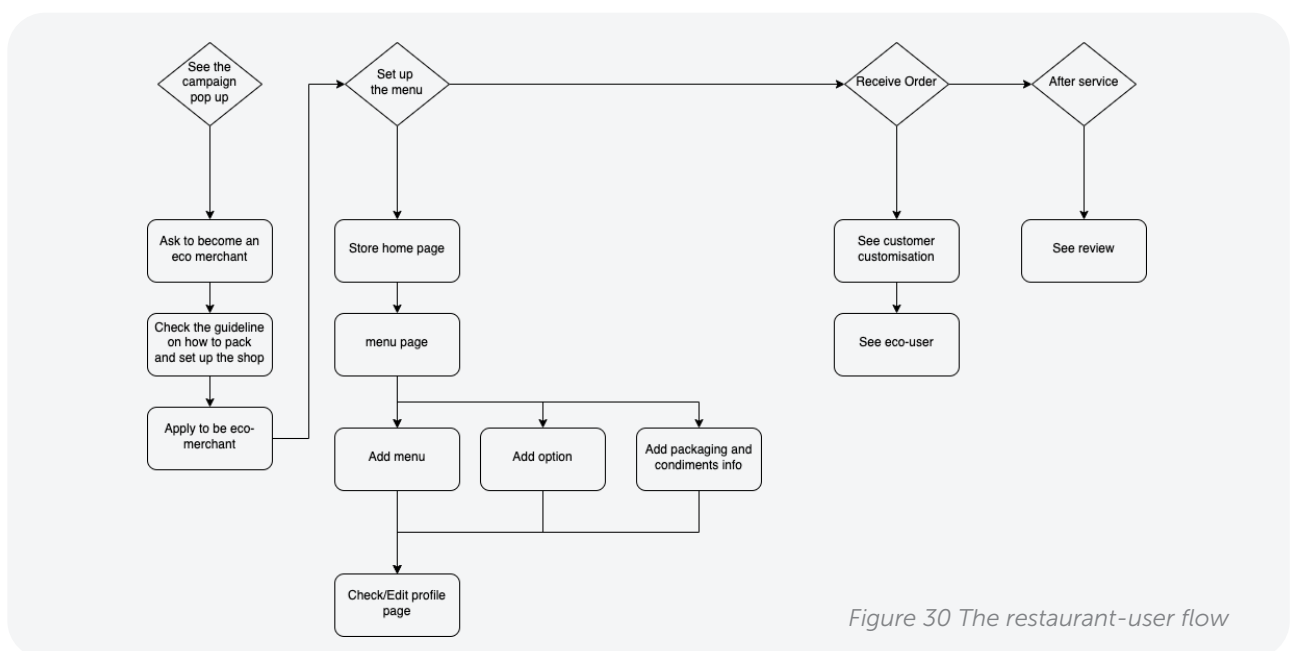


Figure 30 The restaurant-user flow

## 5.2 Initial sketches

Low-fidelity sketches were created for six features as initial ideas to briefly visualize how each feature could be applied to the application. The ideas began with how to draw users' attention and motivate them to reduce packaging waste using gamification (Figure 31). When a user opens the app, they can see a campaign pop-up that may provoke their curiosity. The game appears as a virtual world showing the percentage of how healthy their planet is. Besides seeing their planet, they can also see the planet of their friends. Each planet

has several creatures such as turtles, fish, whales, etc. Each creature population connects to a certain type of single-use plastic and will change according to the user's activities. For instance, the turtle is connected to a straw in accordance with one viral heartfelt video of the straw stuck in the turtle's nose. The video will also be shown in the app to educate the effect of single-use straws on marine lives. Every time users select an option to receive a straw; they must exchange it with one life of their turtle. The interface also suggests what they should do to save the turtle's life as well as create a monthly challenge to keep users motivate.

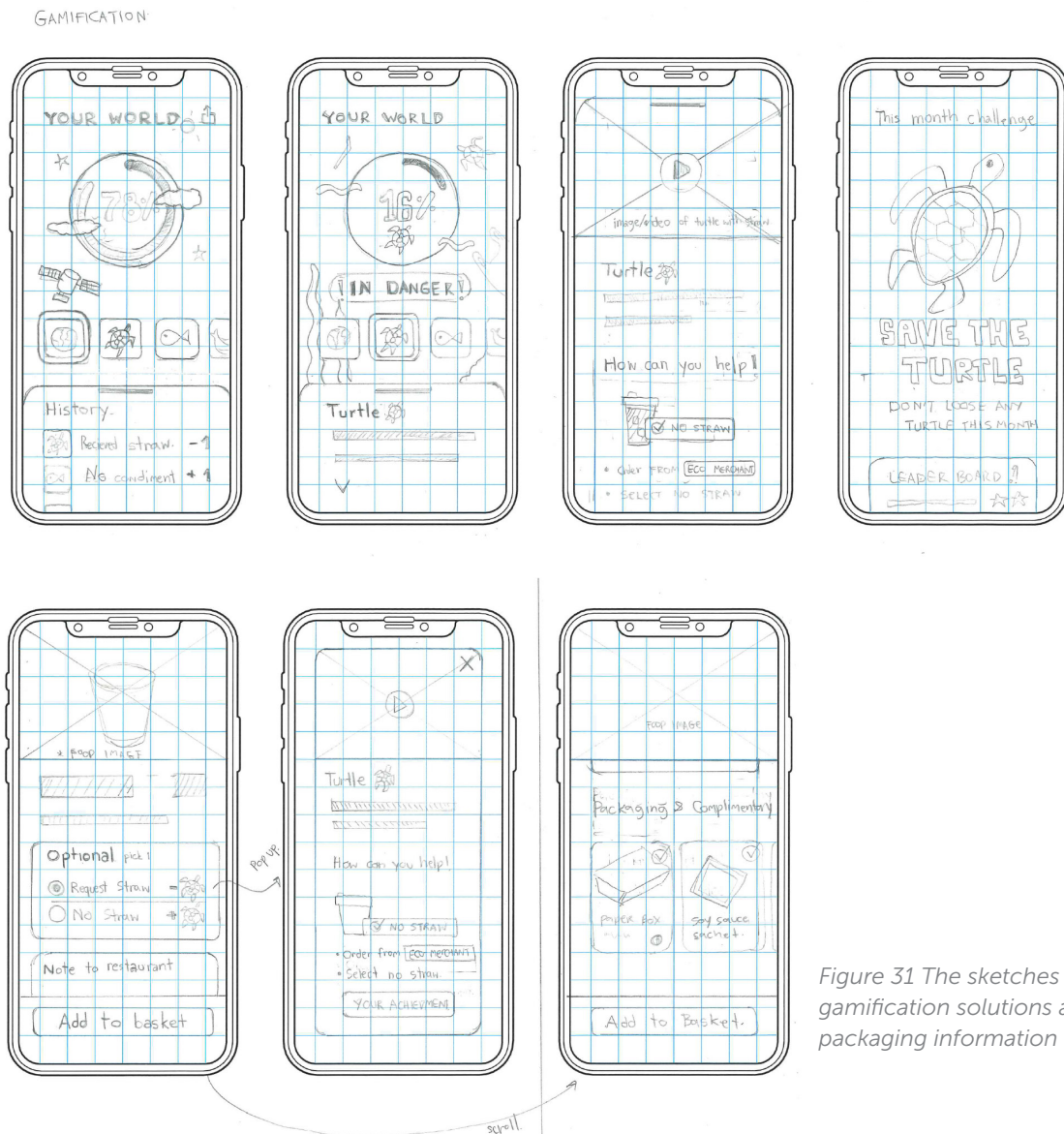


Figure 31 The sketches show gamification solutions and packaging information

Besides the campaign, the app also needs to add new features that allow users to know what they will receive along with their orders. The redesigned application should display packaging information and how to customise the packaging. Moreover, *Figure 32* shows the redesign of the “request for cutlery” button. The problem with the current button is its automatically opt-out so it is not aligned with real-world conventions and the restaurant believed that the request is not trustable. Each restaurant also interprets the word cutlery differently. Although the word “cutlery” obviously includes spoon, fork and knife, some restaurants said it does not include chopsticks while some may say it is included. The word “cutlery” is irrelevant for stores such as a café or a coffee shop where they mainly sell drinks, as it does not include a straw. The new idea appears as tags showing what condiments, cutlery, and other complimentary items customers will receive. The end-user can easily tab the button to opt-out what they do not need or add it back in. Since they have to click the button to remove specific items, the action could not be done by mistake. Therefore, it would be more accurate.

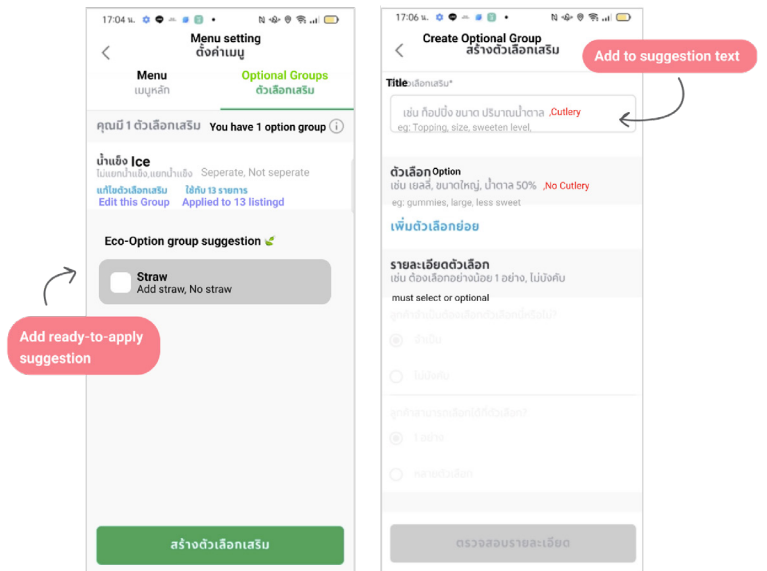
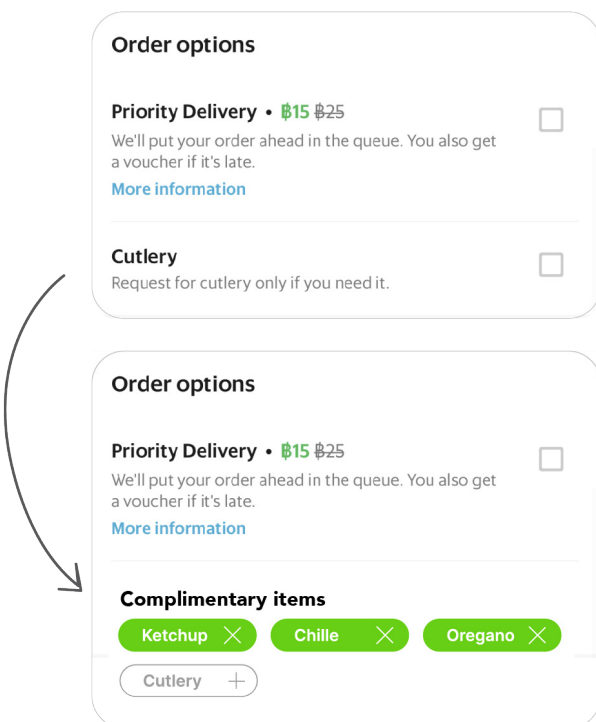


Figure 33 The sketches showing the ready-to-apply eco suggestions.

The restaurant who joined the eco-campaign can be marked as an eco-merchant. The front page of the end-user interface could highlight eco-merchant as a new suggested carousel and make the category visible in the search page. This could help increase the restaurant's visibility, enhance their brand value, and make it easier for the environment-oriented user to find eco-friendly restaurants.

The eco-merchant may have their profile page showing information of how much waste they have reduced and what eco-friendly strategies they utilize as well as showing their packaging and recycling information. While setting up their menu, the interface may display ready-to-apply eco-suggestions or display the suggestion as an example in the fill-in boxes as shown in *Figure 33*.

Figure 32 The sketch showing how the cutlery button can be changed to be more specific



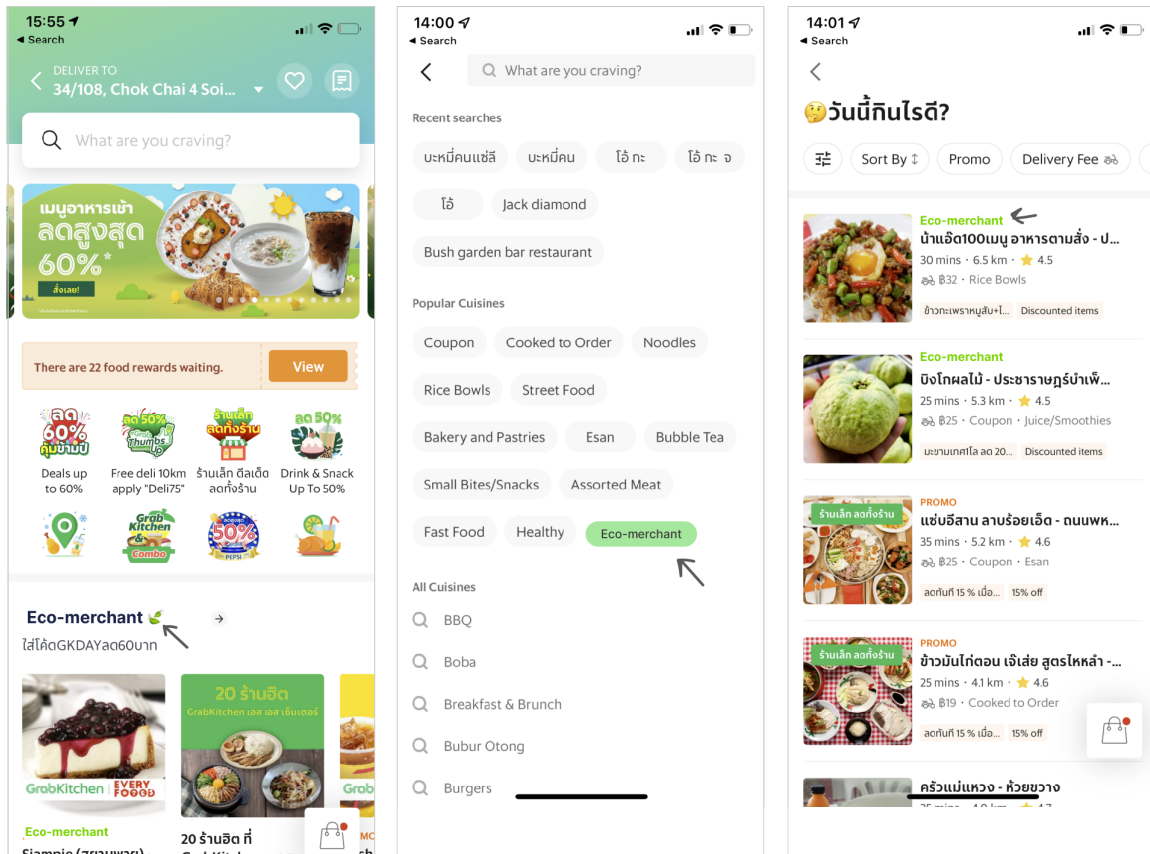


Figure 34 The sketches showing how eco-merchant tag could be implemented.

Recycle information. + Promote store ecofriendly & achievement

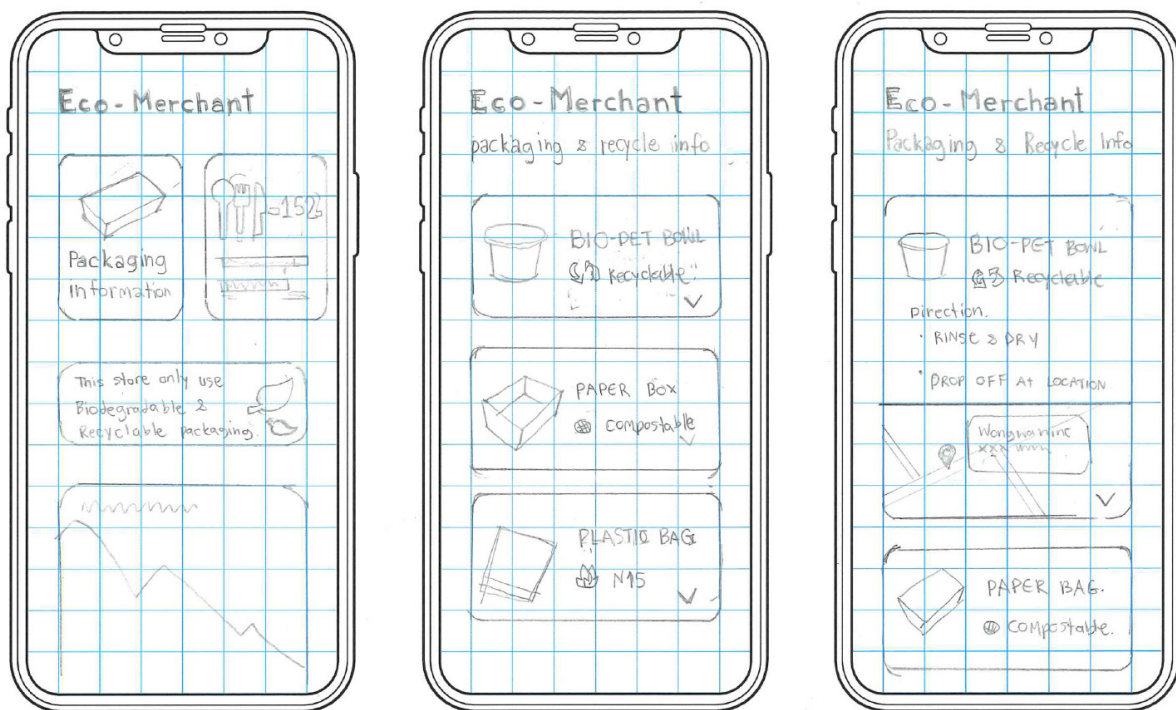


Figure 35 The sketches showing eco-merchant profile



## 5.3 Design development

The low-fidelity sketches were developed into a high-fidelity prototype on the Figma web application. The high-fidelity prototype contains more details and more variations of the design interface on each feature. As the goal is to suggest the solutions that could be implemented in any OFDS application, the development of the high-fidelity prototype does not focus on the visual design of the application e.g., font, colours, the layout of the app, or changing the existing flows. Therefore, the new solution was designed by adding new features to an existing application template. I purchased the “Food delivery mobile UI kit” from creativemarket.com (Nucleus-UI, 2020). The template was used as the foundation of the application to develop the new features by integrating them into the its interface.

Although the application interface should be designed in Thai, the high-fidelity prototypes were developed it in English as this master’s thesis is part of master’s degree program in English.

The high-fidelity prototype was developed with both user flows in mind. When introducing a new feature to one user, the feature must work for another one as well. For example, if the app adds the packaging customisation feature to the end-user interface, how can the restaurant add this packaging information when they set up their menu. The prototype was designed and developed in finding a solution that will work for both users.

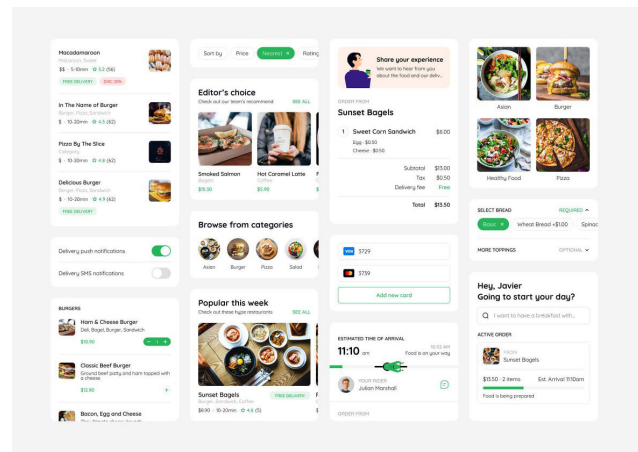


Figure 36 The design components from Nucleus-UI (2020) that were utilized as a foundation of the high-fidelity prototype.

### 5.3.1 Interface of the end-user design and development

The end-user interface was designed following the end-users flow that was discussed in *Chapter 5.1.3*. The design starts when the user opens the app and sees the pop-up of the campaign till they finish their ordering process.

#### o Step1: See the campaign and gamification pop-up

The first feature is the campaign to educate and motivate users, especially the convenience-oriented user, to be more aware of the waste pollution issue. The campaign idea could be launched on a special day relating to the environment such as earth day, world environment day or world ocean day. When a user opens the app, the campaign will pop up and they can click to see more details of what it is about. Users can see their planet’s overall health or click on each creature to see its population. On each creature page, they can see relevant data about how much they have been creating single-used plastic on this app and what they can do to help save their marine lives. The gamification solution could raise users’ awareness regarding the waste pollution issue and hopefully help motivate and educate the convenience-oriented user and the context-dependant user.

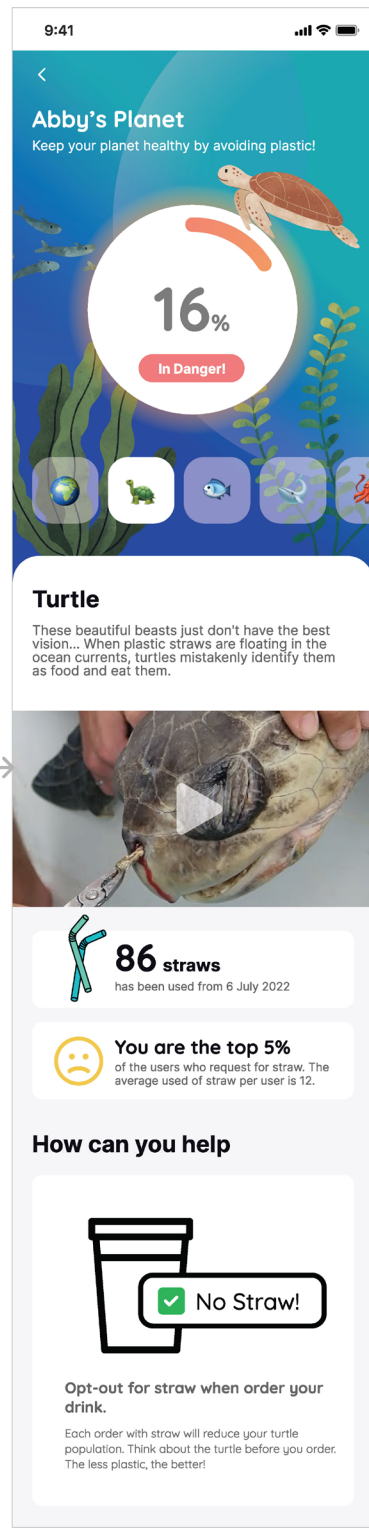


Figure 37 The high-fidelity prototype showing campaign and gamification design

o **Step 2: Browse through home page, browse page and search page**

To encourage restaurants to join the campaign and assist users who want to support eco-friendly restaurants, the homepage suggests a new category called eco-merchants. The eco-merchants can be found in the feature carousel or in the search suggestions. If the restaurants want to receive the eco-merchant tag, they can either change their packaging to be more eco-friendly or participate in the new eco-features. The eco-merchants are divided into three ratings depending on how eco-friendly they are.

The eco-rating is shown by using the sapling

symbol (🌱). The sapling (🌱) symbolises the rise of eco-friendly awareness. It metaphorically signifies that by selecting the restaurant with eco-labelling, the plant is growing which means the environment is getting better. The best rating, equal to three stars, is shown as 🌱🌱🌱. Which is for the restaurant that changes their entire packaging to non-plastic material. For the restaurant that still needs to use plastic in some cases, the plastic must be either biodegradable or recyclable. These restaurants will be rated with two eco-plants, 🌱🌱. Those who cannot change or afford eco-friendly packaging but join the campaign by providing packaging and condiment customisation option will receive one eco-plants, 🌱, label.

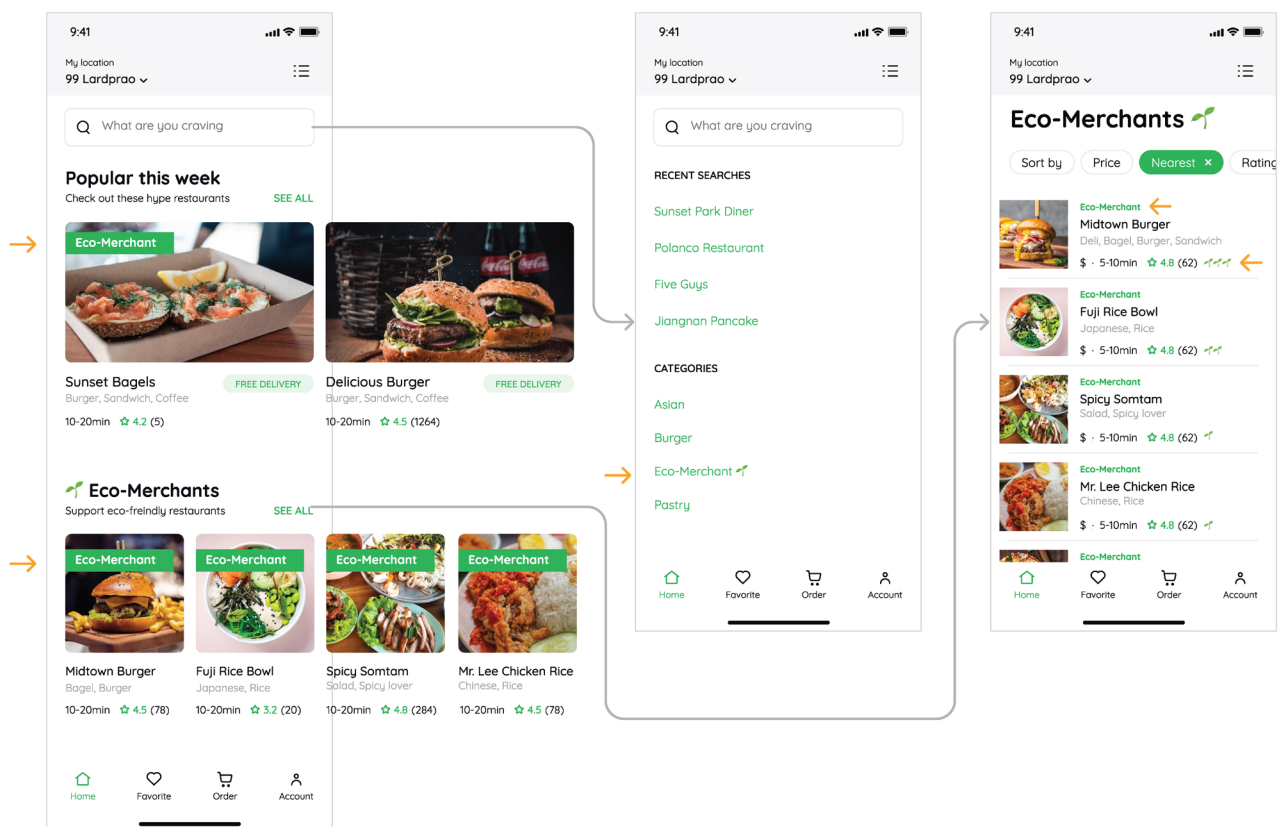


Figure 38 The high-fidelity prototype showing eco-merchant tags and eco-ratings

### o Step 3: See the item on product page

After the user selects a restaurant and the item they want to order, they will come to the product page. There are two important features that should be added to product page. The first feature is to show what are the condiments and complimentary items, such as cutlery, napkins, etc., that will come along with their order. So the user can remove what they do not need. The second feature is the packaging customisation which allows the user to see how the food will be packed so they can customise the packaging of the food.

The “*condiment and complimentary items*” option was developed into three alternatives. This feature is located below the normal options to customize the food. The first design shows condiments and complimentary items as a list. The checkboxes in front of these condiments and complimentary items will be automatically checked as a default. Users need to remove the item(s) they do not need. The second option is that it would appear as a tag instead of the list. The last option appears as a normal option in form of yes and no questions about whether users want to receive a certain item.

Under the condiment option is the “*packaging customization feature*”. This feature was developed into four alternatives. The first one is to show the default packaging as an easy-to-understand icon or photo. Users can click the edit button and fill in the comment on how they want to customise. The other alternatives are up to the restaurant to set up how many packaging options they would like to provide. Users cannot freely customise the packaging (as in an alternative one) but can choose from available options instead. The second design appears as a tab. The user can click each tab to see what packaging options are available. It also provides details of what materials they are made of and whether they are recyclable or biodegradable. Users can also click the information icon (i) to see the recycling information of each packaging.

The third design displays the available options as a horizontal scroll. User can scroll to the side and select the option that they need. The last option displays all available choices in one column. It also marks which one is eco-choice to remind the convenience-oriented users to think about eco-friendly options. The restaurant-user can also adjust the price of each option.

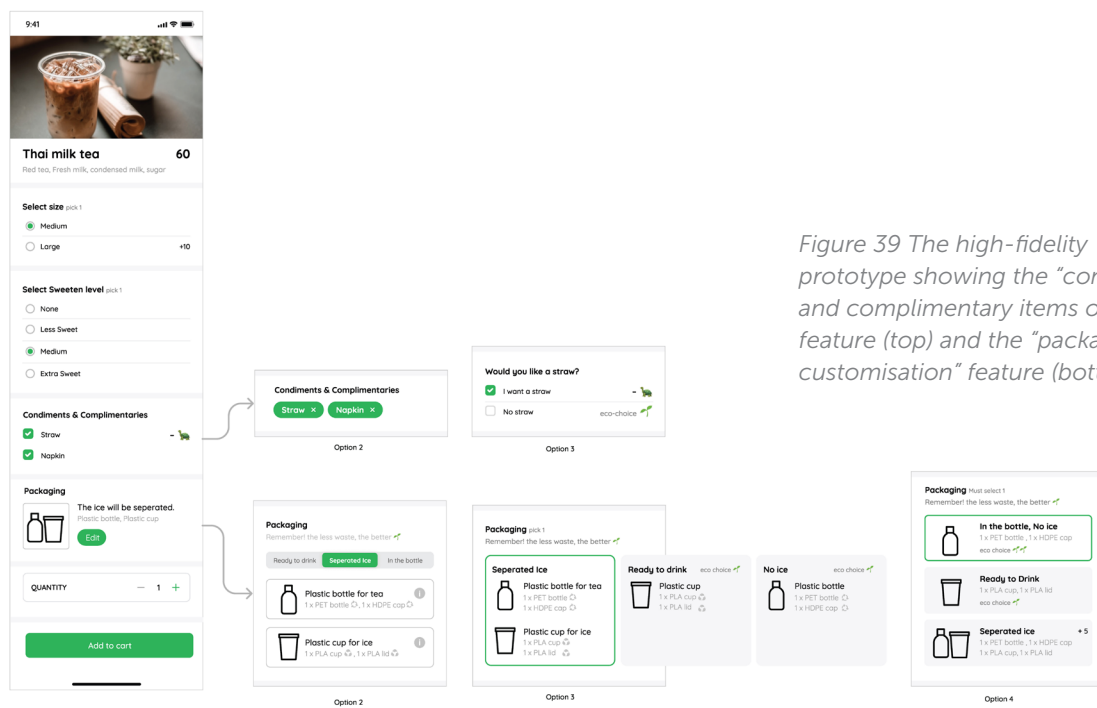


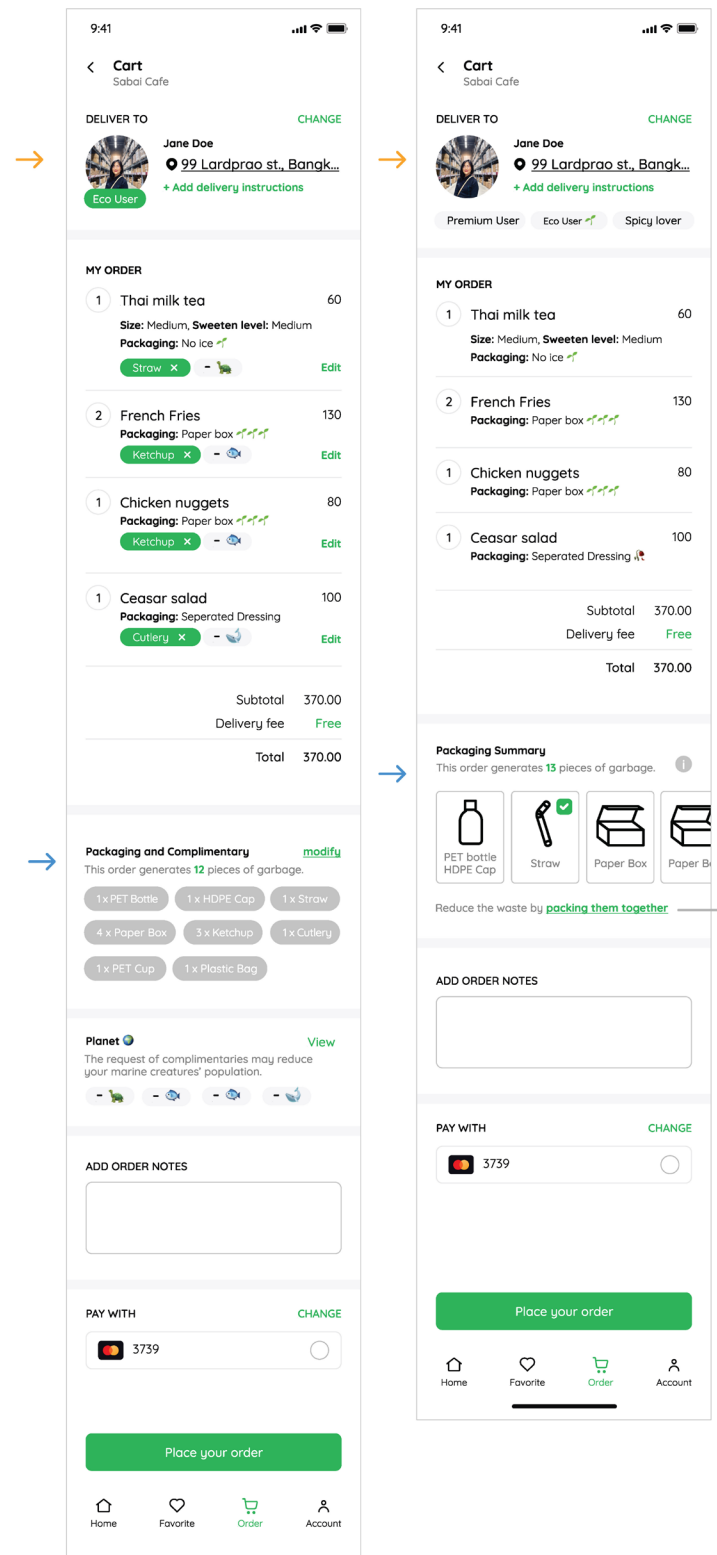
Figure 39 The high-fidelity prototype showing the “condiment and complimentary items option” feature (top) and the “packaging customisation” feature (bottom)

### o Step 4: Prepare for Checkout

The checkout page is where the user sees the summary of their order before placing an order. The contents on this page normally include the user's Information, the list of orders, the custom note box, and the payment options. This page is the best location to show a summary of how much waste each order generates as well as allow customers to combine several dishes together into one container. It is also where environment-oriented can identify themselves as eco-user.

The orange arrows in *Figure 40* indicate three design alternatives for "eco-user identification". The first option, the user can set up their profile as an eco-user, the tag will always appear under their profile picture. The second idea is similar to the first idea, but user can set up several tags to indicate who they are and their preferences. One of the tag can be the eco-user. The last idea is the on-off toggle switch. Users can inform the restaurant that they hate plastic and wish to receive as less plastic as possible. This feature functions as a double verification to inform the restaurant to be extra careful and take their request to not have cutlery and condiment seriously.

The blue arrow points at four alternatives to the "pack-them-together" feature. This is a request to the restaurant to reduce single-use packaging waste by packing different items together in one container. The first design appears as a list of items that they will receive along with the order. The user can click modify to customise these items either by removing them or combining them. The second idea shows the items as images or icons. It was designed as a horizontal scroll in order to save spaces in case there are a lot of items. Under the horizontal scroll, there is a message with a hyperlink saying: "Reduce the waste by packing them together". When the user clicks on the hyperlink they will be on the



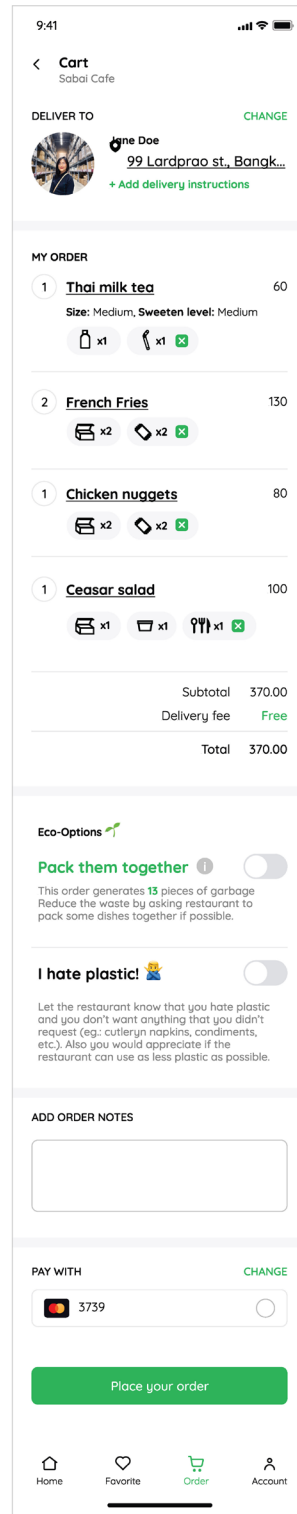
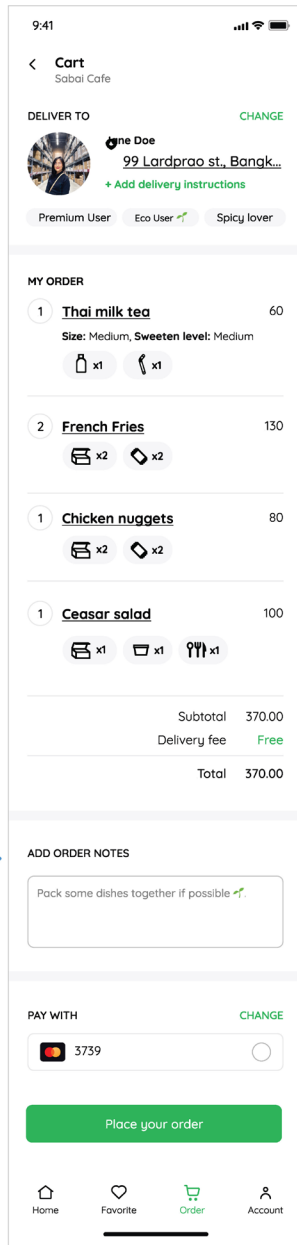
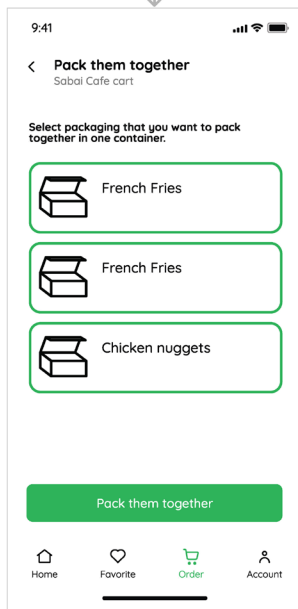
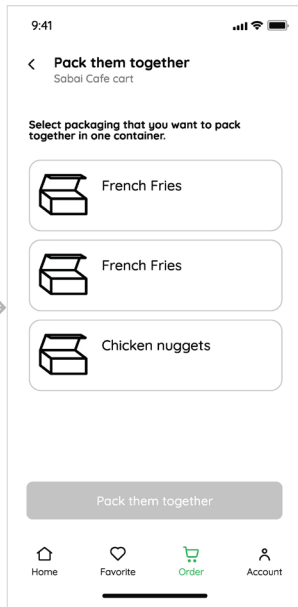


Figure 40 The high-fidelity prototype showing the "eco-user identification" feature and the "pack them together" feature



page where they can select the items that they want to combine. The third option is much simpler. It is simply a suggestion in the fill-in box so the user knows that they can make this request. The last alternative appears as an on-off toggle switch. This option is to inform the restaurant that they can pack different dishes together, but the ultimate decision is up to the restaurant on how do they want to combine it.

**o Step 5: Check previous history on the profile page**

The user profile page shows the progress of how many waste users have reduced as it may help motivate the users to continue practising eco-friendly behaviours. The data on this page can be shared on social media to show their achievements. The app can also support recycling behaviours by providing recycling information of their previous order. The page shows relevant disposal information such as what material it is made of, how it can be sorted, and where it can be sent for recycling.

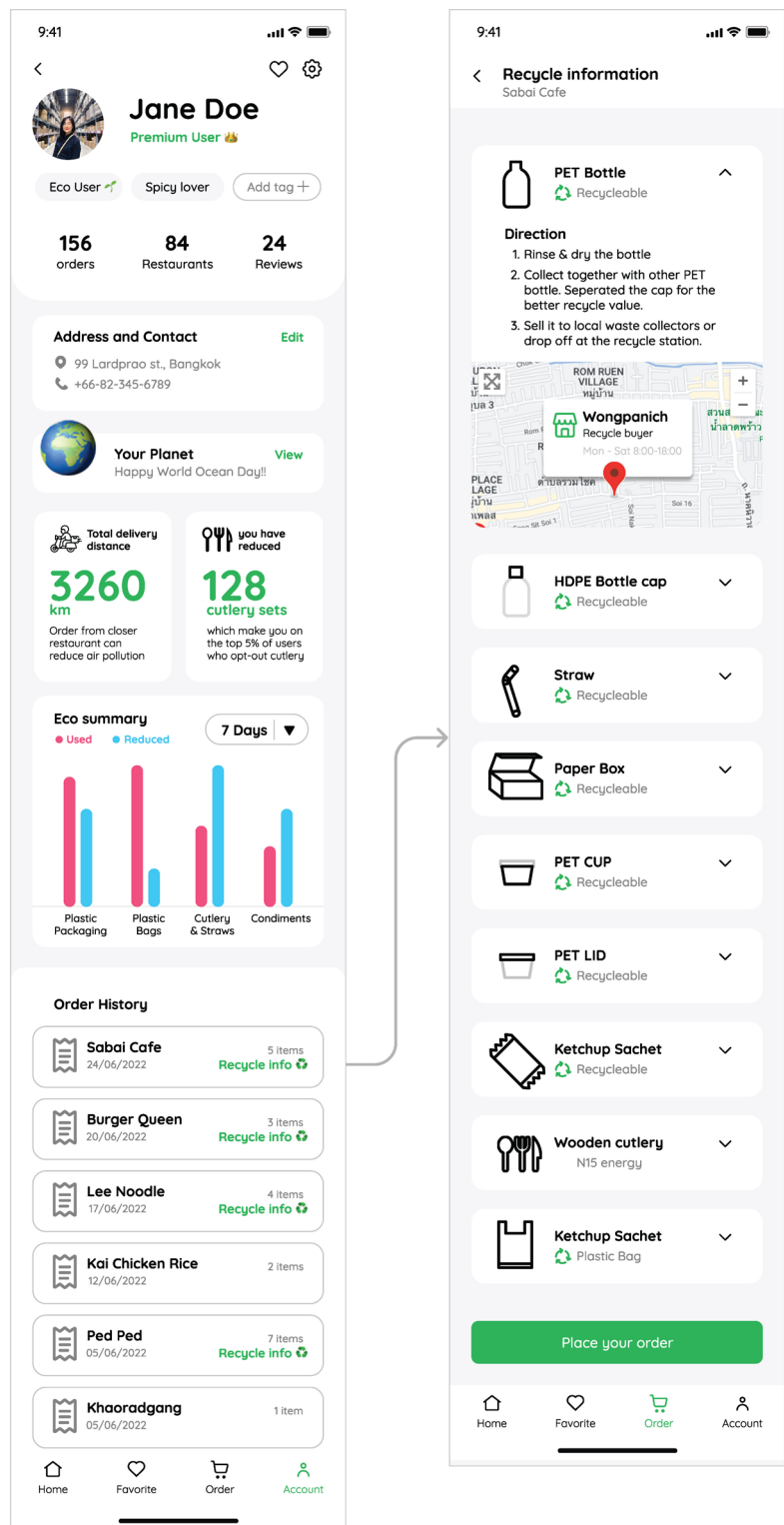


Figure 41 The high-fidelity prototype showing the profile page and the recycling information

### 5.3.2 The Interface of restaurant-user design and development

The interface for the restaurant-user was designed in correspondence with the end-user features. While the end-users should be able to adjust their packaging and condiments, the restaurant is the one who has to set up this information. This section discusses the process of how the restaurants can manage these options and how the customisation would appear when they receive the order.

#### o Condiments and complimentary option set up

Although with the existing feature in the current app, a restaurant-user can manually set up an option asking customers if they would like to

receive condiments or cutlery, the problem is they do not realise that they should add these questions. The design was developed into three alternatives focusing on how the restaurant-user can let their customers know what they provide along with the order and allow customers to remove the items they do not need.

The first alternative is to show example messages as a suggestion in the fill-in box when the restaurant-user creates a new option. This is the simplest alternative as there is nothing changed from the current user flow. *Figure 42* depicts how restaurants can set up the option. The orange arrow points at the suggestion message in the fill-in box.

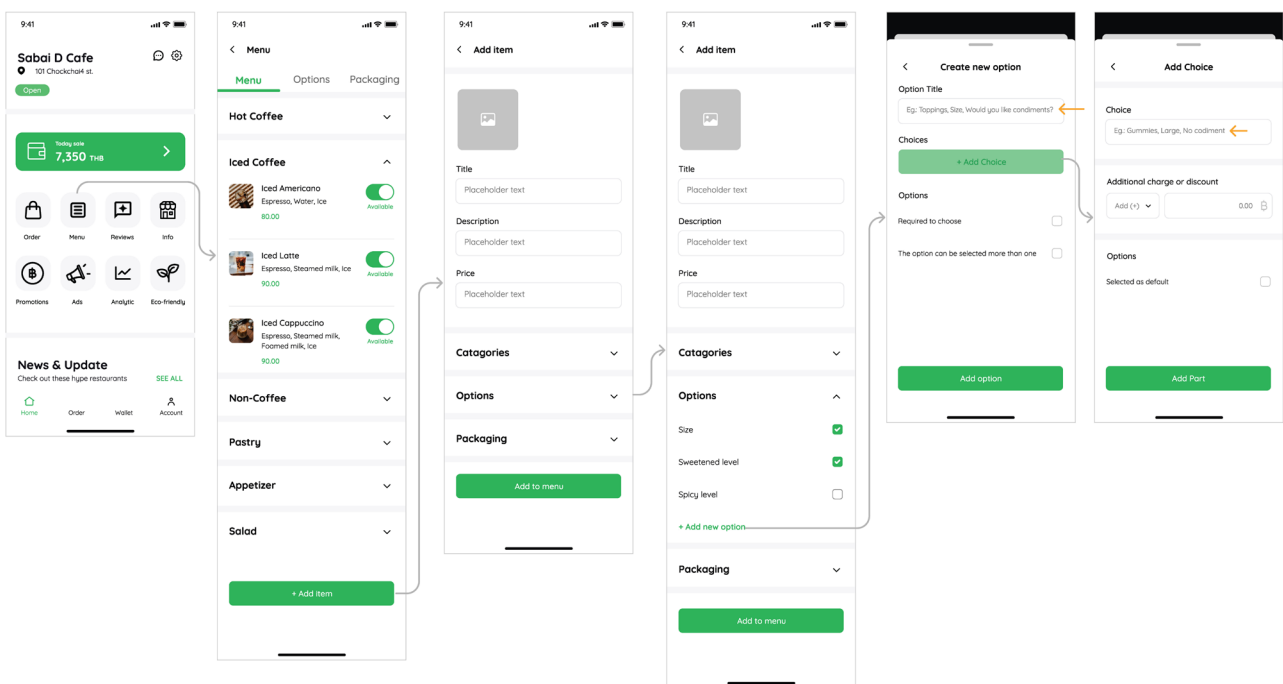


Figure 42 The high-fidelity prototype showing the suggestion to add condiments and cutlery option in the fill-in box

The second alternative (Figure 43) also shows a suggestion but much more prominent compared to the first alternative. In the “options tab”, where the restaurant-user can add a new option and see the list of their current options, the restaurant-user can scroll down under their current options list and see the eco-option suggestion box. In the suggestion box, there are available pre-set options that they can easily modify and add to their menu options.

Unlike the other two alternatives which are only shows as suggestions for the function

that already exists in the OFDS application, the last option (Figure 44) shows an interface with a new “condiments & complimentary” section. Under the section headline, there is a description text explaining that the restaurant should let customers know what they will get along with their meal. The text also emphasises that allowing the customers to opt-out of what they do not need can help reduce the restaurant costs and save the environment. The restaurant then can easily add the items by adding it into the box below the description.

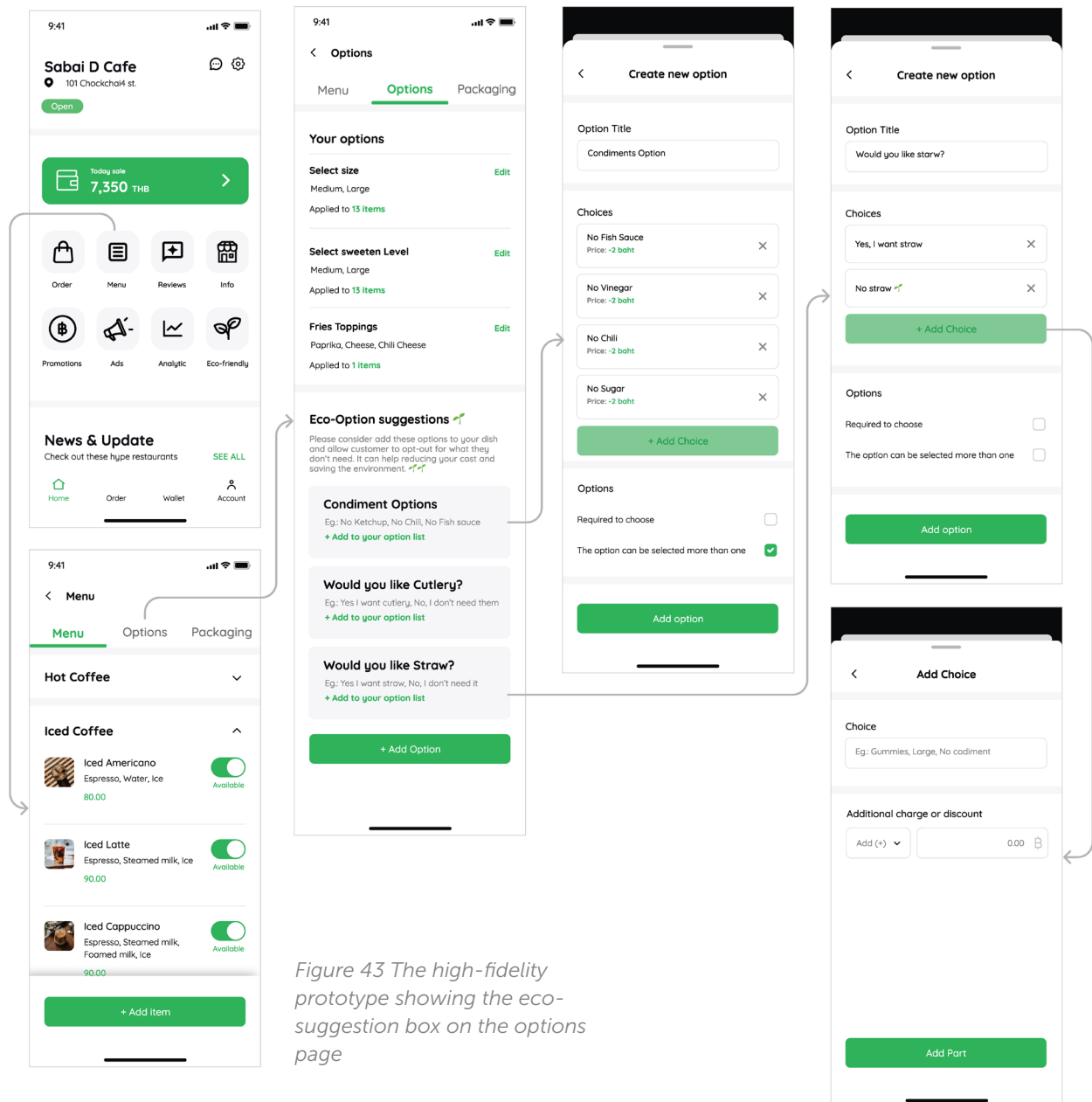


Figure 43 The high-fidelity prototype showing the eco-suggestion box on the options page

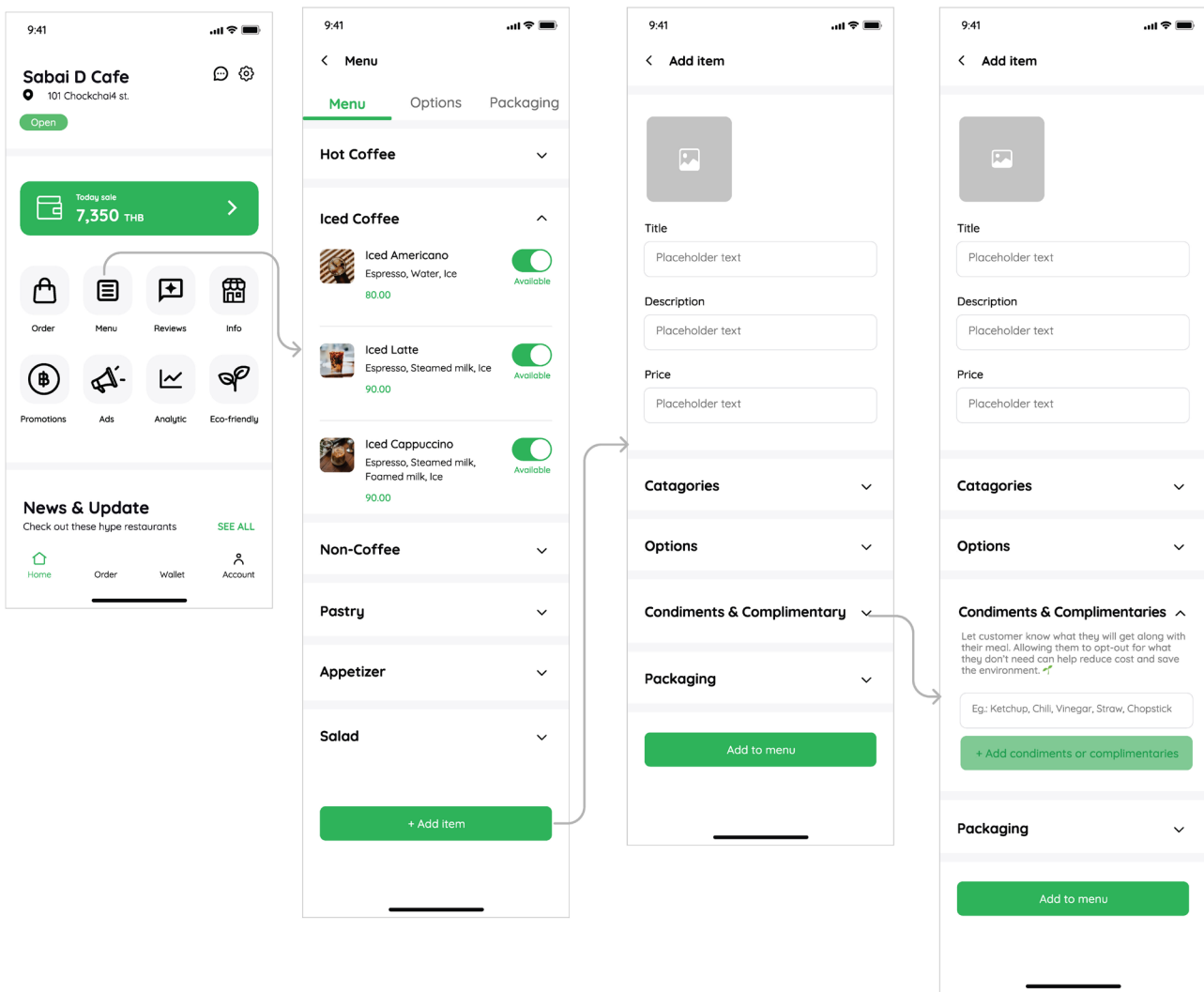
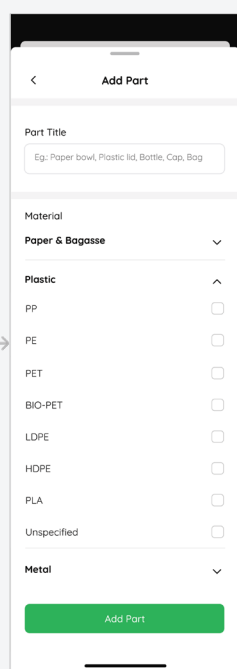
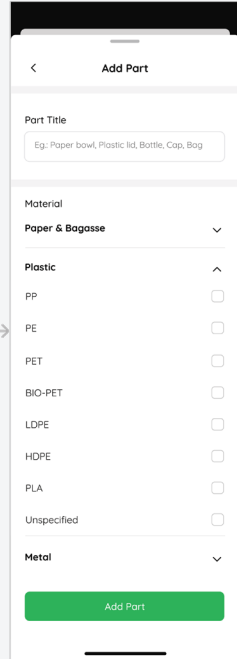
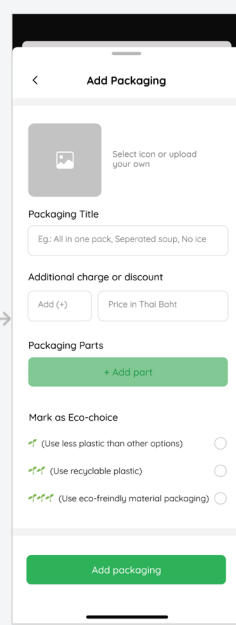
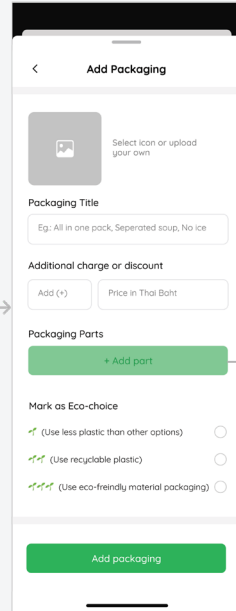
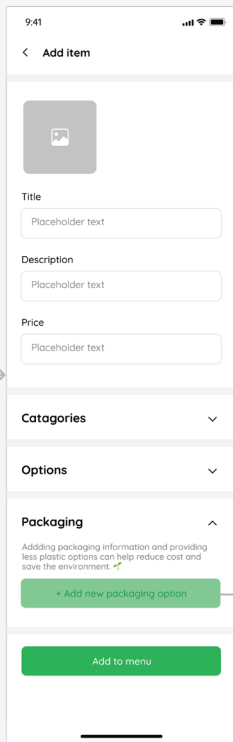
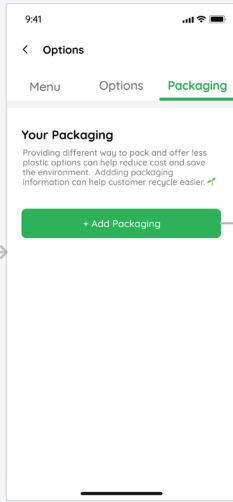
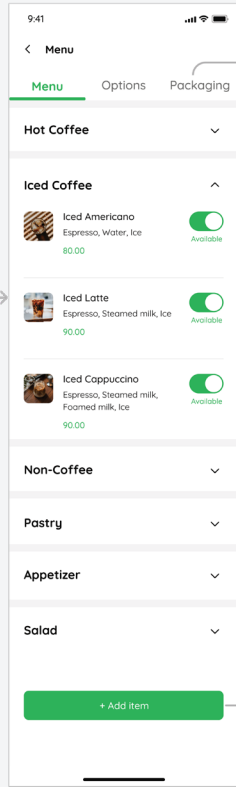
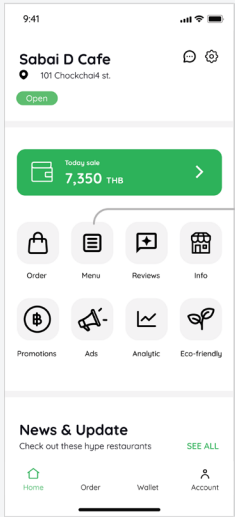


Figure 44 The high-fidelity prototype showing the new “condiments and complimentary section” on the “Add item” page

### o Packaging customization option set up

As discussed in [Chapter 5.3.1](#), the restaurant should provide different packaging options for customers to choose from. The new design interface inaugurates a “*packaging tab*” where the restaurants can add their packaging options. On the packaging page, there is a description suggesting why the restaurant should provide different packing options and offer fewer plastic options. The restaurants are responsible for adding material information which can help customers to recycle easier.

The material information will be linked to the database provided by the OFDS provider and shows how each packaging should be recycled. It is also possible to adjust the price for each packaging if needed. When packaging choices are specified on the packaging page, they appear in the packaging section whenever users add new items. This makes it is easy to assign which options are available to each meal by simply checking the boxes. They are also able to add new packaging options when they add new items.



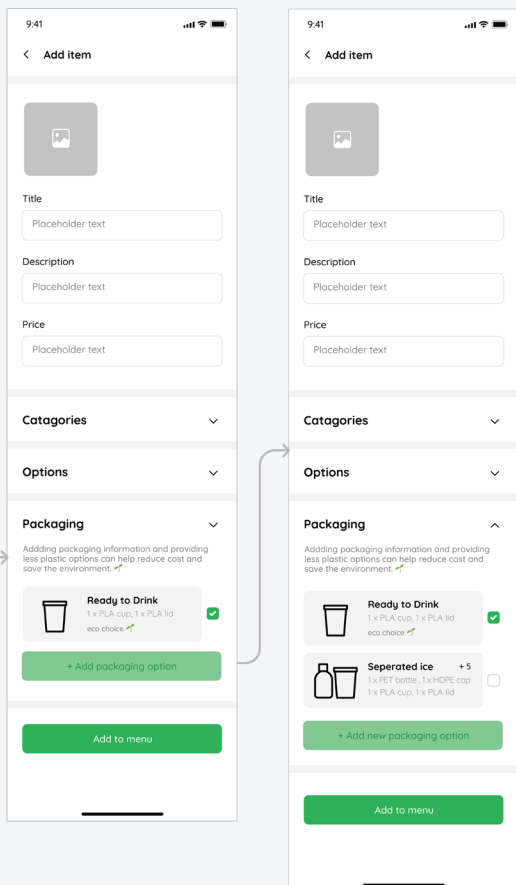
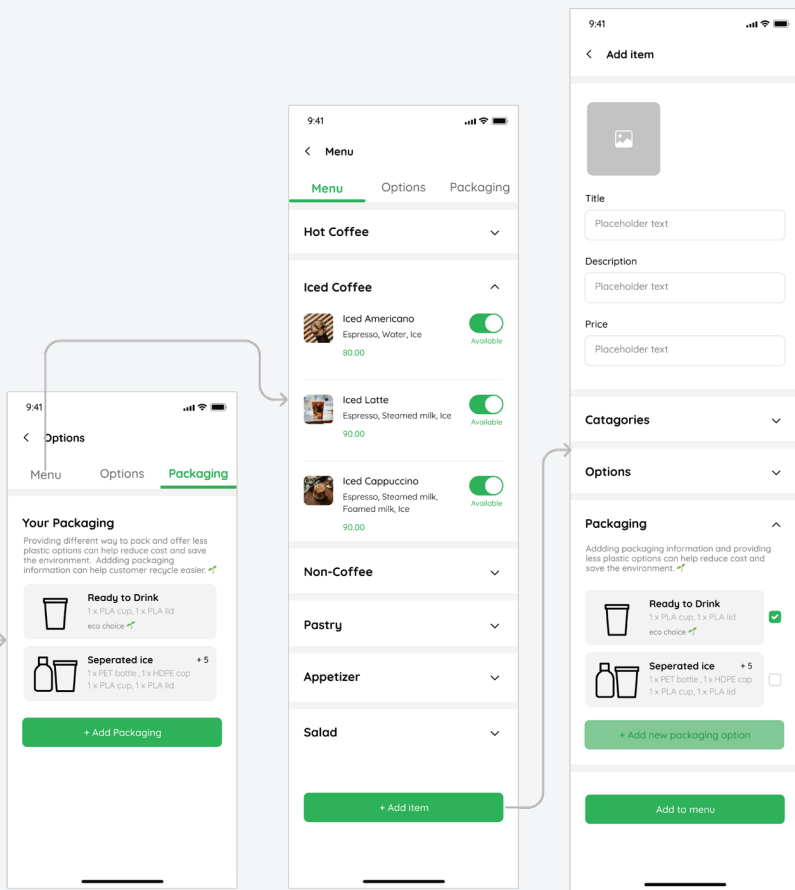
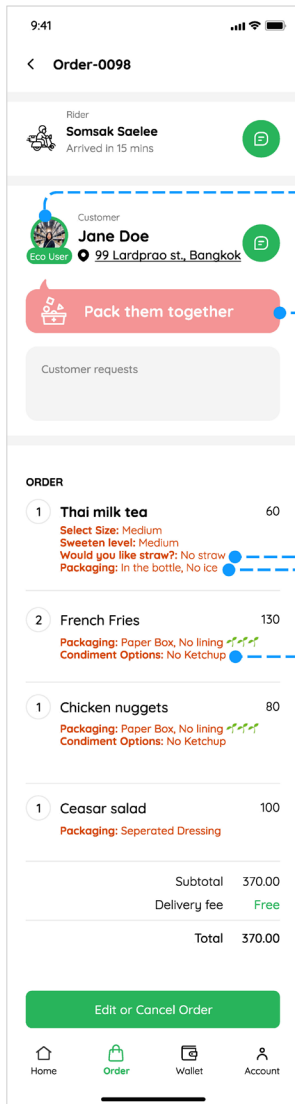


Figure 45 The high-fidelity prototype showing how restaurant can add the "packaging customization" feature.

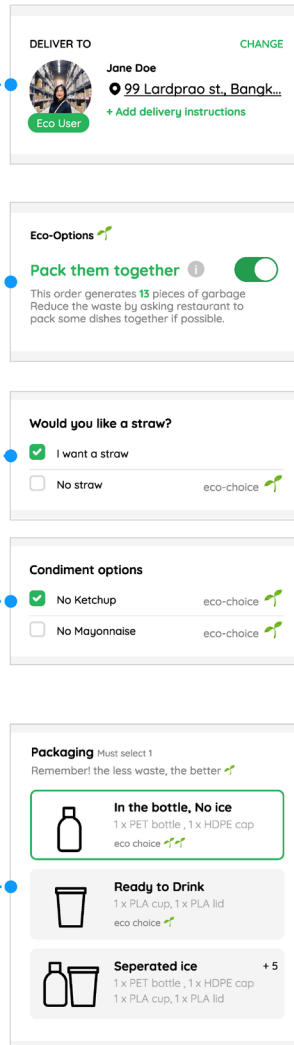


## Alternative 1

The received order interface showing how restaurant see the order.

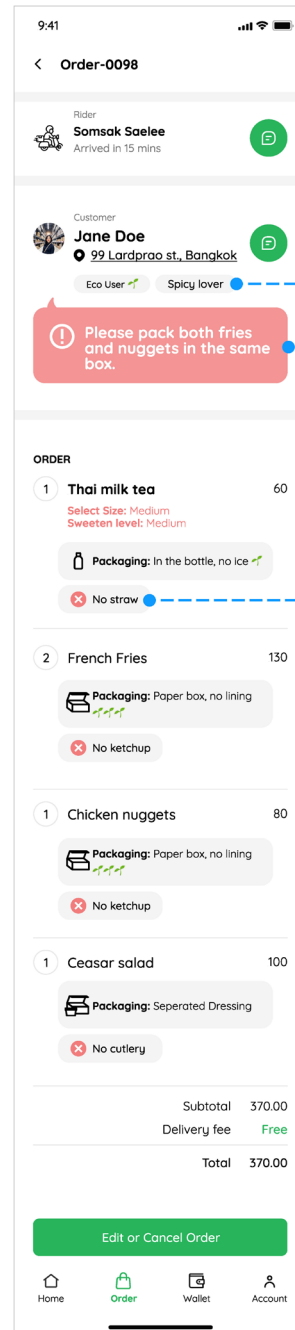


The design components on the end-user interface



## Alternative 2

The received order interface showing how restaurant see the order.



The design components on the end-user interface

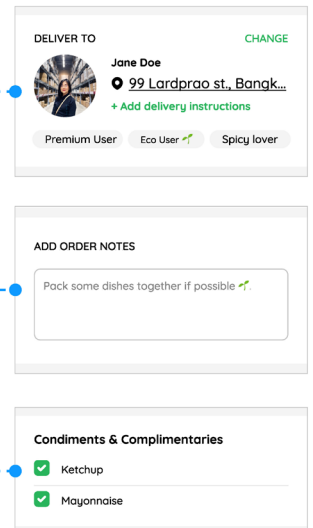
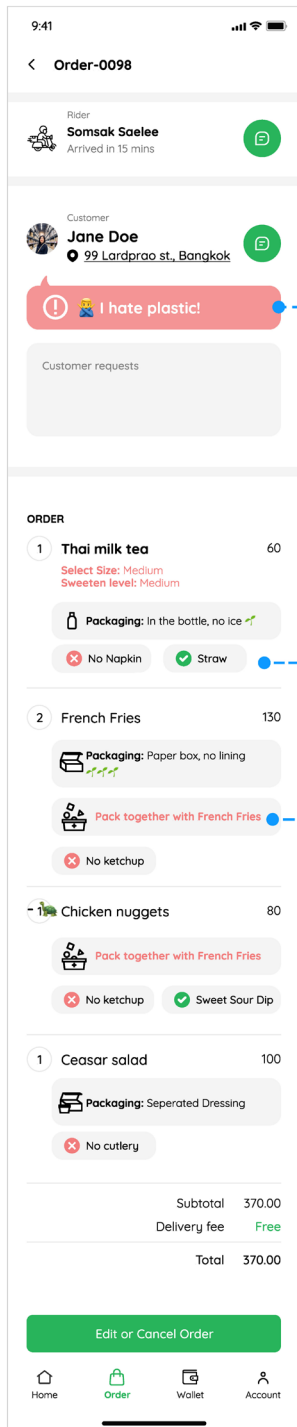


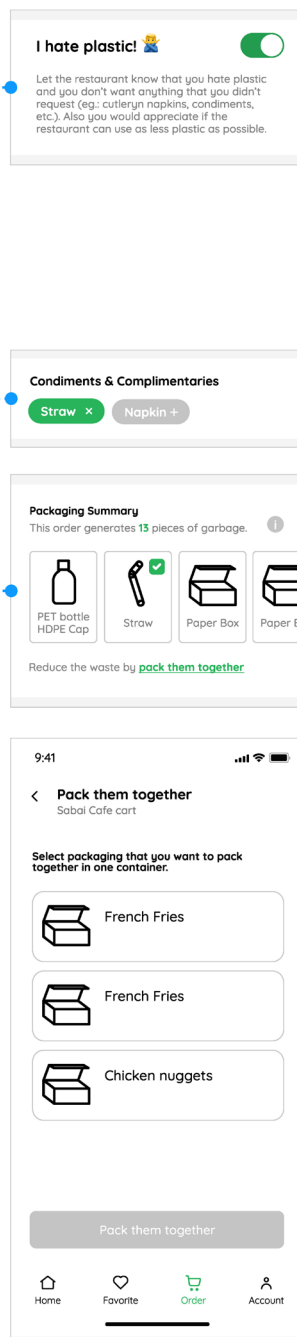
Figure 46 The high-fidelity prototype showing the received order page alternatives

### Alternative 3

The received order interface showing how restaurant see the order.



The design components on the end-user interface



### Receiving order

After the new features were set up, it is also important to consider how these features would appear when the restaurant receives an order. The end-user's customisation requests should be noticeable, yet they should also be simple and not too overwhelming. The restaurant worker should be able to easily understand the request and follow through with the order.

Figure 46 shows how each end-user design alternative that was discussed in Chapter 5.3.1 can be presented on the "received order" page. The design was developed into three alternatives. Each alternative contains different design components. These components can be mixed and matched after selecting the final solution. The left column of each alternative is the potential solutions of the "received order" page while the right column presents its connected end-user features.

For instance, the top section of alternative 1 shows the received order page when the customer set up their profile as an "eco-user" and turns on the "pack-them-together" switch. In this alternative, the "condiments and complimentary" option would be set up by the restaurant using the regular option feature which is the same way they set up their meal customisation. Therefore, the "condiments and complimentary" customisation would appear as the coloured text under the item title along with other options.

Alternative 2 illustrates how the received order page would be if the end-user has the option to identify themselves using tags and request for the food to be packed together by filling in the comment box. The tags will appear under user information. Below it is the request in the comment box with a red background to make it more noticeable. In this alternative, the condiments option has its own section and appears as a list that the customer has to uncheck to opt-out. The opted-out condiment will appear as a tag with a red cross icon.

The third alternative shows the interface when the customer has the *"I-hate-plastic"* toggle switch. If activated, it will show as a red comment box under the user profile. The *"condiments and complimentary"* option appears as a removable tags design, in this alternative. The restaurant worker will be able to see the tags showing what condiments and complimentary they should and should not pack along with the order.



Chapter 6

# Design Selection

As of now, several ideas were generated as discussed in [Chapter 5.2](#). The challenge is how to select which alternative of each feature should be in the final suggestion. In order to select and narrow down the idea, it is of advantage to acquire feedback from users. Although ideally, a physical meeting with users to test the prototype on a mobile device was the most desirable method, the participants and the researcher live in different countries, so the reasonable solution is an online workshop with a focus group. The goal of the workshop is to gather users' input on each design and see what the most preferable options from users' perspectives are. This section discusses how the workshop was designed and what the outcomes are.

The outline of this chapter is as follows:

- 6.1 Workshop design and preparation
- 6.2 Workshop results
  - Activity 1: Motivation
  - Activity 2: Packaging customisation
  - Activity 3: Pack them together
  - Activity 4: Condiment and complimentary customisation
  - Activity 5: Eco-user identification
  - Activity 6: Showing progress and recycling info
  - Summary of the workshop
- 6.3 Design selection
- 6.4 Area of improvement

## 6.1 Workshop design and preparation

The workshop was conducted with four participants and took 1 hour and 45 minutes to complete. Three of the participants are OFDS regular end-users and another one is a restaurant owner. The workshop was designed on FigJam web application. The participants were asked to familiarize themselves with the program before the workshop started. The workshop began with a ten-minutes introduction where the facilitator explained the information about the project and what the participants would have to do in the workshop.

The introduction also included the results from the user research explaining who the users are and highlighting their key insights and the purpose of the design.

After the introduction, the participants proceeded to the main activities. The design alternatives from [Chapter 5.3](#) were organised into six activities according to the insights. For activities one to five, the facilitator presented the ideas to the participants and asked them to use the dot-voting method to vote for the most

desirable idea. Each user had three dots that they could use for voting. It was up to them how they want to split the dots. They could give all three dots to one idea or separate one dot for one idea and another two for others. After the vote, each participant explained their reasons behind the vote and answered a few prepared questions on post-it notes. For the last activity, there was no voting as there was only one design. The facilitator presented the design and asked participants to brainstorm ideas on how to develop the page. Each activity took around 15 minutes to complete. After completing all activities, there were five minutes to wrap up and thank the participants and ask them to share their last thoughts.

## 6.2 Workshop results

### o Activity 1: Motivation

This activity aimed to find what would be the best way to motivate the convenience-oriented user to make eco-friendly decision. To elaborate, it was not that they did not want to be more eco-friendly but they could not make a connection between their everyday task and sustainable aspects. The four ideas that could help motivate users are:

- Gamification campaign
- Labelling the option with eco-choice
- Giving away eco-points that can be redeemed for rewards
- Providing discount.

The participants were asked to vote on which of these four ideas they thought would be the best way to motivate users.

As a result, the idea that received the highest score of six points was the “eco-points” alternative while the second place, with both three points, was the “gamification campaign” and “giving a discount”. The participants thought that the “gamification campaign” solution was interesting and would help raise long-term awareness while the advantage of “giving a discount” was an instant benefit. However, the “eco-points” seemed to be more feasible for all stakeholders (OFDS providers, restaurants, and end-users) and a better choice in the long run. As users would have to collect the eco-points over a period of time, this option could help them retain eco-friendly behaviours and be more consistent. The participants also suggested that the rewards from collecting eco-points could be eco-friendly products such as reusable straws.

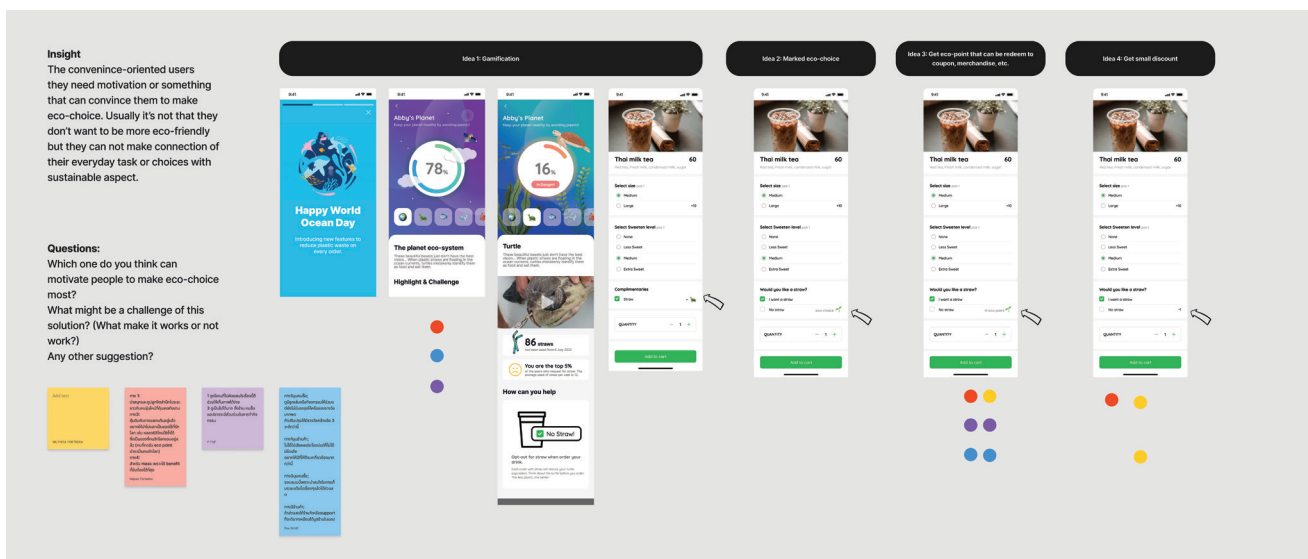


Figure 47 Workshop activity 1: Motivation



## o Activity 2: Packaging customisation

The reason for adding the “*packaging customisation*” feature is because end-users, especially the environment-oriented, want to know how their food will be packed so they can request for changes. Currently, they only know the packaging from the restaurant that they have ordered it before and they had to manually fill in the request in the custom note box. The new packaging customisation feature aims to advocate restaurants to not make assumptions about what customers might need. They can now provide different packaging options for customers to choose from, especially ones with less plastic for customers to choose from. Four interface designs that support this feature were presented to the participants. They were asked to vote for the

option that they liked the most and suggested how it could be improved.

The design that received the highest number of votes was the last alternative which was the one that shows all three options in one column. The advantage of this design was that it is possible to scan what are the available options in a single look. They also like that the price can be different. However, they said that the material information might be too complicated as not everyone could understand what specific names, such as PET and HDPE, mean. They only needed to know whether the packaging is recyclable or biodegradable. Although they knew what the recyclable icon is, none of them knew that the other icon means biodegradable.

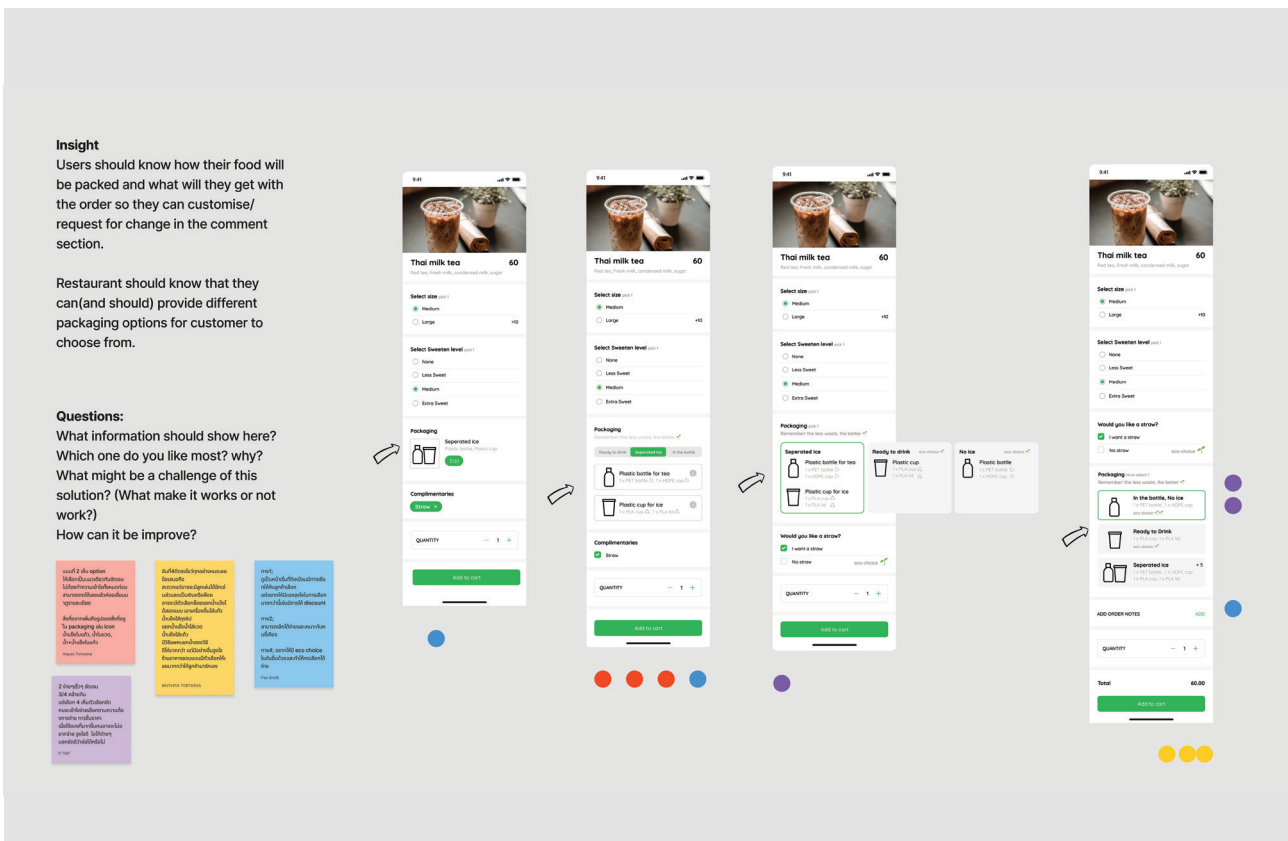


Figure 48 Workshop activity 2: Packaging customisation

### o Activity 3: Pack them together

Apart from customising how each dish can be packed, users should know that they can also ask restaurants to pack different dishes together. Three interface designs of this feature were presented to participants. The first one is when the user can click the hyperlink and select which items they want to combine into one container. The second option is for the customers to make a suggestion in the comment box and the last option is the “*pack-them-together*” toggle switch.

The result for this feature is unanimous. All participants preferred the last option and voted all three points for it. From their perspective, this was the simplest and easiest way as they did not

want to spend so much time ordering. They also believed that the restaurant would know better what can be packed together. The restaurant owner also had very positive feedback for this feature. He liked that he could be in control as sometimes customer manual requests could be difficult to accommodate. Giving control to the restaurant makes this option more flexible and it can be applied to various situations. The participants also suggested that the label or wording of the switch could be improved and maybe there could be an additional comment box when activating the switch in case a customer wanted to make a manual request or a remark if they do not want some items to be packed others

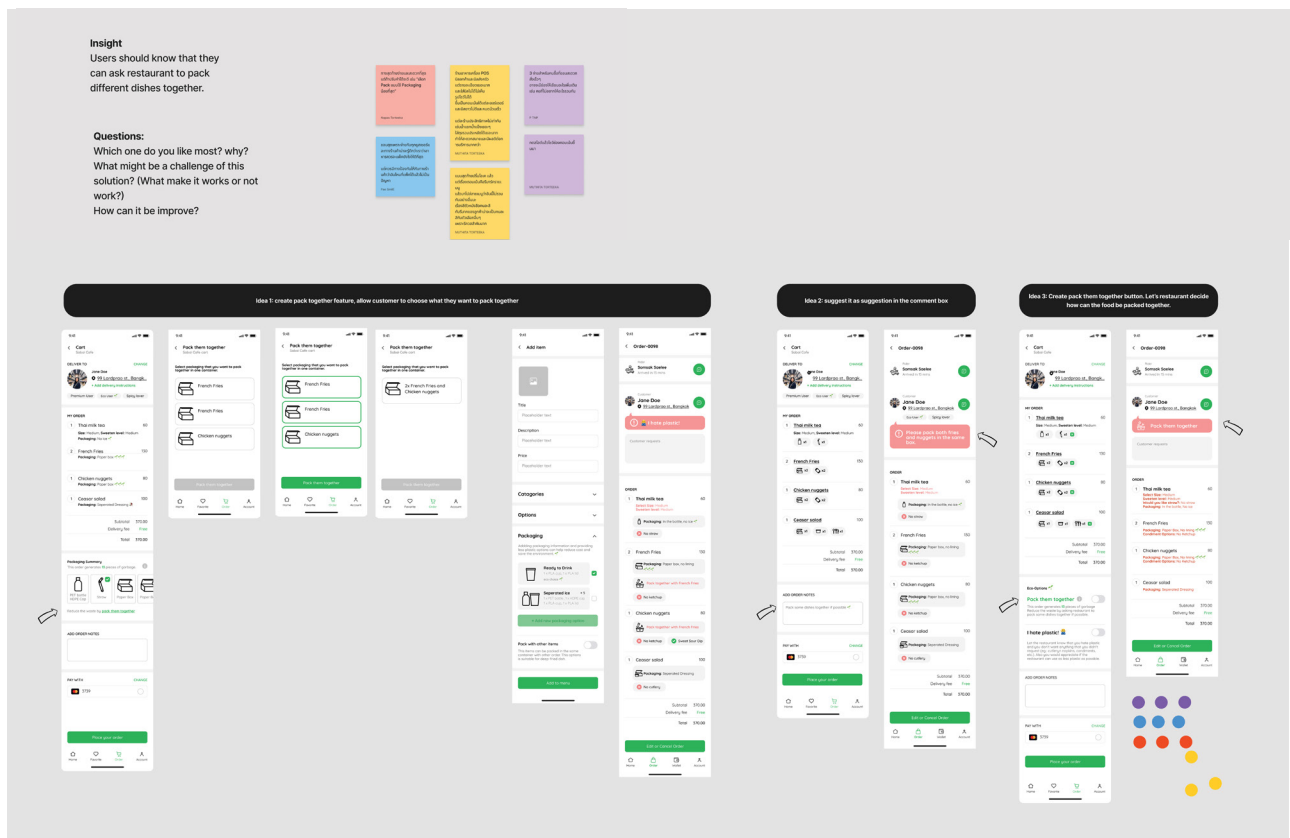


Figure 49 Workshop activity 3: Pack them together

### oActivity4:Condimentandcomplimentary customisation

Aside from packaging, customers should also know what condiments and complimentary items they will receive along with their order. The examples of condiments and complimentary items are ketchup, chilli fish sauce, vinegar, cutlery, straws, napkins, etc. Essentially, it is possible in the current application to set up condiment and complimentary customisation in the same way they set up other options to customise the meal e.g., size, topping, spicy level, etc. However, the problem is the restaurant did not know that they could include these condiments and complimentary options. This activity focused on how the interface can suggest to the restaurant that they can and should add this option.

The participants were presented with two

alternatives to vote from. The first one is the “eco-option suggestion” on the “options page”. Users can click the option that is applicable to their menu and see the adjustable pre-set that can be easily added to their options list. While the second one is to have a new “condiment and complimentary items section” on the product page where they can add their items by filling in the box.

Unlike other activities, the result for this feature was inconclusive. Although the first idea received more points, participants seemed to be sceptical. The end-user participants were unfamiliar with the restaurant interface and the English language. Although they agreed with the idea that condiments and complimentary items should be laid out and customisable, they thought the wording could be improved. It should be more attractive and highlight that

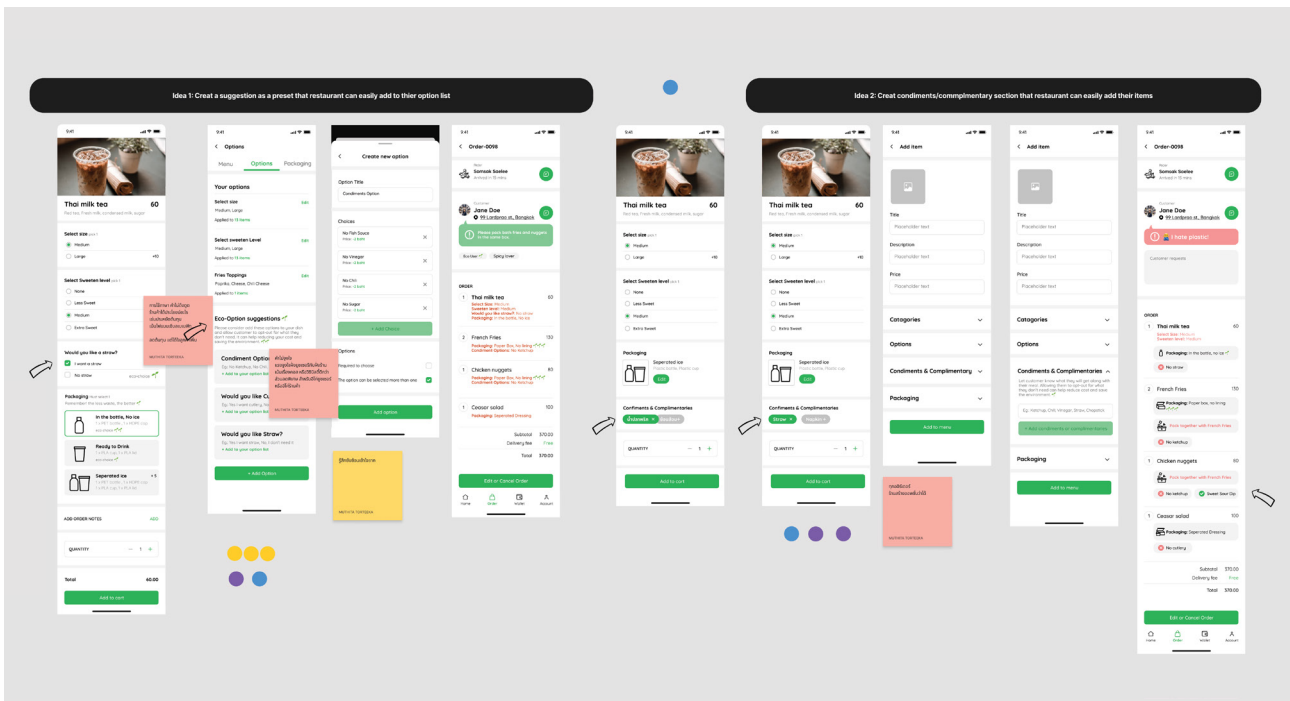


Figure 50 Workshop activity 4: Condiment and complimentary customisation

the restaurant can reduce the cost if they add these options. However, it was up for debate whether straws should be in this section, or in the packaging section. Despite the confusion about the restaurant flow, two end-users participants preferred the second alternative over the first one when asked to ignore restaurant interface. However, the participant who is the restaurant owner preferred the first option. They also suggested that the interface design should be more harmonised with other components. For example, instead of using a tag design to present condiments, it should be the check box instead.

**o Activity 5: Eco-user identification**

According to the insights gathered from the environment-oriented user, they want the

restaurant to know that they are not happy receiving cutlery especially when they asked not to. Restaurants should not make assumptions that it is better to give more but not less. For some users who take the environmental issues seriously, it is unpleasant. The OFDS applications should have a feature that assists restaurants to differentiate who is this type of customer so they can be more careful while preparing the order and oblige with their requests.

There are three design alternatives of how this feature. The first one is to have the "eco-user status under the customer profile picture, the second one is the tags showing their preferences, and the last one is the "I hate plastic" toggle switch. All participants voted for the last option as it is the most explicit direction.

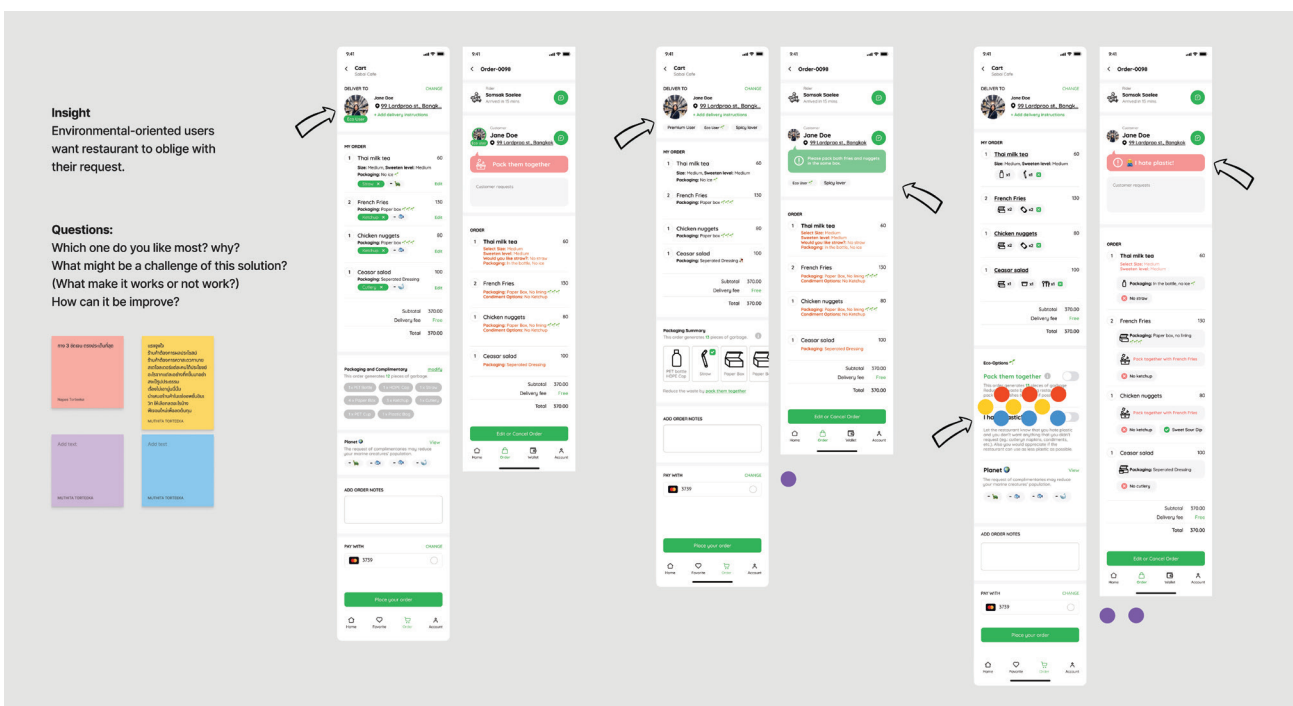


Figure 51 Workshop activity 5: Eco-user identification

### o **Activity 6: Showing progress and recycling info**

The last feature is to keep users motivated in the long run and persuade them to be more consistent. The facilitator presented the participants with the redesigned profile page that displayed the progress of how much waste they have reduced. The facilitator asked participants for their input on what kind of information they thought would help them maintain their engagement with the eco-activities.

The participants said that the data shows in the prototype was nice to know and would be suitable for someone who cared about the environment. But for the participants to be engaged in the long term, there should be some sort of financial benefits or rewards. They suggested integrating unlock features where there could be a progress bar showing how much the user has opt-out for the straws. When user collected the opted-out straw until a certain amount (e.g., 50 straws), they can get some small reward. And if they continue to save more, they will get bigger rewards. The data can also be more creative. Instead of raw numbers, the participants suggested it could be a fun fact comparison such as comparing the length of the straws that were reduced with the circumference of the earth.

One participant also mentioned that the monthly comparison or monthly challenge might not work as the number of orders they ordered from OFDS each month were different depending on their financial situation, so they were incomparable.

### *Summary of the workshop*

Before ending the workshop, participants were asked to share their last thoughts. All participants had positive feedback towards eco-friendly features and some said these options would help them reduce waste. But they also mentioned that the most important thing was that the features needed to be simple, seamless and not too complicated. In addition, the best way to persuade people was to provide something for them in return. They were very positive about eco-points.

They also mentioned that the restaurant should also gain some benefits too. For instance, having an eco-restaurant tag for the restaurant where users can get the eco-points. Although the idea of having an eco-merchant tag was designed and discussed in [Chapter 5.3.1](#), it was not presented in the workshop due to the limit of time. It was beneficial that the participant brought it up as it helped validate that this idea should be implemented.





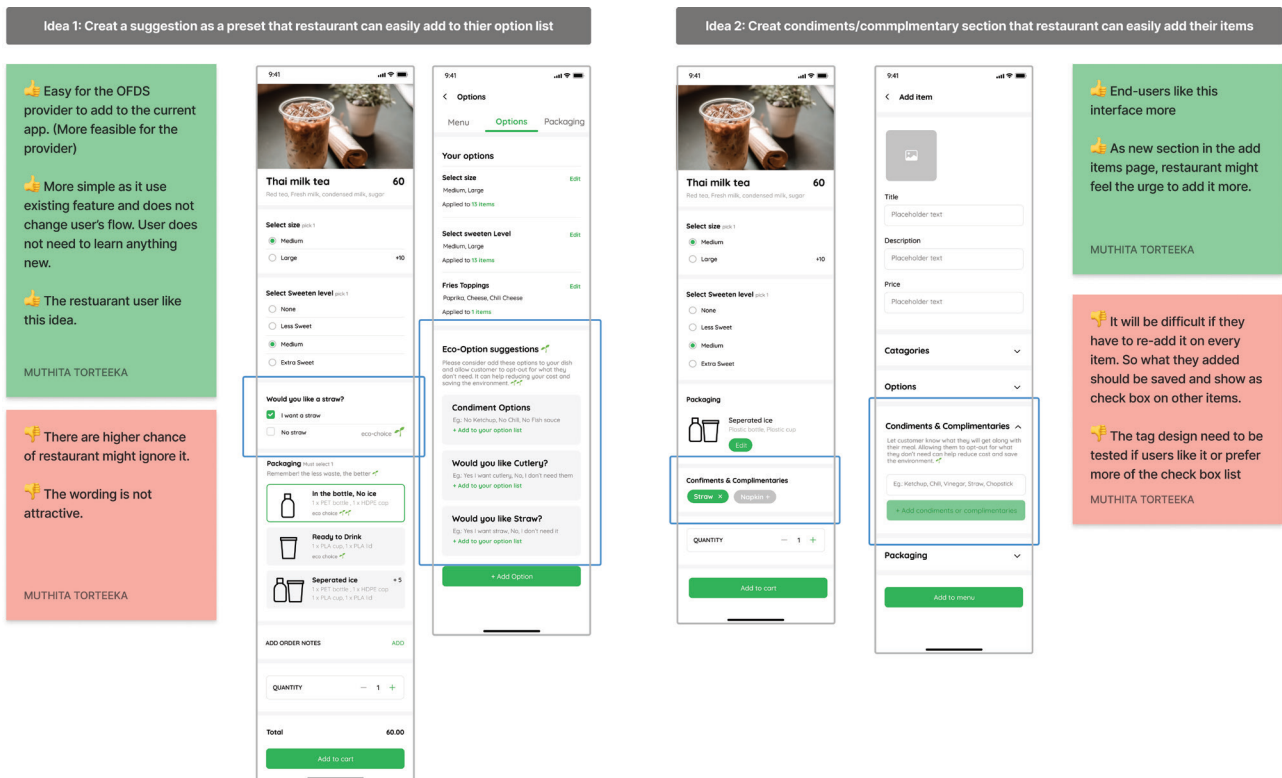
## 6.3 Design selection

At this point, the ideas that were generated through the ideation phase were assessed by the focus group through a workshop. After the workshop, I evaluated each activity result in order to determine the final solution. I mostly agreed with the results of the vote, considering all the feedback and the reasons that were provided by the participants. As a result, the final design of activities one, two, three and five would be the same as the dot voting results.

However, as the result from activity four were inconclusive, further detailed evaluation was required. *Figure 53* shows the pros and cons of each alternative. Although the second alternative provided a solid place for condiments and complimentary section which make “condiments and complimentary” customisation option more distinguishable, the eco-suggestion solution is simpler

and seamlessly integrated with the current functionality of the OFDS application. The advantage of the eco-suggestion aligned with what participants mentioned in the wrap up that the most important aspect is the new design need to be simple.

Therefore, the “eco-suggestion” alternative was selected. This alternative is also more feasible for the OFDS provider. As they only need to simply add a suggestion box instead of creating a new section and feature on the “add item” page. It also does not change any user flow, so the user does not need to learn any new step. For these reasons, the “eco-suggestion” alternative is much simpler compared to the other. This decision aligned with Wongprapinkul and Vassanadumrongdee’s (2021b) findings. They found that the users preferred the solution that was not too complicated and did not require to change their behaviours too much.



## 6.4 Area of improvement

After the solutions for each feature were selected, the next step was to develop the final design which is discussed in the following chapter. Most of the selected designs still needed to be developed follows the participants' feedback. The summary of which solutions have been selected and how they should be developed are as follows:

### ○ **Activity 1: Eco-point**

**Area of improvement:** Developing the eco-point system so that the users could get the point when they make an eco-friendly choice. The eco-point can be linked with the eco-merchant scheme where the eco-merchant restaurant can determine which choice is eco-friendly and offer eco-point for those option.

### ○ **Activity 2: All packaging options show in one column**

**Area of improvement:** Minor change in the material information detail. The specific terms such as PET and HDPE could be removed or changed to be more user-friendly. The design could also be changed to be more harmonised with other design components.

### ○ **Activity 3: Pack them together toggle switch**

**Area of improvement:** Although the participants suggested that there could be a comment box popping up to add a specific note, the box would be redundant with the usual "custom note" box in the bottle of the page. If a user would like to fill in a specific request, they could use the normal "custom note" box instead. Therefore, it was not required to add another box and there was no change in this feature.

### ○ **Activity 4: The eco-suggestion and pre-sets**

**Area of improvement:** The wording could be changed to be more financial attractive.

### ○ **Activity 5: I hate plastic toggle switch**

**Area of improvement:** As all participants were pleased with the solution, there was no suggestion on how it could be improved. Therefore, this button would remain the same.

### ○ **Activity 6: Profile page**

**Area of improvement:** Developing the unlock feature that users can check on their profile page. They should see how many points they have, and what it can be redeemed for. They should also be able to see that if they continue saving more, they will get better prize.



Chapter 7

# **The Final Design and Discussion**

This chapter discusses the final design suggestion on how the OFDS applications can be enhanced to reduce waste that was caused by the platform. These solutions were designed based on insights that were gathered from user research that was discussed in *Chapter 3*. The solutions are design suggestions that should be able to implement in other OFDS interfaces. The solutions were created for two types of users. One is the “*end-user*” who uses the OFDS application to order the food while the other user is the “*restaurant-user*” who set up their shop and receives orders from the OFDS application. As each type of user required separated interfaces therefore the final solutions were separated between the end-user and restaurant-user. The final high-fidelity prototype can be found in *Appendix D* or accessed through the link: <https://bit.ly/3zdXMp0>

The outline of this chapter is as follows:

#### 7.1 End-user interface design solutions

- Eco-merchant category
- Eco-reward
- Packaging Customisation
- Pack them together
- I hate plastic
- Recycling information

#### 7.2 Restaurant-user interface design solutions

- Eco-suggestions to add condiments and complimentary items option
- Packaging customisation
- Receiving order
- Material information

#### 7.3 Limitation

## 7.1 End-user interface design solutions

For the end-user, six features could be implemented into the interface. The goal of these features is to facilitate users to make eco-choices. These features are “eco-merchant category”, “eco-rewards”, “packaging customisation”, “pack-them-together” request button, “I hate plastic” identification, and “recycling information”

### 7.1.1 Eco-merchant category

The “eco-merchant” is a new restaurant category. The restaurants that can be in this group need to pass the eco-criteria that was set up by OFDS providers. The restaurant who wants to receive the eco-merchant tag must try to improve their packaging to be eco-friendly materials such as bagasse or paper as much as possible. It is understandable that plastic is still needed for some types of food. In that case, the plastic should be recyclable or biodegradable. In addition, the restaurants should set up “condiment and complimentary options” as well as provide “packaging customisation options” if applicable. The eco-merchants should also set up their “recycling information”, so customers know how it can be recycled.

In return, the restaurant would receive more visibility. It also helps add value to their brand. By having an eco-merchant tag, customers can understand that the restaurant set up eco-options because they care about the environment not because they are being cheap. Moreover, another advantage of becoming an

eco-merchant is that only the certified eco-merchant can give eco-rewards (which will be discussed in the following section). This would provide advantages to the eco-merchants over similar competitors as users who are collecting eco-rewards would prefer to order from the restaurants that can provide points.

The eco-merchant labelling would also help end-users to find eco-friendly restaurants easier as according to the survey results in [Chapter 3.6.1](#). One of the solutions that users are likely to partake in is to support restaurants that use eco-friendly packaging. These results also correlated with the results from Wongprapinkul and Vassanadumrongdee (2021b) survey that customers would likely support the stores with an eco-label.

As shown in [Figure 54](#), the proposed design solution suggested that the eco-merchant stores could be identified by the green label over the restaurant cover image. Users can also browse for eco-merchant on the front page at the eco-merchant carousel or find it as a search suggestion. In case the cover image is too small, the label could appear as a green tag above their name.

Although this research suggested how the eco-merchant could be integrated into the design interface, for successful implementation, this solution still requires further service design development on how the OFDS provider would promote and verify eco-merchant restaurants.



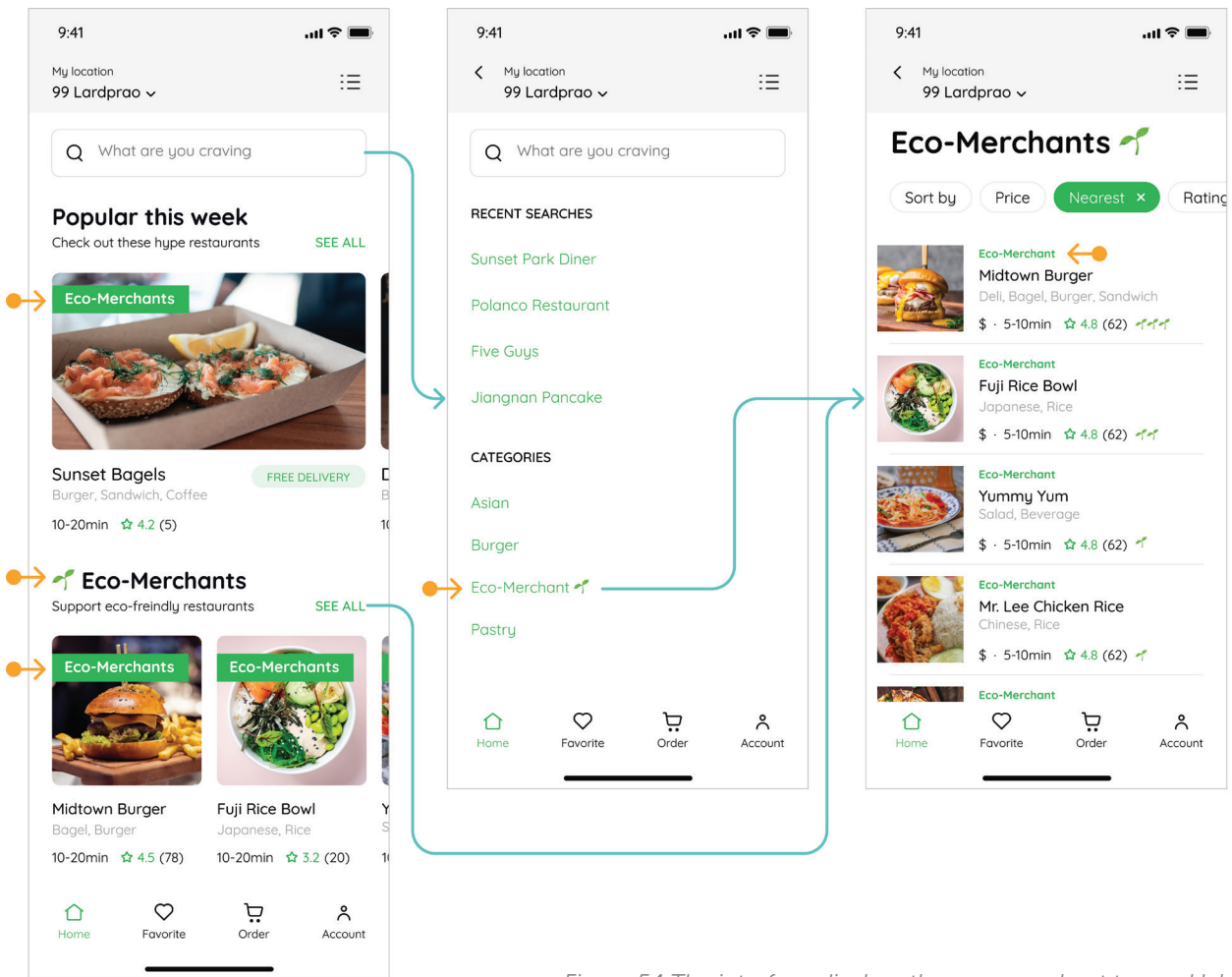


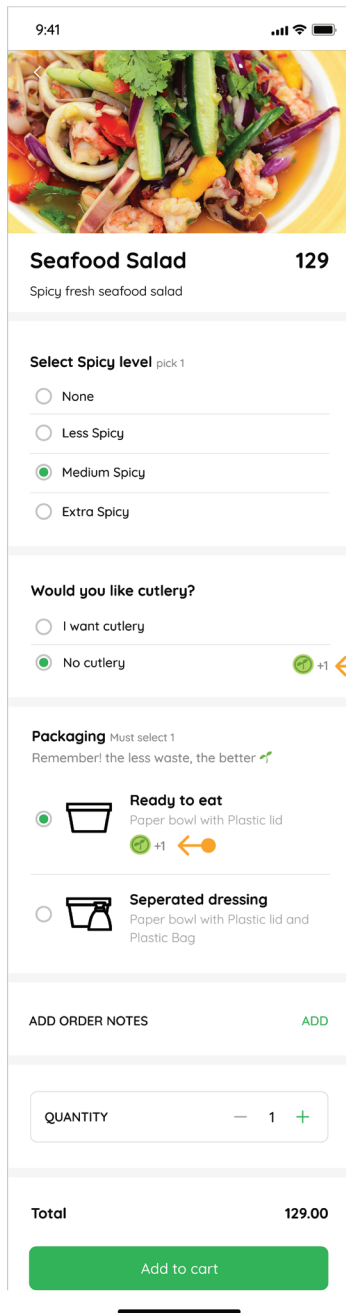
Figure 54 The interface displays the eco-merchant tag and label.

## 7.1.2 Eco-reward

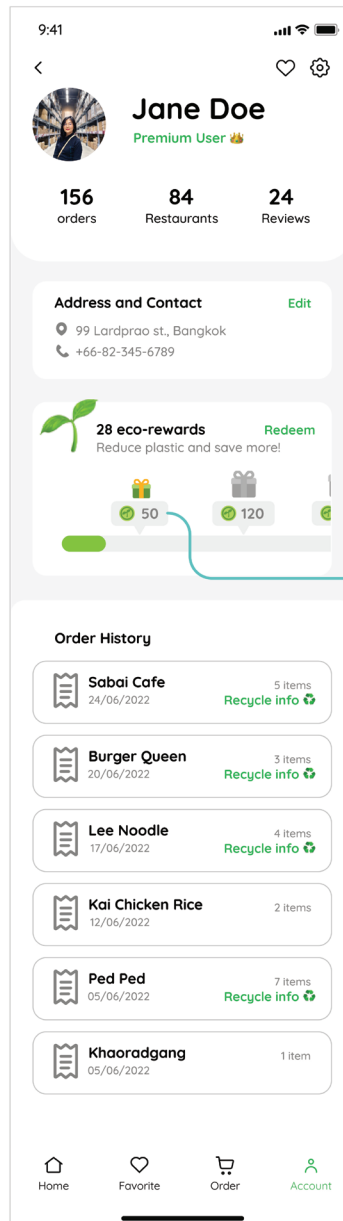
Eco-reward is a strategy to persuade users to make eco-choices. As the convenience-oriented users often forget to consider the environmental aspect, this feature is added to remind them which choice is better for the environment. It also persuades them to make an eco-choice as they can get a reward in return. In addition, it can also help the context-dependent user to be more consistent and motivate them to continue selecting eco-friendly options with the unlock feature. And for the environment-oriented users, these prizes are their trophies. They can share their achievements of how much they have saved and use it to encourage people around them to do the same.

The eco-reward appears as a coin located beside the customisable choice that the user has to select. When users select eco-friendly options, such as opting out of condiments or selecting less packaging, they will receive one eco-reward. The eco-reward is collectable, and users can track them on their profile page. The collected rewards are presented as a progress bar. When it reaches a certain amount, they can redeem the rewards for the prize such as a discount coupon or eco-friendly merchandise. The prize value depends on how many rewards they have collected. If they continue to save more, they can exchange it for a better reward. It is up to the OFDS provider to select how

### Product Page



### Profile Page



### Pop up

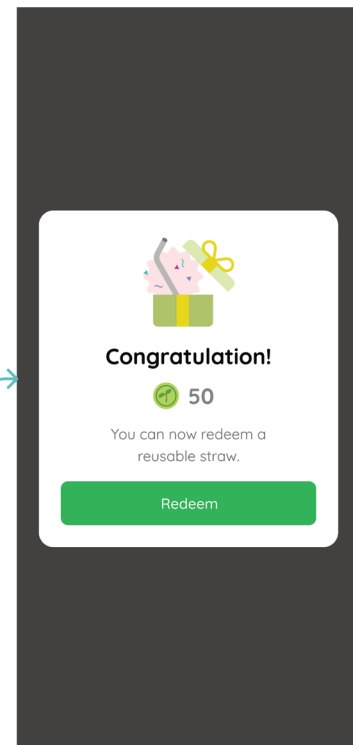


Figure 55 The interface displays eco-rewards feature.

many eco-rewards consumers need to acquire the prize and determine the value of the prize that is suitable with their budgets.

Although this project focused only on suggesting the new function, and the placement of the new features in the interface, the OFDS providers also need to establish the services to

support this feature. As the eco-reward can be given by an eco-merchant, there should be a way to verify that these eco-rewards are only assigned to the eco-friendly choices and not to other irrelevant options such as spiciness level, size, etc. The restaurants that provide eco-rewards wrongly should receive a warning or a penalty.

### 7.1.3 Packaging Customization

The result from the user research revealed that the environment-oriented users would like to know how the food will be packed so they can ask the restaurant to customise them. As different users also have different preferences, some of them may prefer the food not to be separated into many ingredients. This way it is easy to unpack and ready to eat. Meanwhile other customers may prefer some part of the food to be separated to maintain the freshness. Instead of assuming what customers want, restaurants should provide different ways of packing for customers to choose from. A different way of packing does not only mean providing different packaging materials e.g., plastic box versus bagasse box but also includes how the food is packed. According to the result of the diary study, users thought that some packaging can be less excessive by using fewer plastic bags or not separating some ingredients or toppings.

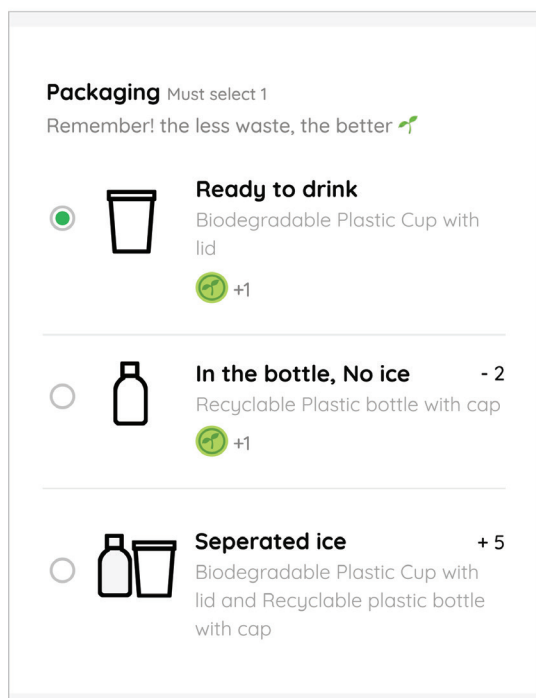


Figure 57 The checkout page displays pack-them-together and "I hate plastic" button

The final packaging customisation design was changed following the feedback from the workshop. The new design was changed from boxy options to be the selectable choice with a circle in the front. The new design is more seamless as it is similar to the other customisable options. The information also changed to be more descriptive. Instead of showing specific names such as PET, HDPE, etc., the new design shows a simpler packaging description instead. If the user order from an eco-merchant and chooses the less plastic option, they can get an eco-reward. Restaurants can also increase or reduce the price of each option.

### 7.1.4 Pack them together

Apart from customising each dish's packaging, the single-use packaging waste from each order can be reduced by combining different dishes into one container. This is a suggestion received from the diary study and user interviews that some items such as deep-fried foods, or the same dipping sauce could be packed together.

On the checkout page, a user can find the "pack-them-together" toggle switch in the "eco-options" section below the summary of their order. There is also a text explaining the feature and reminding them that it can reduce waste. It is up to the restaurant's judgement what they think could be packed together.

In today's application without this button, some environment-oriented users would send the request to pack the food together by filling in the custom note box. However, for the user who is convenience-oriented, they would not even think about it. Meanwhile for the context-

## Check out page

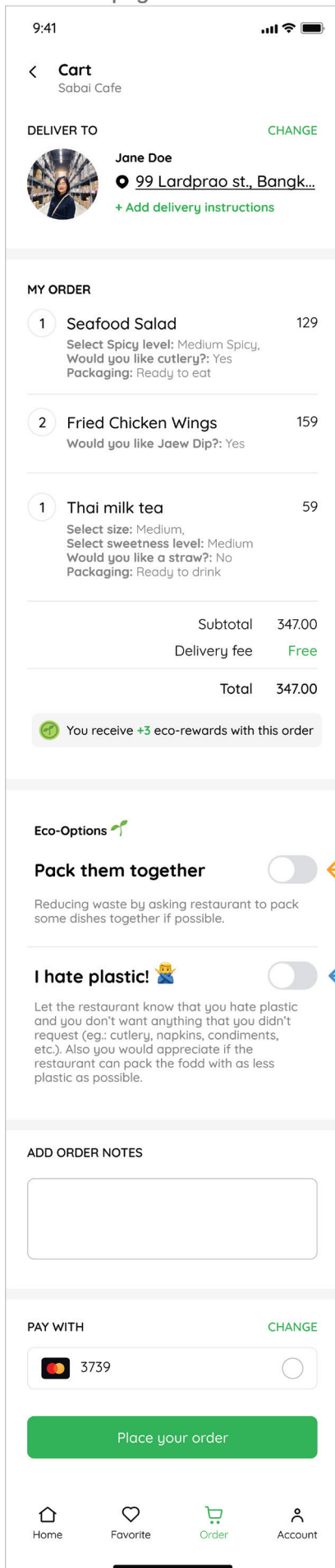


Figure 58 The recycling information page

dependent user, filling in the box might be too cumbersome. This *“pack-them-together”* button would remind the convenience-oriented user that it is possible to make this request. It is also easier for the context-dependent to simply switch on the button instead of filling in the *“custom note box”*.

The switch default is off so the user must turn it on if they want to allow the restaurant to pack some dishes together. Although if the default is on, it might be able to reduce more waste. But it would also cause the same issue with today's *“request-for-cutlery”* button that users do not trust the interface. According to the 10 Usability Heuristics for User Interface Design by Nielsen (2020), the interface should match the convention of the real world. It is a custom that different food orders would be packed separately, therefore the default should be off.

Although in this project, the button was designed in English, in reality it should be in Thai to communicate with the Thai user. The suggested Thai label for this option is *“อนุญาตให้บรรจุรวมกันได้”* (pronounced as pack-ruam-gun-dai) which means *“allow to be packed together”*

### 7.1.5 I hate plastic

The *“I hate plastic”* toggle switch was created from the insight that the environment-oriented user wants to be heard. They want the restaurant to take their request of not wanting plastic seriously. As the restaurants normally assume that there is no harm in giving more, this feature may remind them that it is not the case for some customers. As the button uses a strong and direct phrase as *“I hate plastic”*, the restaurant that want to please customers would be more careful handing out plastic containers and cutlery.

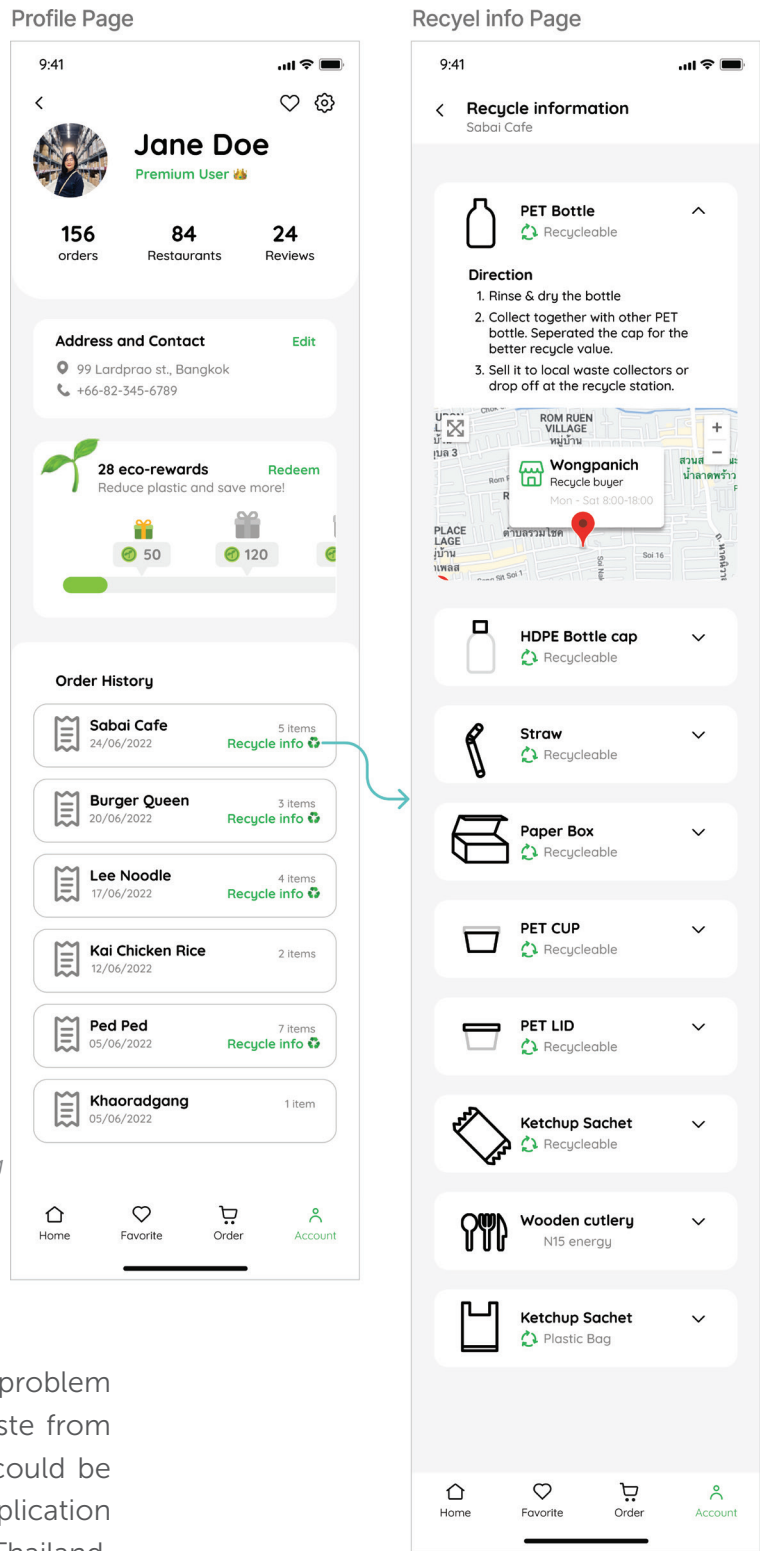


Figure 58 The recycling information page

### 7.1.6 Recycling information

The result of the survey shows that the problem with sorting single-use packaging waste from OFDS is that it is unknown where it could be sent to recycle. This is due to the complication of nonuniform recycling system in Thailand. Some types of packaging can only be sent to specific places as other recycling points do not want them. Another issue is not knowing what material they are made of. Hence, the OFDS application could help assist recycling behaviour by providing relevant disposal information. This would help the context-dependent users as they tend to be more engaged in eco-friendly activities if it is easier for them.

Users can find recycling information by checking their order history and clicking the button to see recycling information on the packaging from each restaurant. The page displays what material the packaging is, how each packaging waste should be treated and, where they can be sent to recycle.

## 7.2 Restaurant-user interface design solution

There are four intervention points in the restaurant-user interface design. The goal is to reduce waste by urging the restaurant to stop making assumptions and excessively packing the food. Instead, they should pack the food efficiently according to what customers need. The final “restaurant-user” design interface solution assists the restaurant-user in finding out each customer’s preferences by providing customisable options. As the restaurant-user is the one who needs to set up the end-user features (Chapter 7.1), the new interface established how to integrate those functions into restaurant-user interfaces.

### 7.2.1 Eco-suggestions to add condiments and complimentary items option

The interview participants reported the struggle of not knowing what condiments, cutlery, and other complementary items they would get along with their orders. Hence, they did not know what exactly need to be filled in the custom note box to avoid receiving those items. The restaurant should add options asking customers whether they would like to receive these items. Although it is possible to set up these customisable options through the existing function of the application, the restaurant did not know or did not consider that they should add these condiments and complimentary items as an option.

To encourage restaurant-users to add condiments and complimentary items options to their store, the new design interface

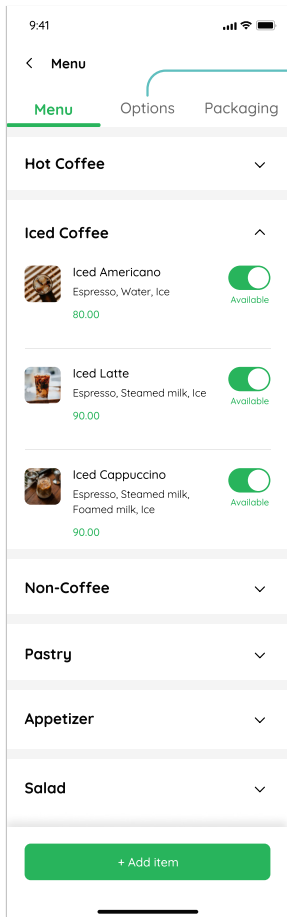
displays the suggestion box on the “options page” located below their current options list. As shown in Figure 59, the suggestion was designed to be in the green box separated out from other components. The title of the suggestion box was changed from “eco-option suggestions” to “How to save both money and planet 🌱” to point out that adding these option is not only good for the environment but also help reduce the restaurant cost.

The restaurant-user can simply click on any of these suggestions that are applicable to their store. Then they will see the page to add a new option with a pre-set that was already set up for them. They can easily modify the pre-set to match what they have in their store and add it to their list. It is also possible to adjust the price of each choice in case the restaurant would like to provide a discount when customers opt-out of these items. The eco-merchants will have the option to determine if it is an eco-friendly choice and provide customers with the eco-reward. This pre-set assists the restaurant-user to easily form their questions and choices as well as encourage them to provide condiments and complimentary items customisation options.

The focal point of this project is to show how the eco-suggestion box could be integrated into the interface but not the copies of the suggestion. The OFDS provider should have a professional copywriter develop the text on how it could be written. The messages should also be written in Thai. It does not need to be a direct translation of the suggestions in this research, but it should contain the message that the restaurant would gain financial benefit while being able to help improve the environment.



### Menu Setup Page



### Option Setup Page

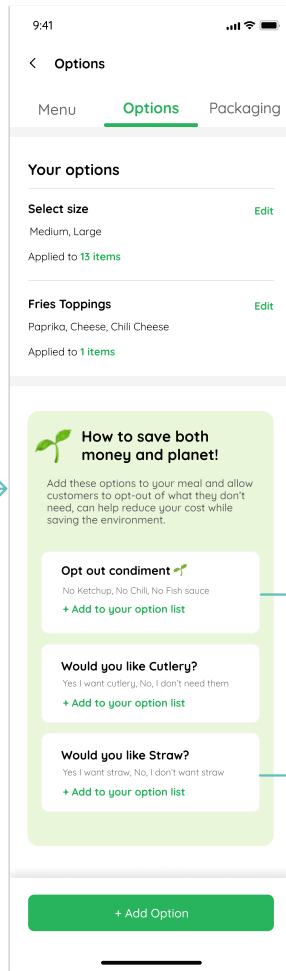
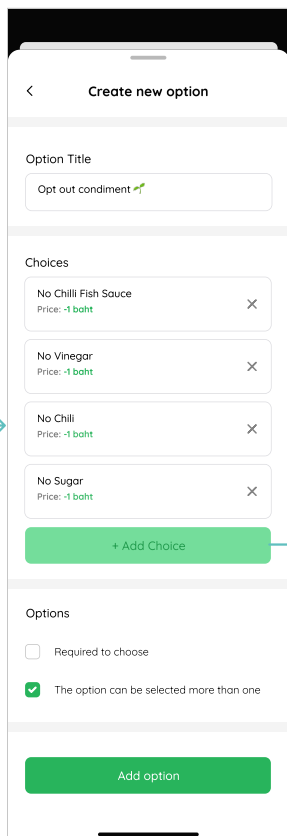
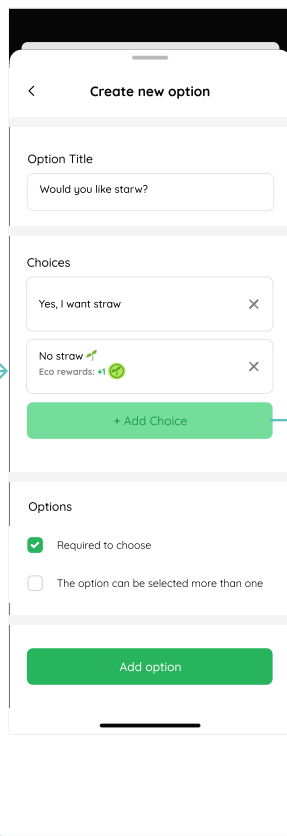


Figure 59 The interface displays the suggestion to add condiments and complimentary items options, and how to add it the options list.

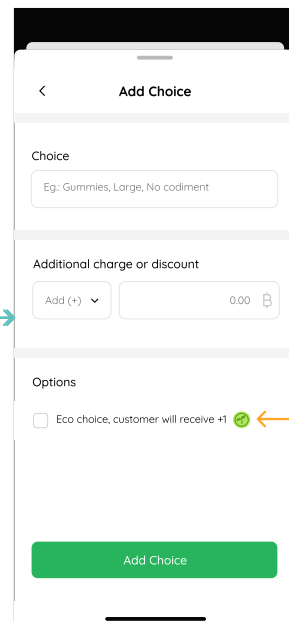
### New option Page - with preset



### New option Page - with preset



### Add Choice Page



Only appear to eco-merchant user



## 7.2.2 Packaging customisation

As discussed in *Chapter 7.1.3*, the end-user should be able to select how their food is packed. Therefore, the restaurant-user is the one who needs to provide those options. *Figure 60* shows how restaurants can set up the packaging option. To start, they can click on the “packaging tab” which is located beside the “options tab” on the “menu setup page”. On the “packaging set up” page, they will see the explanation with the link to “see more examples” which will show them the suggestions of what packaging options they can provide to customers.

To set up their packaging information, they shall click on the “+ Add Packaging” button to go to the “add packaging option” page. On this page, they can upload photos of their packaging or select the pre-made icons that represent their packaging. Below the image, they must add the title and description. They can see the suggestion text in the fill-in box as examples. There is also the option for the eco-merchant to set up whether this packaging is an eco-friendly choice.

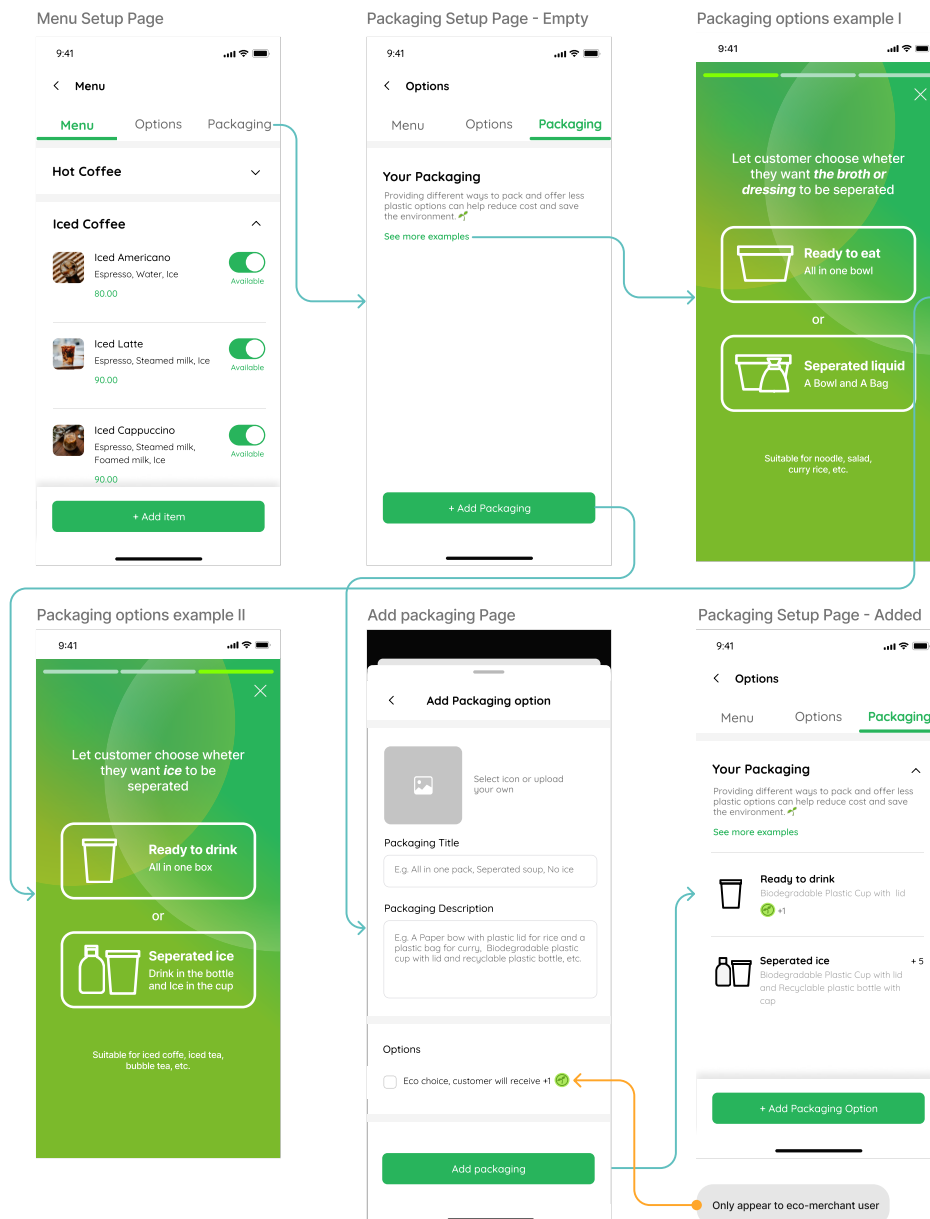


Figure 60 The interface displays the packaging customisation feature.

Different customers may have different preferences on how they want their food to be packed. For instance, some may prefer the food to come in the box as they want to eat it directly from the packaging while others may prefer to eat it from their own plate and do not need the box. With the packaging customisation feature, restaurants do not need to make assumptions about whether customers would need the box to eat or do they want the ingredient to be packed separately. Hence, they do not need to over-compensate or overly pack the food which can help reduce single-use packaging waste.

### 7.2.3 Receiving order

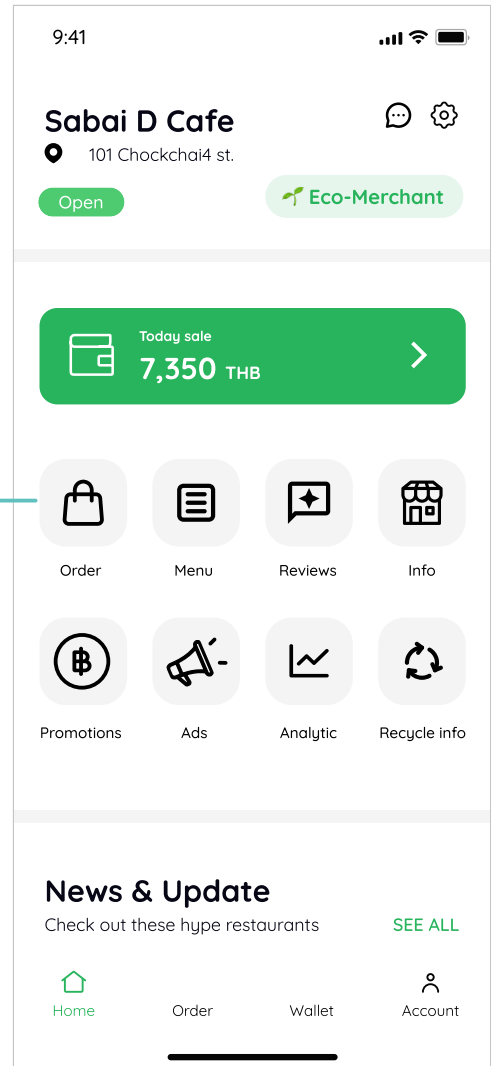
The end-user final solutions suggested that they should be able to opt-out of complimentary items, select preferred packaging, and switch on the “pack them together” and “I hate plastic” switch. The restaurants should be able to see these requests when they receive orders. shows how the new features display on the “view order” page.

The “*pack them together*” and “*I hate plastic*” requests appear as a box under the user information section above the “*custom note box*”. The placement of these two features must be above the list of items as the user should not have to scroll down to see them in order to avoid the restaurant missing the requests. The box was designed to be in red background colour so the restaurant can easily spot the request. While other customisation options such as condiments and packaging are located as coloured text under each dish’s title.

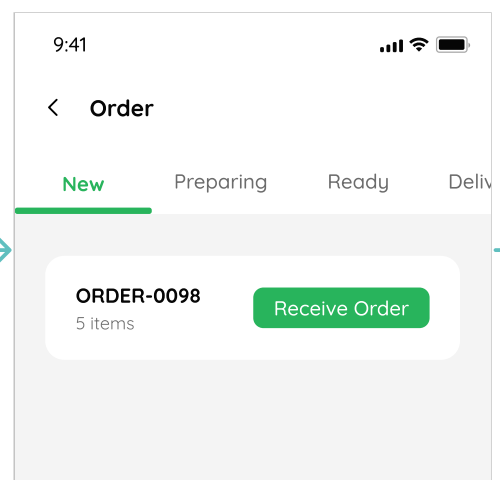
### 7.2.4 Material information

The last feature is to set up material information so users can check how the packaging can be recycled (*Chapter 7.1.6*). *Figure 62* illustrates

#### Home Page



#### Incoming order Page



## View order Page

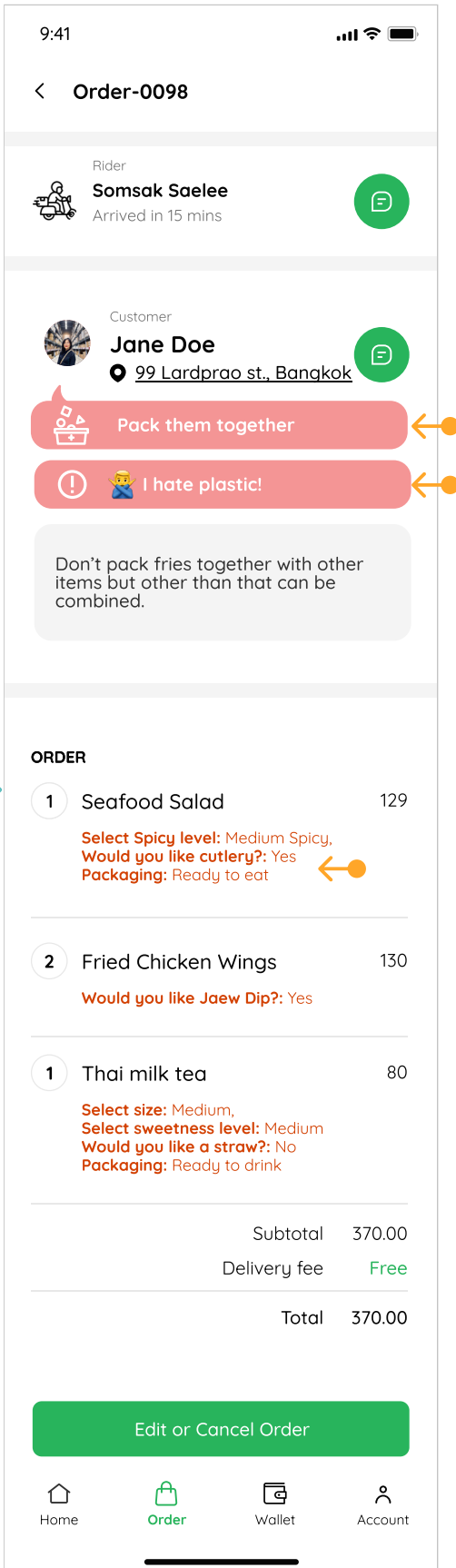


Figure 61 The "view order" page

how the restaurant-user can set up these packaging materials. Starting at the "restaurant-user home page", there should be the "recycling info" button to go to the "recycling info" page. If they have never added any information before, they can see a pop up explaining what this page is for. They then can click the "+ Add material button" to start adding material information. On the "add material page", they can upload a photo or choose the pre-made icon. After, they need to select the type of packaging e.g., box, bowl, cup, bag, etc. from the drop-down box and specify what material it is made of.

The restaurant-users are responsible to upload their material information. However, the one who provides information on how these materials can be recycled is the OFDS provider. For instance, if the restaurant-user selects the type of packaging as "bottle" and material as "PET", then it should link with the database of where customers can send the PET bottle to recycle and display it to end-users.

This solution is probably the most difficult feature to implement for the OFDS provider. As it requires the research team to gather information and might as well coordinate with other local recycling businesses. In addition, on 22nd of May, 2022, the new governor of Bangkok, Chadchart Sittipun, was elected. One of his campaign pledges is to tackle the environmental issues by collecting post-consumer waste through official schemes in order to be treated (Supateerawanitt, 2022). His campaign website outlines the strategies that he would A) set up multiple drop-off points for recycling in all 50 districts, B) launch point collection and redemption benefits, C) promote waste-banks in schools. If these strategies have been implemented, this feature could be integrated with his policies by suggesting official drop-off points and merging the eco-rewards. (chadchart.com, 2022)

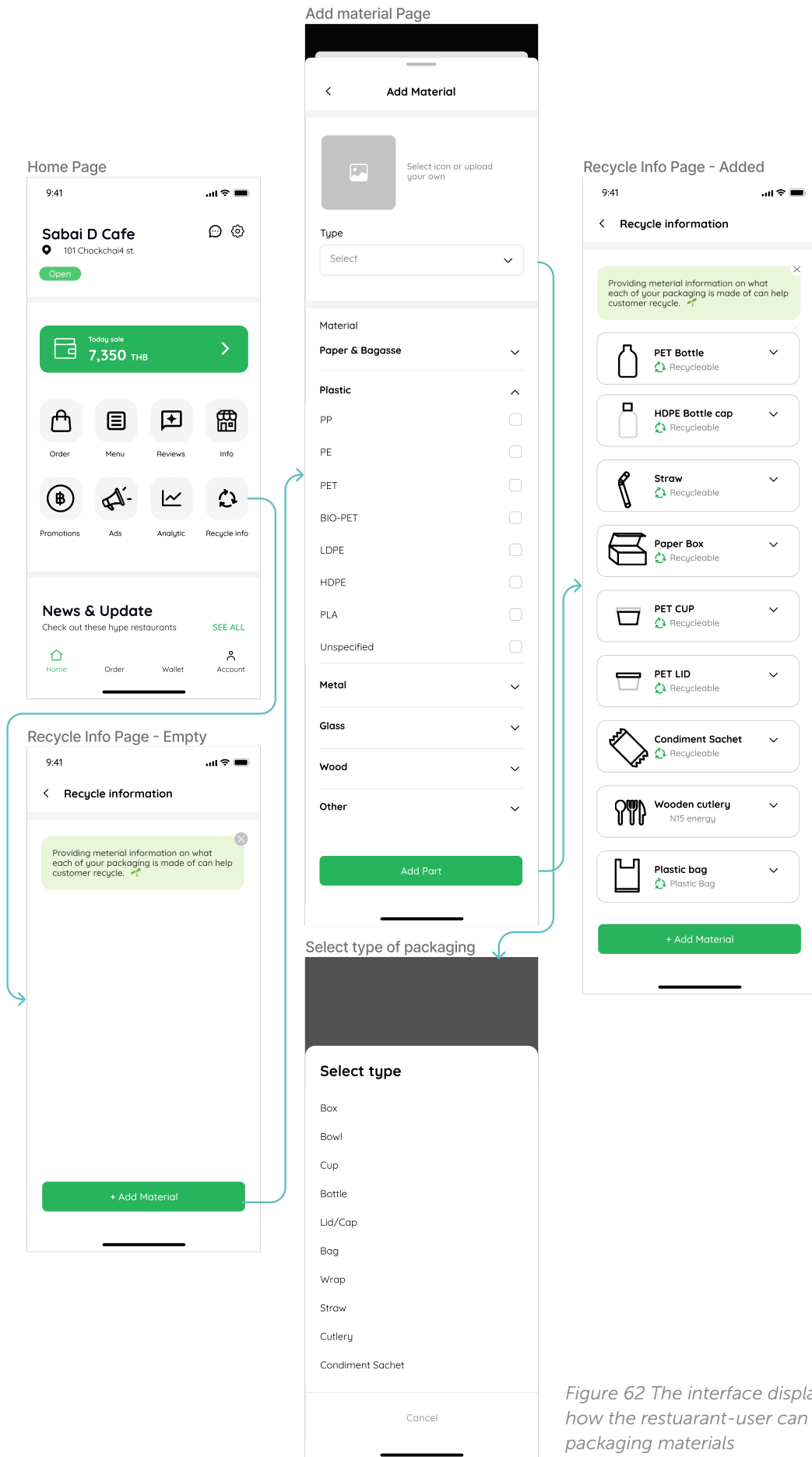


Figure 62 The interface displays how the restaurant-user can add packaging materials

## 7.3 Implementation

These final solutions are suggestions based on the data found in this research. It is up to the OFDS providers what features they would like to implement. Although it is preferred that all the final features be integrated into the applications, the OFDS do not have to include all of them.

Features that should be highly prioritised are the features that were categorised in the MUST category in the *MoSCoW* evaluation. These essential features are:

- Packaging customisation
- Pack them together switch
- Eco-suggestions to add condiments and complimentary items

The three features were prioritised because they would have the highest impact on the environment. They were made for users to request less packaging, so they can directly reduce waste that was generated on each order. All three of them work independently. The effectiveness of these features does not depend on other features to be implemented.

The second priority is the *"I hate plastic"* button. This feature received very positive feedback from the workshop participants due to its simplicity and flexibility. It can be used to remind the restaurant that they should pack the food with less plastic, fewer bag and fewer unnecessary layers if they want the customer to be satisfied.

For the eco-merchant and eco-reward features, they are less prioritised as they were aimed to motivate people, but do not directly reduce waste. The advantage of these two features is they can be launched as a big campaign and raise awareness about the waste pollution issue. The financial benefits also attract more

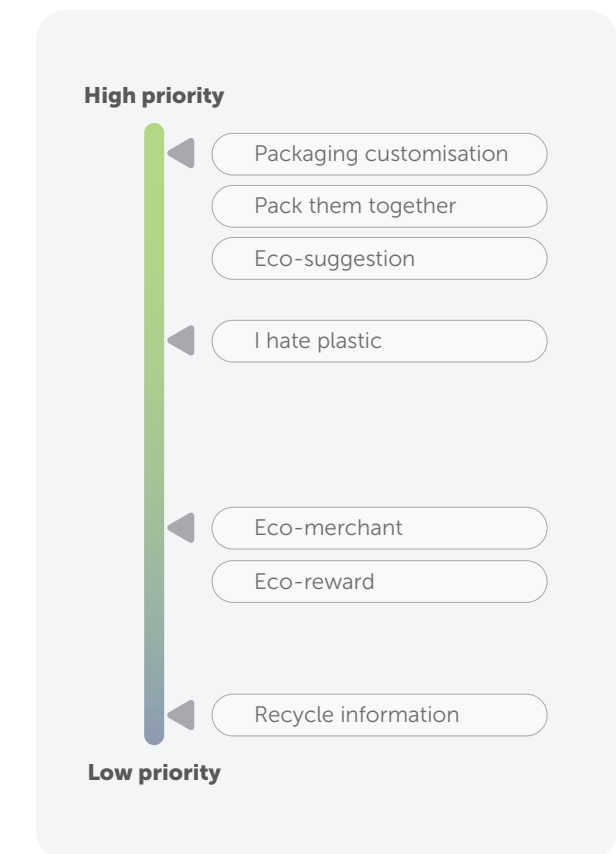


Figure 63 Priority ranking of the final solutions

customers. On the other hand, these two features would have a higher cost to implement, as they require support services and manpower to make them work. The eco-merchant needs the team to recruit and verify the restaurant that wants to participate. Additionally, the eco-reward requires the OFDS to invest in the prizes and staffs to handle the shipment.

The least prioritised feature is the recycling information. As discussed earlier, it is the most difficult feature to implement. In case it was not implemented, there are also other alternative applications available to help users sort waste. However, those applications would not be as effective. It is always more convenient for users if they do not need to download new apps. The OFDS applications also have a larger number of users. Another problem with the alternative app

is the users may not know what material the packaging is. The material information should be provided by the restaurant.

Although most of these features work independently, the “eco-reward” and the “recycling information” rely on other features. The “eco-reward” feature is connected with the “eco-merchant” and other customisation options. The reward must be assigned by the eco-merchant to the eco-friendly choice. So, without the “packaging customisation” feature or “condiment options”, the “eco-reward” would not work. Meanwhile, the “recycling info” feature also depends on the “packaging customisation” feature as it requires the restaurant to fill in the packaging information.

## 7.4 Limitations

### o *Sampling biases*

The final solutions were based on the knowledge gathered from the participants of this project. The qualitative data from interviews were collected from only three restaurant-user participants and five end-users participants, which is a small number as compared to the overall population size. The participants were recruited through the convenient sampling method. Therefore, they might not be the best representative of real users. Although more sampling would have ensured more accuracy, the insights gathered from the participants are likely to exist with other users as well. Therefore, they were relevant to the topic and sufficient to develop the final solution.

### o *Research biases*

The qualitative data obtained through the interview method may differ from the actual behaviours of the users. People might show

that they care more about the environment than they actually do because they do not want to be perceived as being irresponsible towards the environmental issues. The insight analyses of this research were also done based on my personal judgements which may be subjective and may affect the outcomes.

### o *Language difficulties*

The research is based on a Thailand case study, all subjects are in Bangkok, Thailand. All research activities that interacted with users were conducted in Thai and then translated into English during the analysis and development phases. Although I attempted to translate as closely as possible with what participants said, some sayings were not the same. This is because there are Thai words and local slang that do not exist in English.

It was also a challenge when testing the design alternatives in English with the focus group as they were not familiar with the English interface and some of the vocabulary used. Therefore, the language difference may have created an unforeseen misunderstanding.

### o *Different locations*

As I and the participants live in different countries, the physical research methods were not possible. Although the research during the discovery phase could be equivalently done online, the challenge lay more in the delivery phase. I was unable to meet the participants in person to test the design alternatives on the actual mobile device. If the participants could see the designs and interact with them, they would probably experience how each feature works better and provide more accurate feedback compared with seeing the static design on a computer screen.

### o *The difficulty of gaining business perspectives*

It is unfortunate that I could not get in touch with any of the OFDSs providers in Thailand as their advice would have been very valuable for the project. However, the information was replaced by interviewing the service providers in other countries instead. I am glad that I could contact Foodpanda in Hong Kong as they are also operating in Thailand, and we have similarities in terms of food and culture. I also received relevant information from the expert interview with the Maikhorrub campaign founder as they had been in contact with Thailand OFDS's providers. Therefore, these data could compensate for the lack of direct information from OFDS providers in Thailand.







Chapter 8

# Epilogue

This chapter discusses the area that could not be completed in the project and future possibilities to complete the result and improve the outcomes of reducing waste. The chapter also includes the reflection and conclusions of this project.

The outline of this chapter is as follows:

8.1 Future Work

8.2 Reflection

Conclusions

## 8.1 Future work

### o *The interface design improvement*

The final solutions have shown how the new features could be integrated into the OFDS application interfaces. However, there are still more details that could be developed further but I was unable to do so due to the limited amount of time. One of these details is the packaging icons in the application. As of now, the prototype shows only a few icon examples and the place where the restaurant-user can add them. These icons should be designed to match the available packaging in the market. The restaurant-user also should be able to upload their own photo as well. Yet, the page flow of this function is still not demonstrated.

The final solutions are a guideline of suggested features based on the users' insights of this research. Before implementing the final solution into the actual application, the design must be usability tested with real users on a real device in order to ensure the user-friendliness of the new features.

### o *Incorporate other design disciplines*

This project only focused on the interface design solution and filtered out several pain

points that were deemed to be irrelevant to interaction design. However, to achieve better outcomes in reducing packaging waste, these filtered out insights that were discovered in this research could be utilised to develop services design or product designs that could help reduce waste. For instance, the restaurant participants were very positive about changing their packaging to eco-friendly packaging if the OFDS providers could provide affordable options for them. They also expressed the difficulty of finding eco-friendly packaging that was suitable for Thai food. Thus, the packaging could be redesigned.

Some of the final solutions that were suggested also needed service design support. To implement the solutions such as the eco-merchant and eco-rewards, the OFDS providers need to establish the rules and services to recruit, educate, and verify the eco-merchant. They also need to check constantly that they are using eco-friendly packaging and assign eco-points to the right options. The service can also include the assessment and suggestions by experts on how a restaurant should pack their food and what packaging options they could provide in the application.

### o Publishing the guideline

The final suggestions that were determined in this research could be published online for easier access to the public and to reach more readers. I am hoping that the suggestions from this research would be found by designers who are working on developing an OFDS application and could inspire them to apply these features to their interfaces.

## 8.2 Reflection

Initially, the reasons I decided to work on this topic came from my personal annoyance when receiving too many plastics from food delivery in Bangkok, as well as my guilt at contributing to the waste while ordering packaging for my former employer. Working on this project has expanded my knowledge much more regarding waste pollution issues and the circular economy. The research started from a broad literature review trying to understand the problems and current situations. By doing this research, I learned packaging materials, how they should be recycled, and the controversy over whether biodegradable and compostable packaging is better for the environment. Following that, I attempted to understand the situation in Thailand's context, such as how people recycle in Thailand and how the waste was handled by the authorities.

By learning more about the issue, my annoyance with plastic waste has grown and became more passionate about being environmentally friendly. I have been more careful about sorting waste, trying to convince others to change and learning how to become a better designer when designing both physical products and digital products. Even though it is

possible to integrate design techniques to nudge users' behaviours. Like adding a "request-for-cutlery" button, it would not work as expected if it is not aligned with the real world conditions and users do not trust the interface. Therefore, instead of tricking them, I believed in the solutions that could assist the users who have their own initiatives. As the interviewee from Wolt said: *"The role of the platform is to make it possible for the restaurant partners and customers to make more sustainable decisions."*

During the research and interaction with users, I was glad to see that there were more people in Bangkok who are concerned about environmental issues. They also had similar problems with excessively packaged meals and were looking for solutions. I do hope that my master's thesis could be used as a foundation for OFDS providers to develop interfaces that could help reduce single-use packaging waste by integrating the suggested results into their platforms.

I believe that OFDS will continue to be part of Thai people's everyday life. Although we could not stop people from ordering from OFDS, the results of this research suggested how can we reduce the waste that would be generated on each order through the new functionality of the app. The research also suggested how to motivate both restaurant-user and end-user to be more eco-friendly. The result of this research may not be able to eliminate all the single-use packaging waste from OFDS in Thailand. But if it could reduce even a little number of wastes on each order and multiply it with other orders in the long run, the proposed feature should be able to help reduce the great amount of single-use packaging waste from OFDS.

## Conclusion

The results of this project answered the research questions: *What are the factors that hinder OFDSs users to be more engaged in environmentally friendly behaviours?* and *How can we eliminate those barriers through user interface design and assist eco-friendly behaviours that can reduce single-use packaging waste?* The research applied several user-centred methods to uncover the in-depth users' insights and learnt what currently stopped them from partaking in eco-friendly behaviours. The following stage was to find solutions on how to eliminate those obstacles and assist the user to make eco-choices.

The reason that the restaurant excessively packed their food is that they were concerned about customer dissatisfaction and bad reviews. They could not trust the "request-for-no-cutlery" button and they tend to assume what customer needs. They want to provide exceptional service that may be over and above what is expected as they believe that there is no harm in giving more but not in giving less.

Meanwhile, the results from the end-user research show that each user has different preferences when it came to how they want the food to be packed. Some of them seriously do not want to receive these single-use plastics. These users would try to customise the packaging or opt-out of the condiments through the custom note box. However, the restaurants did not listen to their requests and provided cutlery or condiments anyway.

The answers can be found in the restaurant's and customer's way of communicating. The restaurant should stop assuming how customers want the food to be packed and what they need along with the order. To support this idea, the final design solutions integrated

several new features to the interface. These solutions are:

- The packaging customisation features that allow users to select how the food is packed
- The condiment and complimentary options that allow users to opt-out of items they do not need
- The "pack-them-together" button that can be used to inform the restaurant that they can pack different dishes together in one container

These solutions above can help reduce single-use packaging waste on each order. However, they would be ineffective if the users themselves do not want to use them. Thus, the final solution also suggested how to motivate both restaurant-user and end-user to be more eco-friendly by implementing the eco-merchant category and the eco-rewards features. The research also found that even though the restaurants wanted to be more eco-friendly, they did not know how. The proposed restaurant-user interface displays a suggestion on how they can set up the condiments and complimentary options as well as the packaging customisation option.

In addition, As plastic packaging is unavoidable for some types of food, the new design also assists the end-users to recycle by providing relevant information about the material of the packaging that they receive, how to treat them after use and where it can be sent to recycle.

To conclude, this master's thesis achieved the goal that was set in the beginning and proposed the new design solutions that can be integrated into any OFDS platforms in order to reduce single-use packaging waste.



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# Appendix

## Appendix A : Interview guides

### Appendix A.1 Interview guides with OFDS providers

#### Reducing single-use waste packaging from food delivery applications

##### About the project

This Master's thesis aims to reduce packaging waste from food delivery application. The study will investigate what can influence users' decisions and change their behaviours to become more environmentally friendly. The research focuses on interaction design-oriented and looks into how to develop the service and interface. The motivation factors gathered from stakeholders will be mapped with design techniques aiming to nudge users' behaviours towards circular economy goals. The obvious example is the opt-in button for cutlery that has been implemented in several applications. By adding this button, the default choice is to exclude cutlery. Therefore, users need to opt-in if they want cutlery in their orders. This is similar to the design technique called the "status quo bias" where users are likely to prefer the default settings. As a result, this button has successfully reduced the use of disposable cutlery and its waste.

Similarly, this study is interested in discovering how to improve the OFDS applications interfaces that can lead to a reduction of packaging waste. The research will utilise the double diamond framework combined with the user-centred design approach. By gathering insights from relevant stakeholders: the service provider, restaurants, and end-users, this study aims to discover the influential factors that can motivate users to be more engaged in eco-friendly practices. After that is to find a way to apply those factors to the design interfaces. The project will be conducted in the spring semester, from the beginning of January and expected to finish by the end of May 2022.

##### Questions to Wolt

I'm still in the early stage of my thesis. At the moment, I'm mainly interested on what already have been done by Wolt and the feedback from users and restaurants, as well as your business perspective and future plan towards waste pollutions issue. The questions are listed below.

1. The Wolt website mentioned that users can choose venues that offer *ecological packaging* (from the carousels in the app's discovery view). Could you please tell me more about how this feature works? For instance, How Wolt assesses which restaurants can be in this category?
2. What are the feedback on this feature from end-users and from restaurant itself?
3. I couldn't find this feature in Norway app. Is it only available in some countries?
  - o If yes, why did it not expand to other countries?
4. Is there anything else that Wolt is currently doing/ or have done in order to help reducing packaging wastes?
5. What are the company future approach towards waste pollution issue?
6. The recent research suggested several actions from the app provider to support restaurant to use eco-friendly packaging, such as providing them with affordable options, reducing commission fees, or offer them more engagement. Do you think these solutions are feasible?
7. Is there anything else that you think can be done to help reducing packaging waste that caused by food delivery application?
8. I also would really love to have your feedback once my project progress more. Would it be okay with you if I contact you again for further discussion?

## Reducing single-use waste packaging from food delivery applications

As mentioned in the email, I'm Master students at NTNU in Norway. I'm studying interaction design. Currently I'm working on my thesis project that aiming to reduce packaging waste from food delivery application. My thesis focuses on design-oriented and looking for the way to develop the service and interface that can induce users and change their behavior to become more eco-friendly.

The obvious example would be the no-plastic-cutlery button that has been implemented in foodpanda as well. By adding this button, the default of every order is changed to not included single-used cutlery which resulting in reducing the waste. So now I'm trying to find out what else

In order to do that, I'm planing to gather qualitative data from the providers, restaurants and end users to see what are their views towards this issues, what keep them away and what can influence them to change. Which is why I would like to talk to you. Because it would be really good to know from business perspective. I'm also curious about what has already been done by Foodpanda and what is the results and feedback from those solution? what is your future plan towards sustainability especially on the waste pollution.


### Questions to Foodpanda

I'm still in the early stage of my thesis. At the moment, I'm mainly interested on what already have been done by FoodPanda and the feedback from users and restaurants, as well as your business perspective and future plan towards waste pollutions issue. The questions are listed below.

1. The Foodpanda website mentioned that you are partner with Baguio and Door2Door Recycling. Could you please tell me more about how this feature works?
2. What are the feedback on this feature from end-users?
3. What about the sustainable Packaging Programme? How does it work? For instance, How do you promote this packaging to the restaurants?
4. What are the feedback on this feature from restaurants?
5. These features are amazing, why do they not expand to other countries?
6. In the website also mentioned, reusable packaging pilot, Is it start yet? And how does it works?
7. Is there anything else that Foodpanda is currently doing/ or have done in order to help reducing packaging wastes?
8. What are the company future approach towards waste pollution issue?
9. Is there anything else that you think can be done to help reducing packaging waste that caused by food delivery application?
10. I also would really love to have your feedback once my project progress more. Would it be okay with you if I contact you again for further discussion?



## Appendix A.2 Inquiry to couriers

 · 22h · 🗨️


สวัสดีค่ะ พอดีกำลังทวงวิจัยเกี่ยวกับการลดขยะจากฟู้ดเดลิเวอรี่ เลยมีคำถามอยากมาถามพี่ๆน้องๆเดอรัหน่อยค่ะ

1. เป็นไปได้สำหรับไรเดอร์หรือไม่ ถ้าลูกค้า หรือร้านอาหารจะส่งอาหาร หรือเครื่องดื่ม โดยไม่ใส่ถุงพลาสติก
2. เคยเจอลูกค้าที่ขอไม่เอาถุงพลาสติกมั้ยคะ หรือเจอรี่เคสอะไรแปลกๆมั้ยคะ มีปัญหาในการส่งมั้ยคะ
3. เคยสังเกตมั้ยคะ ว่าร้านค้าแพคมายังไง มีแบบไหนที่ไม่ชอบ หรือต้องระวังเป็นพิเศษมั้ยคะ
4. แล้วถ้าอาหารหก หรือรั่ว ลูกค้าคอมเพลนว่าร้านอาหารแพคไม่ดี หรือคอมเพลนที่ไรเดอร์คะ

See more

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1. เป็นไปได้ครับ เริ่มมีหลายร้านหันมาใช้บรรจุภัณฑ์กระดาษแล้ว ทั้งแก้ว ด้วย ถุง หลอด... ส่วนตัวคิดว่าบรรจุภัณฑ์กระดาษแข็งแรงกว่าพลาสติกซะอีก ไม่หกง่าย
2. ลูกค้าที่ขอไม่เอาถุงพลาสติกและพลาสติกอื่นๆ มีครับ ผมก็คนหนึ่งที่ไม่เอาถ้าไม่จำเป็น แต่ \*\*\* บางครั้งลูกค้าจะเอาซองใส่ลม แต่ดันแลกดไม่เอาซองใส่ลม โนแอฟ พอเอาไปไม่มีก็ต่อว่าคนขับ บางคนเลยตัดปัญหาด้วยการเอาไปให้ตลอด
3. ร้านค้าส่วนใหญ่ที่มีบริการส่งอาหาร จะรู้และแพคของดีครับ มีการรียางแน่น หรือติดเทปใสเพิ่ม เพื่อป้องกันอาหาร/เครื่องดื่มหก แต่ก็บางร้าน ใช้บรรจุภัณฑ์พลาสติกอ่อนมาก ถึงจะใช้เทปติดแล้วแต่ก็ยังทำให้อาหาร/เครื่องดื่มหกได้ เช่น Mc
4. แล้วแต่เคสครับ ส่วนตัวผมจะดูก่อนทุกครั้ง ถ้าคิดว่าไม่ปลอดภัย จะหาวิธีทำให้อันใจว่าของไม่หกก่อนที่ไปส่ง แต่พอส่งแล้วของหก ก็คงเป็นความผิดผมเอง ก็ต้องขอโทษลูกค้า และเสนอแนวทางแก้ปัญหา อาจจะคืนเงินของที่เหลือหาย หรือไปซื้อให้ลูกค้าใหม่ โดยมากลูกค้าที่เจอ ถ้าขอโทษและคุยกับเขาดีๆ ลูกค้าก็จะไม่ค่อยมีปัญหาครับ
5. เรียกว่าขยะจากการซื้ออาหารแบบกลับบ้านดีกว่า ง่ายสุดคือลูกค้าจะไม่ใช้อะไร ก็บอกไว้ เช่น ไม่เอาซองใส่ลม ไม่เอาหลอด ไม่เอาฟร็อกน้ำปลา...

จะให้ร้านค้าหันมาใช้บรรจุภัณฑ์กระดาษก็เป็นทางเลือกหนึ่ง แต่ก็จะเป็นการเพิ่มต้นทุนให้ร้านค้า แต่ถ้าทางบริษัทที่ให้บริการต้องการทำ CSR อาจจะสนับสนุนในการทำไปร เช่น มีตรารับรอง ร้านอาหารปลอดพลาสติก ใช้แต่บรรจุภัณฑ์กระดาษ และลูกค้าที่ซื้อวันนี้ ลดค่าส่ง หรือมีส่วนลด หรือจะได้รับเหรียญคนรักโลก...

Like Reply 21h




1. เป็นไปได้แต่จากประสบการณ์ส่วนตัวใหญ่ร้านค้าจะกลัวลูกค้ามองว่าร้านค้าไม่เรียบร้อย ไม่มีการจัดการดูแลสินค้าที่ดี แต่สำหรับไรเดอร์เป็นไปไม่ได้ถ้าใส่กระเป๋าก็ได้
2. ไม่เคย
3. จำเป็นต้องสั่งถุงหิ้วที่หิ้วทั้งถุง แบบที่ไม่นิยมและต้องระวังเป็นพิเศษคือสินค้าที่มีการชำรุดแตกหักเสียหายง่ายหรืออาหารที่สามารถหกเลอะเทอะได้ง่าย
4. แล้วแต่กรณีส่วนใหญ่จะเป็นการคอมเพลนไรเดอร์ ถ้าไรเดอร์มีถังแล้วแต่ถังก็มีก็จะเป็นเรื่องปกติก็จริง

Like Reply 21h

2 Replies

Like Reply 21h



เป็นไปไม่ได้สำหรับไรเดอร์หรือไม่คะ ถ้าลูกค้า หรือร้านอาหารจะส่งอาหาร หรือเครื่องดื่ม โดยไม่ใส่ถุงพลาสติก

ตอบ - เป็นไปได้ครับ ใช้วิธีคือยึดถาดใส่ขนมใส่คำใส่ถ้วยแข็งๆออกจากถาดสินค้าแล้วใส่ถุงและใส่ถุงกระดาษดีสูงมากกว่าใช้วิธีฉีกไว้ในตัวกระดาษอีกครับ

เคยเจอลูกค้าที่ขอไม่เอาถุงพลาสติกมั้ยคะ หรือเจอรี่เคสอะไรแปลกๆมั้ยคะ มีปัญหาในการส่งมั้ยคะ

ตอบ - ไม่มีไรเดอร์ครับเพราะจะขอรับ วิสดู อาหารก็ถึงผมจะมีแต่ผม หากคิดจะให้มีการลดใช้ถุงพลาสติกหรือลดใช้พลาสติกโลก คืออยู่ถึงระบบการจัดการของภาครัฐะปัจจุบันครับ ต่อให้การใส่คำใส่ถ้วยไม่ทางนำมาใช้หรือลดราคาถุงกระดาษ ก็ยังไม่มีการเปลี่ยนแปลงเช่นเดิมครับ

เคยสังเกตมั้ยคะ ว่าร้านค้าแพคมายังไง มีแบบไหนที่ไม่ชอบ หรือต้องระวังเป็นพิเศษมั้ยคะ แล้วถ้าอาหารหก หรือรั่ว ลูกค้าคอมเพลนว่าร้านอาหารแพคไม่ดี หรือคอมเพลนที่ไรเดอร์คะ


ในมุมมองหนึ่ง คิดว่าเราจะต้องหาฟู้ดเดลิเวอรี่ได้อย่างไรบ้างคะ

ตอบ - ค่าคอมมิชชั่นข้อ 1 และ ข้อ 2 ครับ

Like Reply 21h


2 Replies

All comments




ไม่ใส่ถุงพลาสติกเข้ามาในรูปแบบถุงพลาสติกอยู่ครับ

Like Reply 21h



อ้อ ในถุงนี้ไม่มีโอกาสหกจากถุงแตก ใส่กล่องพลาสติกด้านบนขึ้นมามีน้ำพริกก็เขี่ยหรือคนขับ ถ้าใจไม่คงหรืออื่นๆ ให้อีกได้สิน่าจะตอบ โจทย์ครับ

Like Reply 21h



1. เป็นไปไม่ได้ที่จะไม่ใส่ถุงพลาสติกเพราะร้านค้ามีหลายรูปแบบ
2. มีลูกค้าไม่ชอบเพราะสติ๊กเกอร์ของเดอรัเข่งงานแถมมีบาท งานกับฟู้ดต้องใส่ถุงพลาสติกครับ
3. ร้านค้าที่แพ้สินค้ามีหลายร้านแล้วแต่ความเหมาะสมอาหารก็มี
4. อาหารทุกคู่ค้าคอมเพลนไรเดอร์แล้วครับไม่ว่าองที่ร้านจะไม่ครบความดีอยู่ที่ไรเดอร์หรือบริษัทเดอรั
5. ซอซกับมะนาวที่ร้านอาหารใส่ถุงพลาสติก แต่เป็นเรื่องที่ยากครับ

ถ้าอยากได้ความดีที่ตอบ โจทย์คือต้องถามร้านอาหารครับ

Like Reply 21h Edited

## Appendix A.3 Questions to Maikhorrub Campaign

### รายการคำถามสำหรับโครงการ#ไม่ขอรับ

พอดีว่าตอนนี้กำลังทำทำที่สืตเกี่ยวกับเรื่องการลดขยะที่เกิดจาก food delivery ที่มหาวิทยาลัย NTNU คณะ Interaction Design นะ เป้าหมายของทีสืตคือต้องการที่จะหาว่า food delivery application จะสามารถปรับดีไซน์ interface ได้อย่างไร เพื่อที่จะช่วยลดขยะและกระตุ้นให้คนให้คนหันมาใส่ใจสิ่งแวดล้อมมากขึ้นนะ ตอนที่เจอโครงการไม่ขอรับก็คิดว่ามันเป็นโครงการที่ดี และน่าสนใจมากๆ เลยอยากมาสอบถามเพิ่มเติมเกี่ยวกับโครงการนะ ขอขอบคุณมากๆนะ ที่ยินดีมาพูดคุยกันนะ

คำถามจะเกี่ยวข้องกับจัดการ การดำเนินงาน พีดแบ็คจากร้านค้าและลูกค้า รวมถึงแนวคิดส่วนบุคคลต่อปัญหาขยะ โดยส่วนมากจะเป็นคำถามปลายเปิด เพราะอยากเรียนรู้แนวคิด ทักษะคิด และประสบการณ์ของผู้ที่ทำงานเกี่ยวกับเรื่องนี้มากกว่าก่อนจริงๆนะ หากไม่สะดวกที่จะตอบคำถามข้อไหนสามารถข้ามได้เลยนะละ ข้อมูลดิบทั้งหมดจะถูกเก็บเป็นความลับรวมถึงข้อมูลส่วนตัวของผู้ถูกสัมภาษณ์ด้วยนะ หากมีคำถามสามารถถามได้เลยนะละ

1. มาเริ่มทำครั้งนี้ได้อย่างไรละ Why and how did you start the campaign?
2. ตอนที่เริ่มโครงการ ติดต่อร้านอาหารต่างๆให้มาร่วมอย่าง ไรละ และใช้อะไรจูงใจให้ร้านมาเข้าร่วมละ What was the restaurants feedback and how did you encourage them to join?
3. มีที่ติดต่อไปแล้วร้านเค้าไม่ยอมเข้าร่วมมีขะ เพราะอะไรละ Is there any restaurant who does not want to participate and why?
4. คำว่าการลดใช้บรรจุภัณฑ์ซ้ำซ้อน คืออย่างไรละ What do you mean by reducing excessive packaging and how did you achieve it?
5. มีเกณฑ์ในการกำหนดว่าบรรจุภัณฑ์ที่ถือว่าเป็นที่กล่องที่ย่อยสลายได้ง่ายอย่างไรบ้างละ What packaging do you consider eco-friendly?
6. ระหว่างดำเนินงานเกิดปัญหาอะไรขึ้นบ้างมีขะ What are the problem during the campaign?
7. เห็นมีบอกว่ามีแอปตามสั่งตามส่ง ที่ปรับอินเตอร์เฟซเพื่อลดพลาสติก เค้าทำอย่างไรละ
8. ได้ติดต่อแอปใหญ่ๆบ้างหรือไม่ละ Did you contact OFDS application?
9. คิดว่าแอปทั่วไปจะสามารถช่วยพอโครงการนี้ได้อย่างไรบ้างละ มีอินเตอร์เฟซ หรือ ฟีเอเจอไหนที่จะช่วยบ้าง How the OFDS could support the campaign?
10. Feedbackจากร้านอาหารที่เข้าร่วมโครงการเป็นอย่างไรบ้างละ หลังจากจบโครงการเค้าทำต่อหรือไม่ละ What is the feedback from the restaurant after the campaign?
11. พอทราบฟีดแบ็คจากลูกค้าทั่วไปบ้างมีขะ เป็นอย่างไรบ้างละ What is the feedback of the customer after the campaign?
12. คิดว่าจะทำอย่างไรให้โครงการนี้เข้าถึงลูกค้าและร้านอาหารได้มากขึ้นบ้างละ How can the campaign reach more people?
13. โครงการมีแผนในอนาคตอย่างไรบ้างละ What is your future plan?
14. มีสิ่งใดที่จะสามารถมาซัพพอร์ตเพื่อให้โครงการประสบความสำเร็จมากขึ้นบ้างได้มีขะ Is there anything that could support the campaign to make it better?
15. ทำไมโครงการถึงไม่เน้นเรื่องการรีไซเคิลละ Why didn't you focus on recycle?
16. นอกเหนือจากโครงการไม่ขอรับ คุณซุสึมีความเห็นเกี่ยวกับเรื่องปัญหาขยะมูลฝอยหรืออย่างไรบ้างละ และคิดว่ามีแนวทางแก้ไขอื่นบ้างมีขะ What is your personal thought regarding food delivery waste and what else we can do to solve the issue?
17. พอรู้จักใครที่ทำงานเกี่ยวกับเรื่องนี้ หรือแคมเปญอื่นๆใกล้เคียงกัน ที่จะสามารถติดต่อเพื่อไปสอบถามเพิ่มเติมได้บ้างมีขะ Can you refer anyone else who I can talk to?
18. ถ้ามีคำถามเพิ่มเติม ขอติดต่ออีกครั้งได้มีขะ Can I contact you for further question?

## Appendix A.4 Interview guide with restaurant owner

### Question to Restaurants

Thank you for taking the time to meet with us. This research is part of the Master thesis that aiming for reducing single-used packaging waste from food delivery application.

I would like to ask questions about your restaurants, how do you pack your meals for delivery, and your opinion on the single-used packaging waste pollutions. We would like to assure you that you can choose to skip any question and withdraw your participation at any time with no repercussions. Your personal information will be kept confidential amongst the researchers, no personal or identifiable data will be recorded in our notes. All data pertaining to this project will be deleted within two weeks after receiving our final grade.

And please remember that I'm here to learn from you and not to judge. There is no right or wrong answer. I'm genuinely would like to know your experience and opinions

If you have any questions we are happy to answer them now, and are open to feedback at the end of the interview. Again, many thanks.

1. Can you tell me about your restaurants? For example, What kind of food you are selling?
2. What apps do you use for delivery?
3. How do you pack your meal for delivery right now?
  - a. What kind of packaging you use? If it's plastic do you know what plastic it is
  - b. Do you separate one dish to several boxes and packagings? Eg: bags in the boxes and wrap and tape, If so, Why?
4. Why do you choose these packaging? What do you consider and How did you find them?
  - a. Is ecofriendly something you considered when selected the package? How do you know if it's eco friendly?
  - b. Do you ever receive any feedback about packaging from the customers?
5. Do you know how to sort these packaging after used? Eg. Which bin it goes to? Can it be recycle. Etc.?
6. What are your thought about the increase of waste pollution from the food delivery packagings?
7. Is there anything you think you can change to make your packaging more environmentally friendly? Or to reduce the waste?

=====

8. There are several suggestions of what restaurant can do... will you willing to...and why?
  - Provide two type of packaging by request ()
  - Change packaging ()
  - Reduce plastic/wrap/tape
  - Don't add logo/branding / sticker tape etc to packaging
  - Allow customer to return the waste and send it to the right place
9. What support do you think you need (from the app, or from users)
10. What can convince you to change? For example, you can add no straw option right now. Will you do it? If not why? And what would make you do it?
11. Do you think it's important for the restaurant to show their environmental concern?
12. What are your experiences using the app?
  - a. Is there any features you wish the app could support but it doesn't?
13. Can I contact you later for further questions?

## Appendix A.5 Interview guide with end-user

### Question to Users

Thank you for taking the time to meet with us. This research is part of the Master thesis that aiming for reducing single-used packaging waste from food delivery application.

I would like to ask questions about your ~~restaurants, how do you pack your meals for delivery,~~ and your opinion on the single-used packaging waste pollutions. We would like to assure you that you can choose to skip any question and withdraw your participation at any time with no repercussions. Your personal information will be kept confidential amongst the researchers, no personal or identifiable data will be recorded in our notes. All data pertaining to this project will be deleted within two weeks after receiving our final grade.

And please remember that I'm here to learn from you and not to judge. There is no right or wrong answer. I'm genuinely would like to know your experience and opinions

If you have any questions we are happy to answer them now, and are open to feedback at the end of the interview. Again, many thanks.

1. How often do you order food delivery from the app?
  - a. Which meal? Where?
2. What apps do you normally use?
3. How do you use the app? Eg: find restaurant etc.,? What do you search? What do you considered? Where you were? Do you order for others? Do you usually have any special requirement?
4. Once received the food. Do you expect it to come in the box/ready to eat? Do you usually eat directly from the packaging? Do you have access to your own dish and cutlery? If so, do you use your own or single-use and why?
5. What are your thought on the packaging you received?
  - a. Do you expect your meal to always come with cutlery, condiments, napkins, straw, etc. even though you didn't ask for?
  - b. Do you think it necessary to separate the "solid/dry" part of the food and the liquid (soup, dressing, sauce, etc.)?
  - c. Does it affect restaurant images if they don't provide accessories, or didn't separated the food?
    - i. What will you do? Complain? Give bad review? Tell a friend? Not order again? Etc.
  - d. Do you think you received too much plastic?
  - e. What do you feel when that happened?
  - f. Does that affect the restaurant images? (eg: does it make you want to reorder less?)
  - g. Can you think of any restaurant with good packing example? (eg: does it make you want to reorder more?)
  - h. Would you prefer restaurant that use eco-friendly packaging over plastic?
    - i. What packaging do you prefer? Eg: Paper, Bags, Strong boxes that can be reused? Etc.
6. After done with your meal, What do you do with these packaging?

- a. How do you normally throw it away?
  - i. Do you check or know what material it made off? Eg: what kind of plastic?
- b. Do you reuse?

=====

- 7. If they didn't sort
  - a. Why don't you sorted the garbages/recycle?
    - i. I just don't care
    - ii. I don't know how
    - iii. It's too complicated/laziness
    - iv. Too much food left I don't bother to clean
    - v. No recycle bin nearby
  - b. What can encourage you to sort the garbage?
    - i. Get clear direction/guide
    - ii. Make it easier or more convenient somehow? Eg. Transportation, cleaning, easy returning
    - iii. Get discount?
    - iv. See friend doing
    - v. See Progress and rewarding

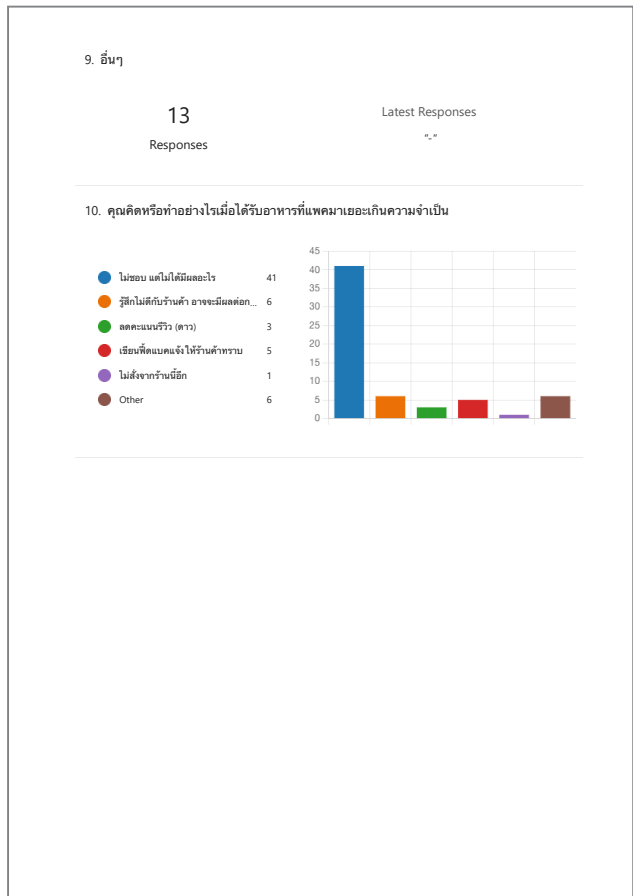
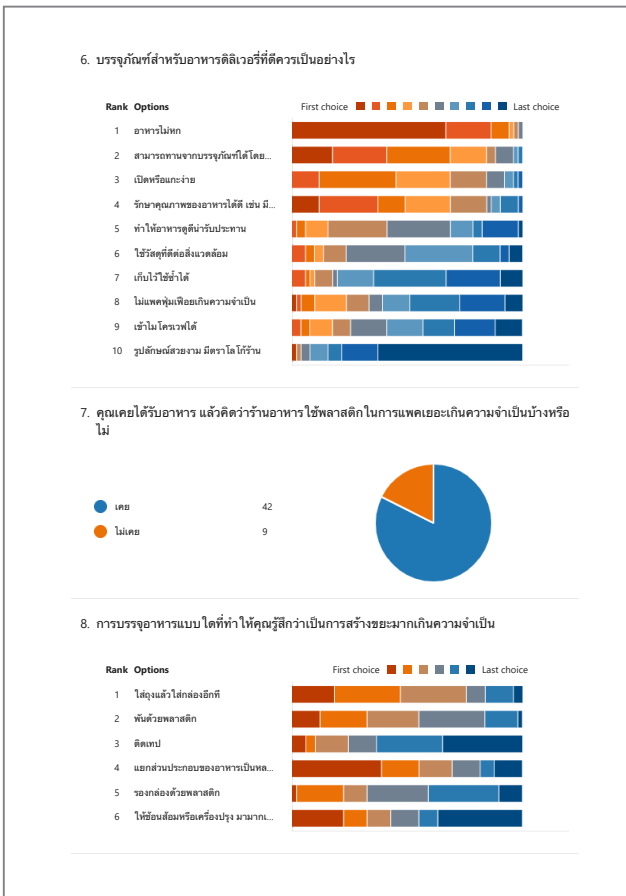
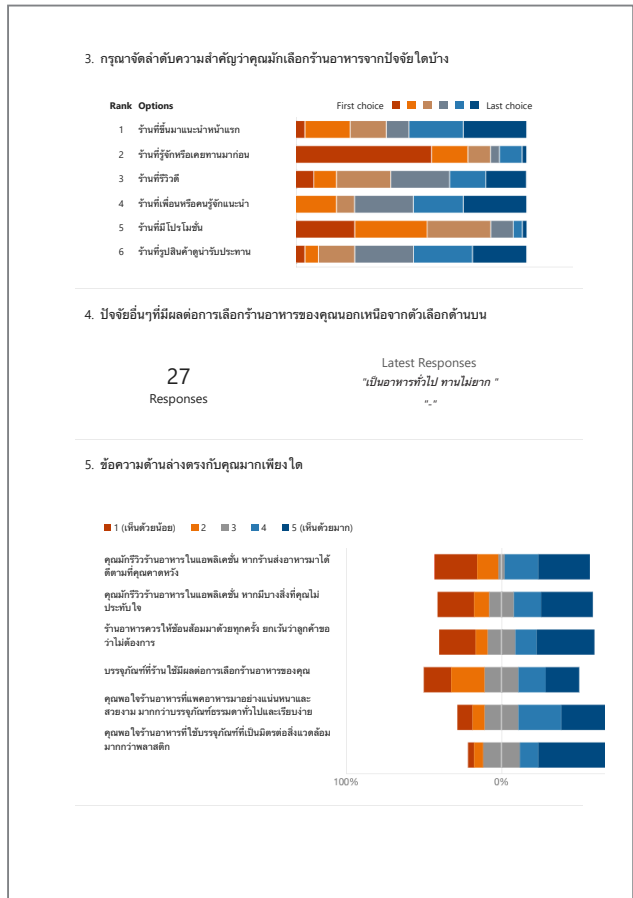
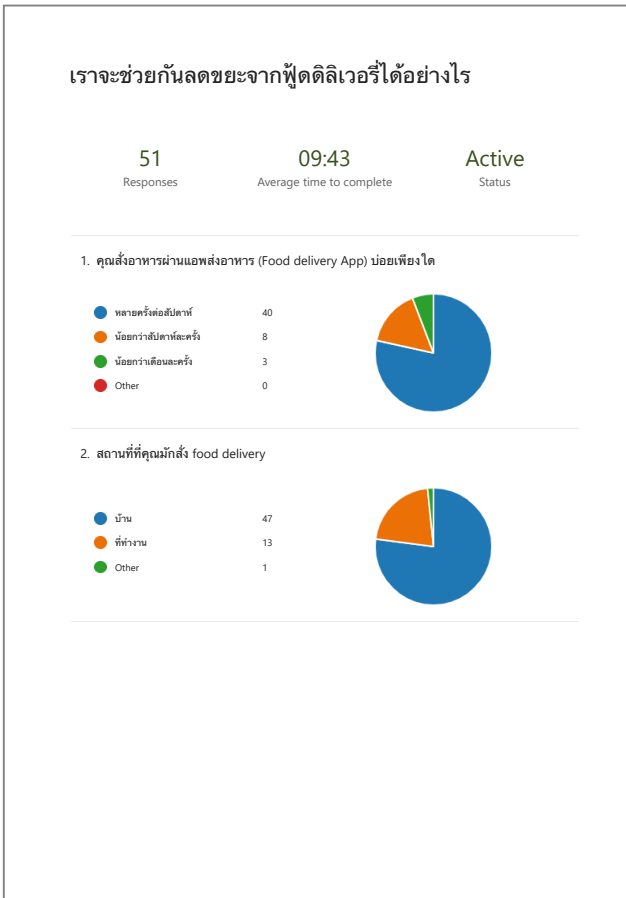
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- 8. If they sort
  - a. When did you start sorting the garbage? And what inspired you to do so?
  - b. How do you sort food delivery packaging?
    - i. Is it different when you are home and outside, eg office?
  - c. Where do you send it to?
  - d. Do you feel like it's difficult to sort?
  - e. Is there anything else you think would help to make sorting easier?
  - f. Where will be the most convenient place to drop off the used-packaging? Eg work, office, restaurant, BTS,MRT station, convenient store? Etc.

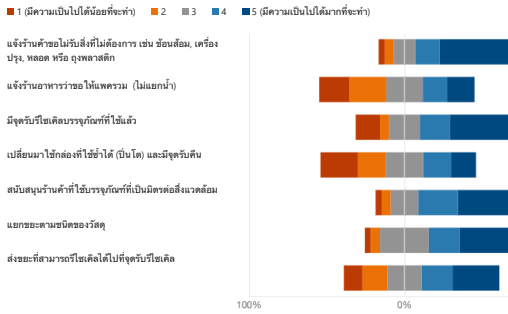
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- 9. How do you think we can reduce singled-use packaging from food-delivery?
- 10. Will you be interested to join Diary study? / Co-creative workshop?

# Appendix B : Survey questions and results



11. คุณคิดว่าความช่วยเหลือจะลดปัญหาขยะที่เกิดจากฟู้ดดีลิเวอรีได้อย่างไร



12. นอกเหนือจากตัวเลือกด้านบน คุณคิดว่าเราจะช่วยกันลดขยะจากฟู้ดดีลิเวอรีได้อย่างไร

18 Responses Latest Responses

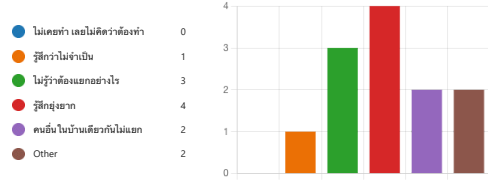
13. ปกติแล้วคุณจัดการกับขยะบรรจุภัณฑ์ที่ได้รับจากฟู้ดดีลิเวอรีอย่างไร



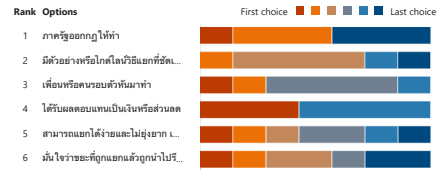
14. ปกติแล้วคุณแยกขยะหรือไม่



15. เพราะเหตุใดคุณถึงไม่แยกขยะ



16. คุณคิดว่าอะไรที่จะสามารถกระตุ้นให้คุณเปลี่ยนมาแยกขยะได้



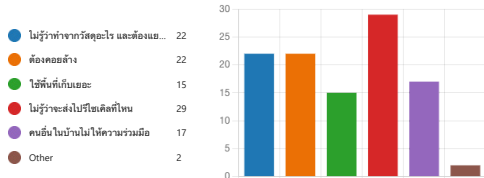
17. ปัจจัยอื่นๆที่อาจจะสามารถช่วยกระตุ้นให้คุณหันมาแยกขยะ

2 Responses Latest Responses

18. คุณเริ่มแยกขยะเพราะอะไร



19. คุณคิดว่าสิ่งใดเป็นปัญหาของการแยกขยะจากฟู้ดดีลิเวอรี



20. ความคิดเห็นอื่นๆ

6 Responses Latest Responses

21. ถ้าอยากขอพูดคุยเพื่อสอบถามข้อมูลเพิ่มเติมได้หรือไม่คะ

10 Responses Latest Responses



# Appendix C : Diary study results

**Packaging waste from food delivery – Diary study**

Questions Responses 27 Settings

27 responses

Summary Question Individual

1. Participant ID  
27 responses

Participant ID	Number of Responses	Percentage
01	18	66.7%
02	4	14.8%
04	5	18.5%

2. Where did you order the food?  
17 responses

Location	Percentage
Home	88.2%
Office	11.8%

3. Please upload the photo of your delivered meal (with the packaging)  
27 responses

View folder

- C60F1E2C-E7DE-482E-93FD-5DF6C0B98929 - phajemas wongsaroj.jpeg
- 47C67BEC-0F09-4EA5-98A4-454F147F4D36 - AaMmPp Chulwong.jpeg
- F68304A9-AAA8-4388-8180-5942E0C56933 - AaMmPp Chulwong.jpeg
- B1B3C99D-F8B9-4796-B95D-1462A3B122DF - AaMmPp Chulwong.jpeg
- 39AF2D0E-0A56-44B5-81F8-SADFB2FDC6D3 - AaMmPp Chulwong.jpeg
- C2FF4463-5C03-43FB-9701-0818B51A6371 - AaMmPp Chulwong.jpeg
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- 236869AC-282D-423D-A8A6-9C9135E788CD - AaMmPp Chulwong.jpeg

46 more files

4. Do you think this meal was excessively packed or generated too much waste?  
27 responses

Response	Percentage
Yes	70.4%
No	22.2%
Maybe	7.4%

5. How restaurant can change the way this meal was packed in order to reduce packaging and plastic waste?  
27 responses

Suggestion	Number of Responses	Percentage
No cutlery	8	29.6%
No straw	1	3.7%
No Condiments eg (ketchup, fis...)	2	7.4%
Some parts/ingredients that we...	11	40.7%
No extra wrap or double layer p...	5	18.5%
less bags	9	33.3%
Change to eco material packagi...	15	55.6%
No Condiment eg (ketchup, เสร...	1	3.7%

6. Is there any other way to reduce the packaging waste apart from options above?  
15 responses

รวมทุกอย่างเป็นแพคเกจเดียว คล้ายยูนิต แต่ต่างจากกระดาษที่กันน้ำ

ลดขนาดถุงพลาสติก ใหญ่

ลดถุงกระดาษ, ลดพลาสติกที่แปะ

เกี่ยวกับฝักใส่มาในอาหารกล่องอีกก็ได้

พับถุงพอ ไม่ต้องติดสติ๊กเกอร์ เพราะติดไปก็เปิดอยู่ดี

ลดถุงหัว ของ ตะเกียบ(แบบไม่ถาวรรับตะเกียบด้วย)

ส่งมาทางออฟฟิศ อาจจะมีช่องให้เลือก ไม่เอาแก้ว หรือไม่เอาน้ำแข็ง หลอด เนื่องจากเป็นสิ่งที่ลูกค้าอาจมีอยู่แล้วเพื่อลดขยะ

ถุงเครื่องปรุง เครื่องเคียงต่างๆวางขายแยกออกมา

ใ้กล่องใส่แยกถุงมาแต่ละชิ้นเปลี่ยนเป็นพลาสติก อาจจะมีรวมกัน ใช้เป็นถุงเดียว หรือเปลี่ยนเป็นกระดาษห่อ ที่ย่อยสลายได้ เพราะเป็นอาหารแห้ง

อยากให้อัดรวมกัน ซอสที่เหมือนกัน ใส่อัดรวมกัน

อาหาร 1 เมนู ควร ใช้เป็นกล่องกระดาษที่แยกได้แล้วไม่เปื่อยออกมาข้างนอก และไม่เออะผสมกัน

ใช้แบบย่อยสลายได้ ถุงหัว ใช้เป็นถุงกระดาษได้

น่าจะบรรจุมาในถุงที่ใหญ่ขึ้น จะได้ใส่ได้สะดวก

ลดขนาดแพคเกจ ใหญ่เกินความจำเป็น

7. What did you do with the packaging after used?  
27 responses

Disposal Method	Number of Responses	Percentage
Throw away in mixed garbage bin	20	74.1%
Rinse and Separate each material to recycle	8	29.6%
Reuse	5	18.5%

8. Other comment or feedback  
24 responses

ร้านควรให้เลือกว่าไม่รับตะเกียบ ทิชชู เพราะเอามากเกินไป

แพคเกจกันหกสะอาดดี

แจ้งว่าไม่รับช้อนส้อมแข็ง ใส่มา

อาหารชิ้นใส่ในกล่องกระดาษ ทำให้อัดเสียรูปทรง

แจ้งว่าไม่รับตะเกียบแต่ยังใส่มา แพคเกจกล่องไม่สวยงามดูเหมาะกับอาหาร

อยากให้มีวัสดุที่เป็นมิตรต่อสิ่งแวดล้อมที่สามารถเก็บความเย็นของไอศกรีมได้

ไม่มีตะ

มีความจำเป็นของเนยออกมาจากกระดาษ อาจจะต้องเปลี่ยนเป็นกระดาษที่เคลือบแทน

ควรมีช่องถามว่าต้องการ ตะเกียบ ช้อนหรือไม่

ควรมีตัวล็อกในการซื้อ แก้วพลาสติก หลอด อาจไม่จำเป็นสำหรับบางคน

แม้จะแพคเกจดีแต่ประกอบกับการขนส่งทำให้อาหารไม่สมบูรณ์ อย่างไข่แดงที่แตก

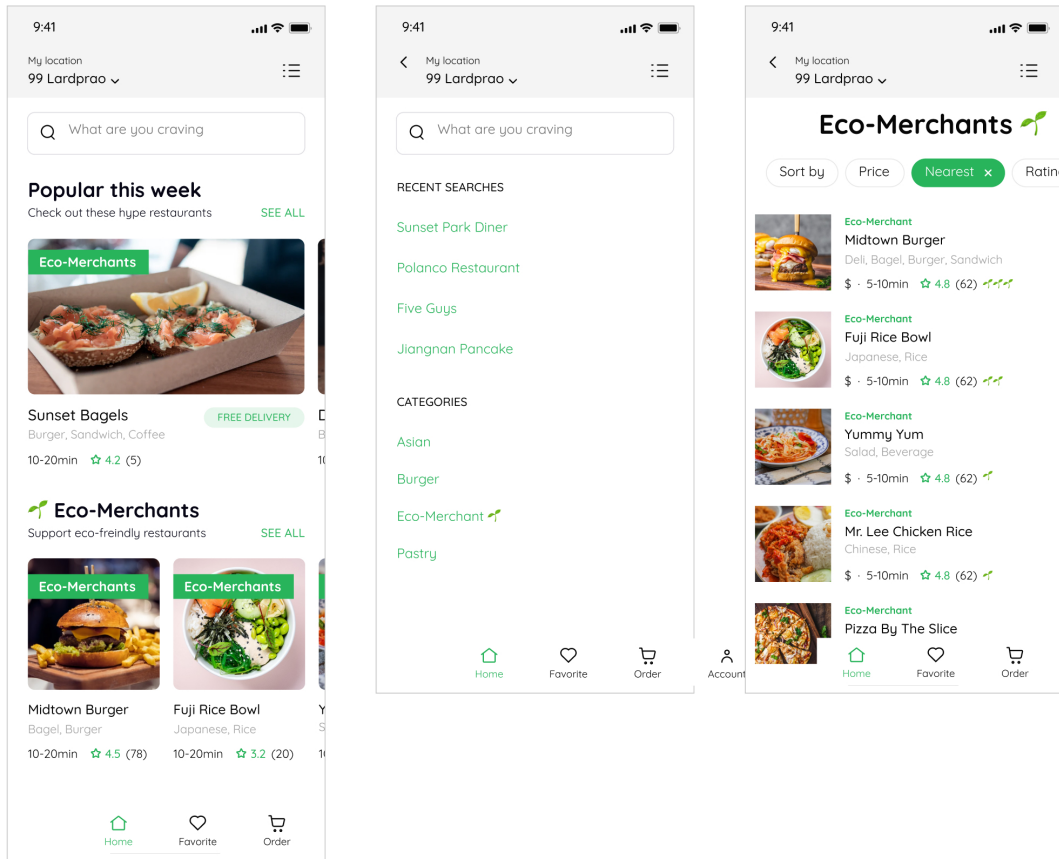
ซอส ซลิตเดียวกันอาจรวมมาถุงเดียว ในกล่องข้าวที่มีกล่องซอส ซ้ำซ้อน

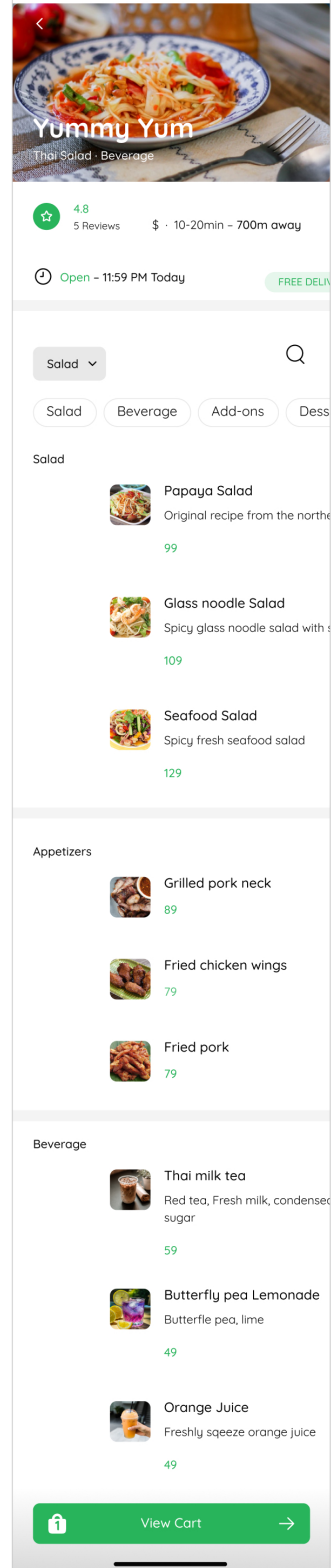
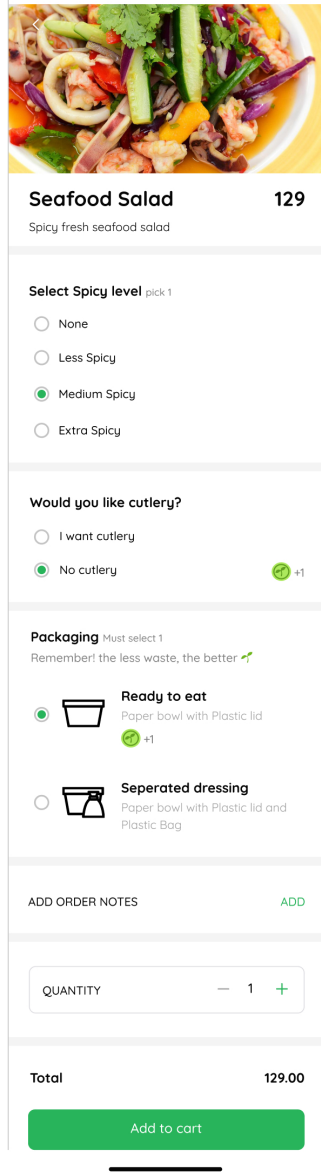
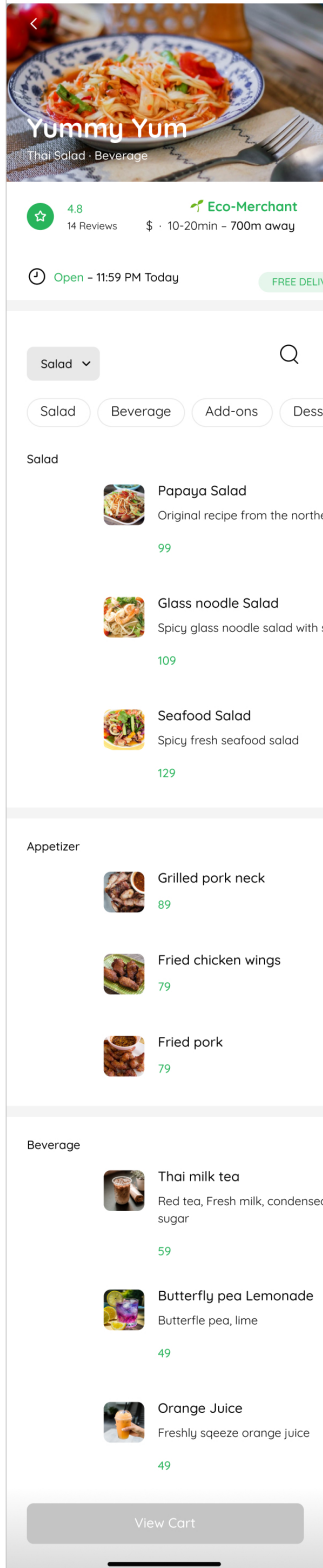
ให้ช้อนส้อมมาที่ที่แจ้งว่าไม่เอา

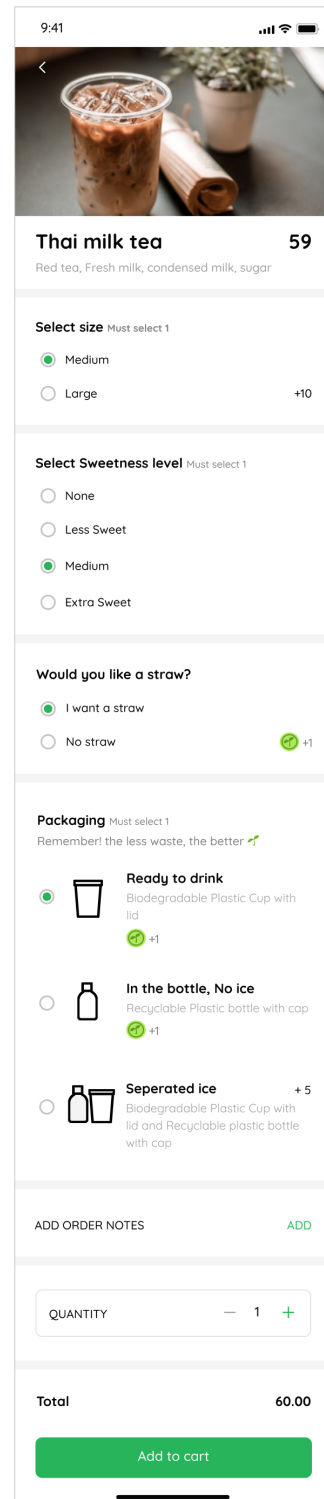
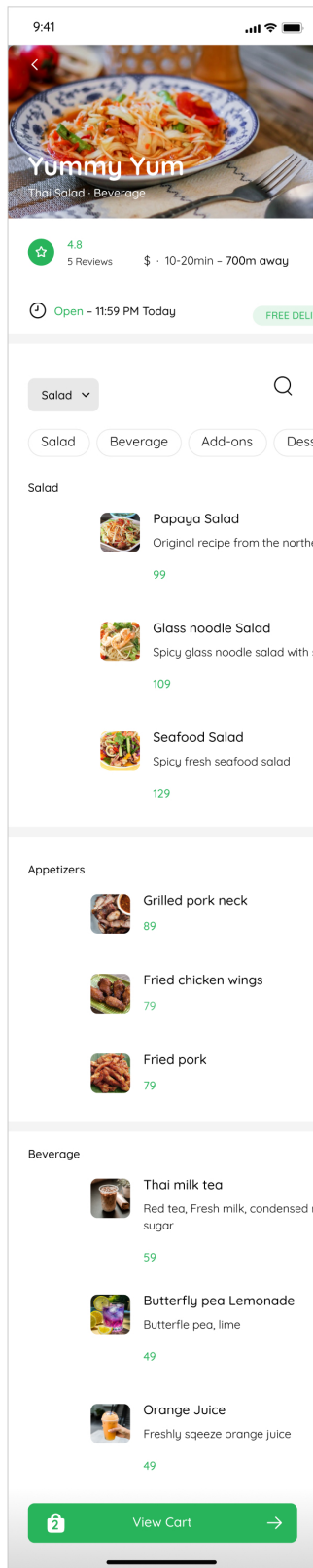
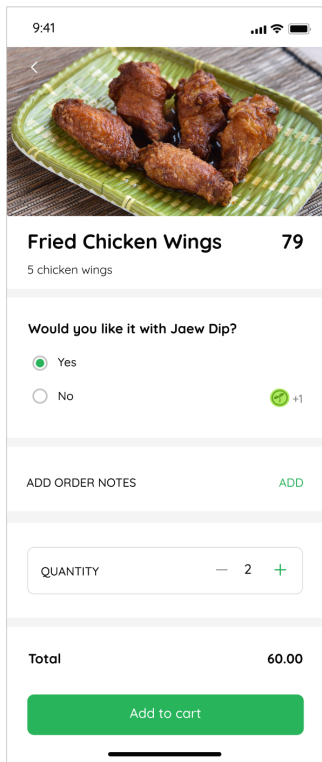
ควรลดการใช้ถุงพลาสติก ใ้มากที่สุด เลือกใช้ผลิตภัณฑ์ที่ย่อยสลายได้สำหรับอาหารแห้ง สามารถเลือกใช้ได้ง่าย

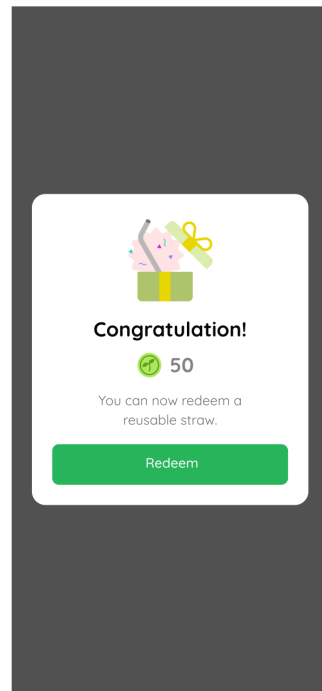
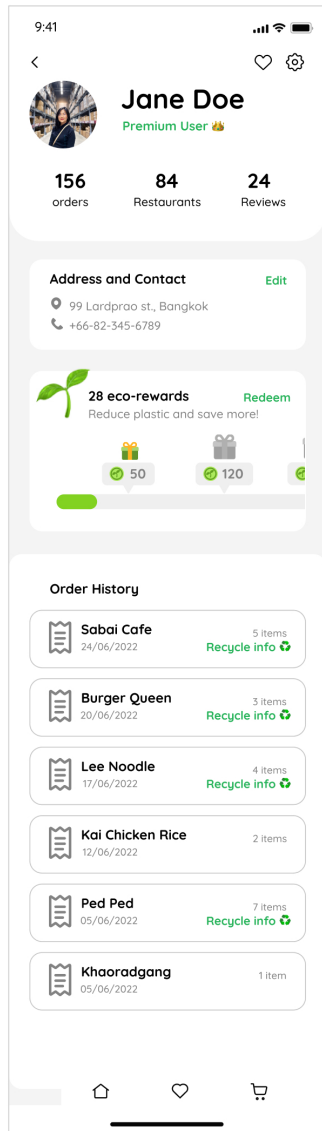
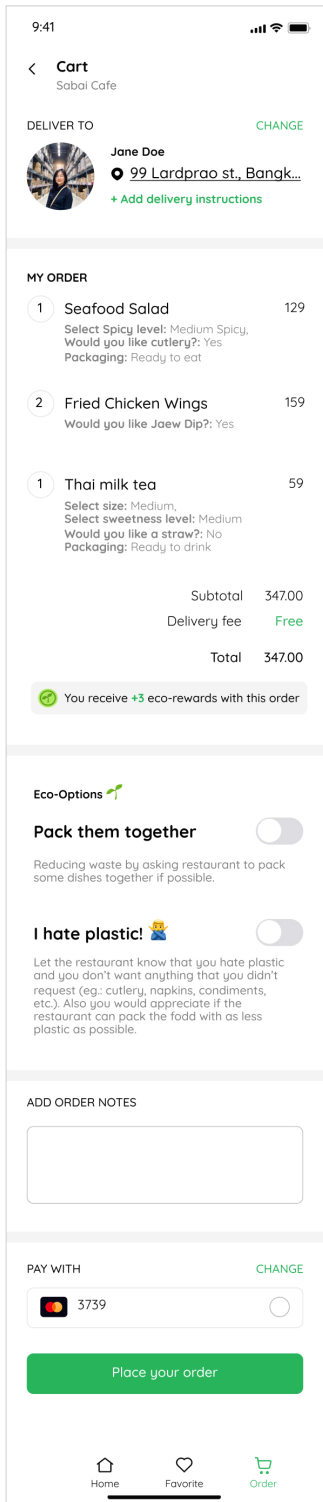
ดีที่ไม่ให้ช้อนพลาสติกมาแต่ไม่ได้ขอ

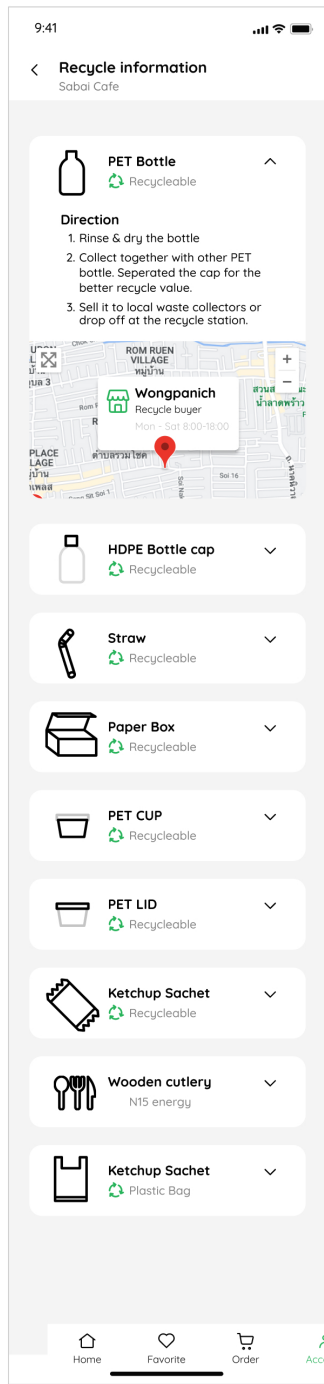
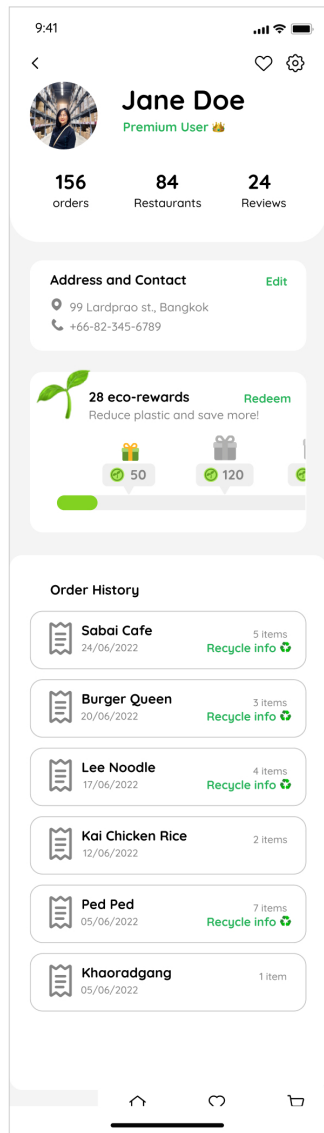
# Appendix D : Final Prototype

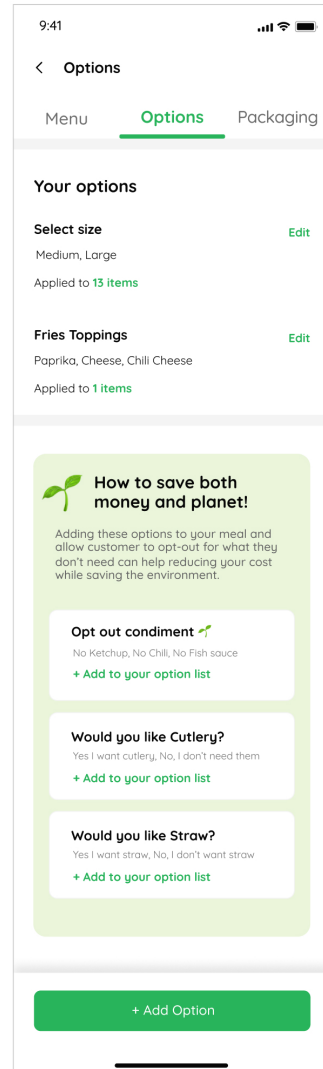
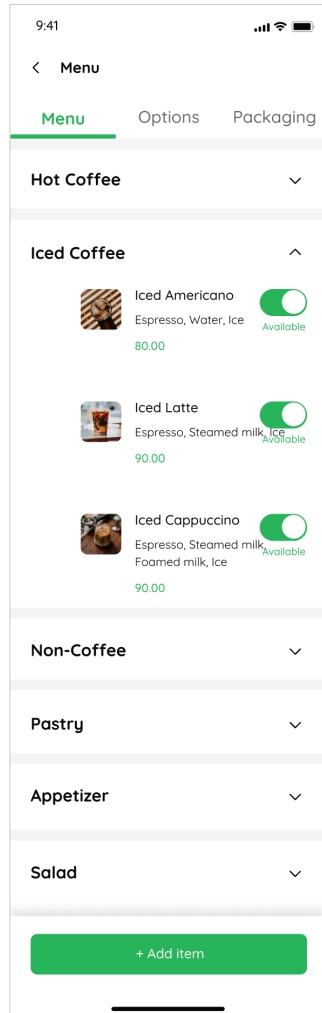
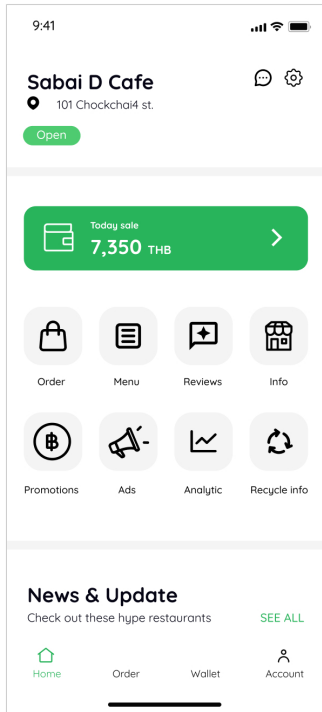














**Create new option**

Option Title  
Condiments Option

Choices

- No Chilli Fish Sauce  
Price: -1 baht
- No Vinegar  
Price: -1 baht
- No Chilli  
Price: -1 baht
- No Sugar  
Price: -1 baht

+ Add Choice

Options

- Required to choose
- The option can be selected more than one

Add option

**Create new option**

Option Title  
Would you like starw?

Choices

- Yes, I want straw
- No straw Eco rewards: +1

+ Add Choice

Options

- Required to choose
- The option can be selected more than one

Add option

**Add Choice**

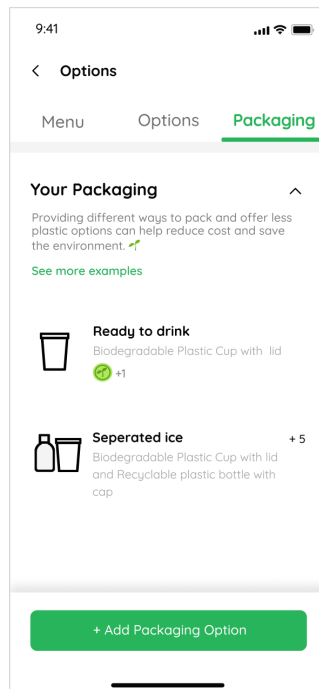
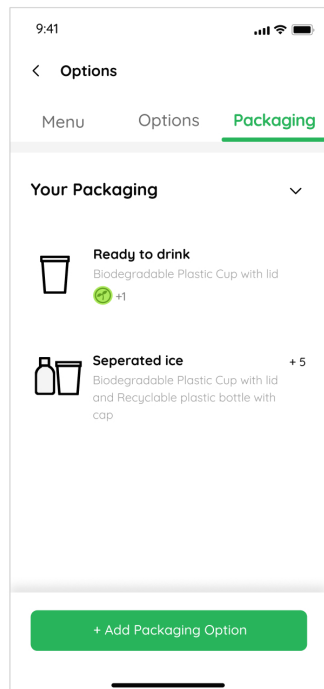
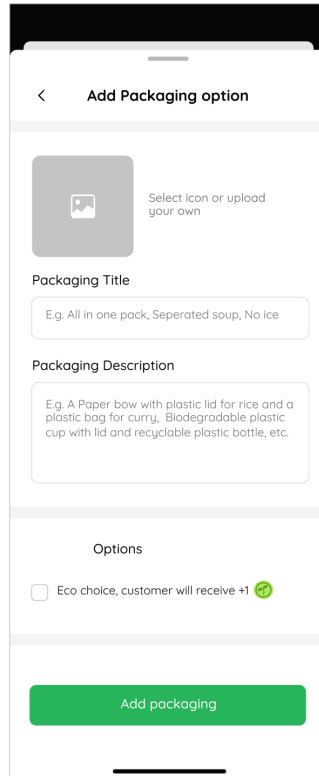
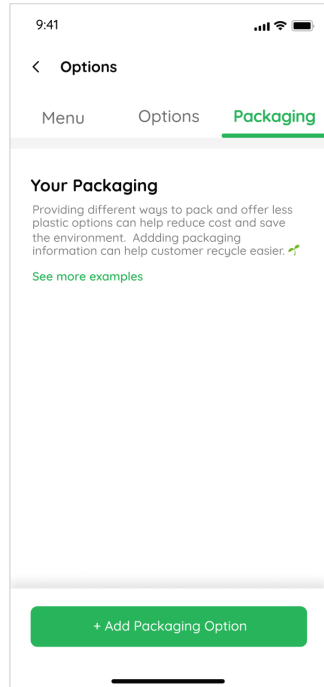
Choice  
Eg.: Gummies, Large, No codiment

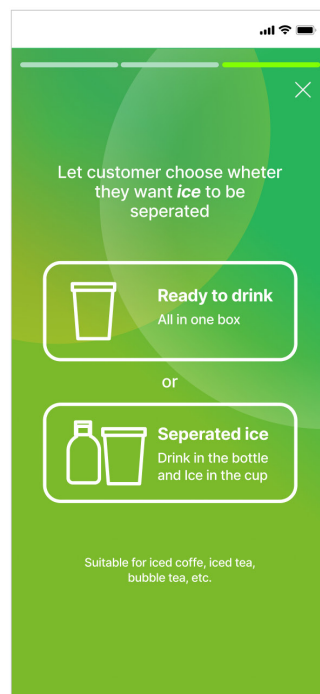
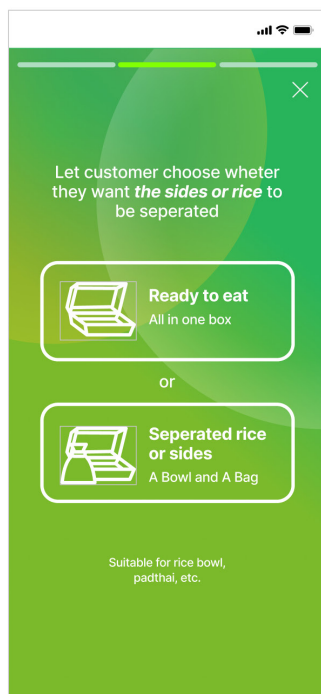
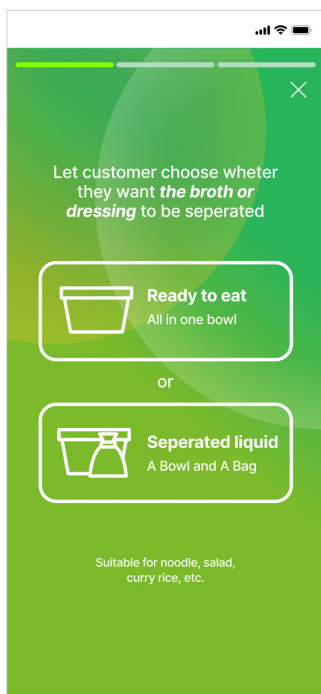
Additional charge or discount  
Add (+)

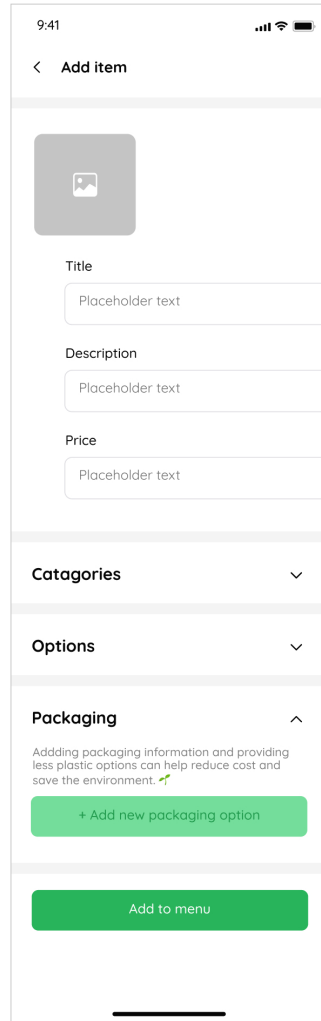
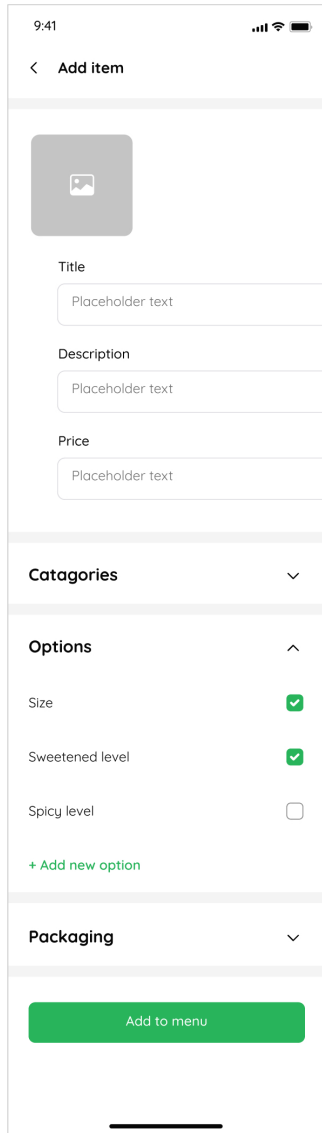
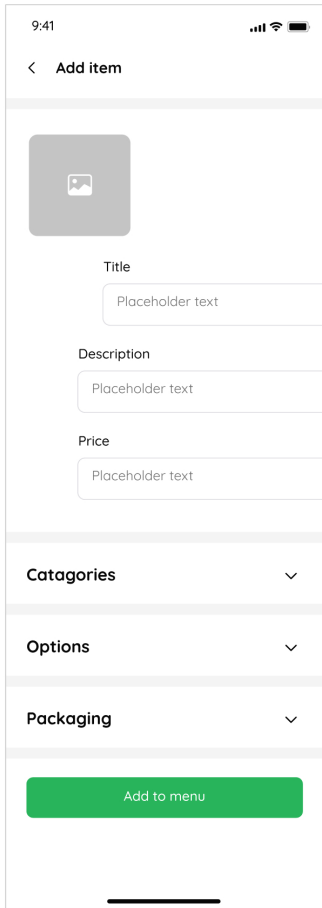
Options

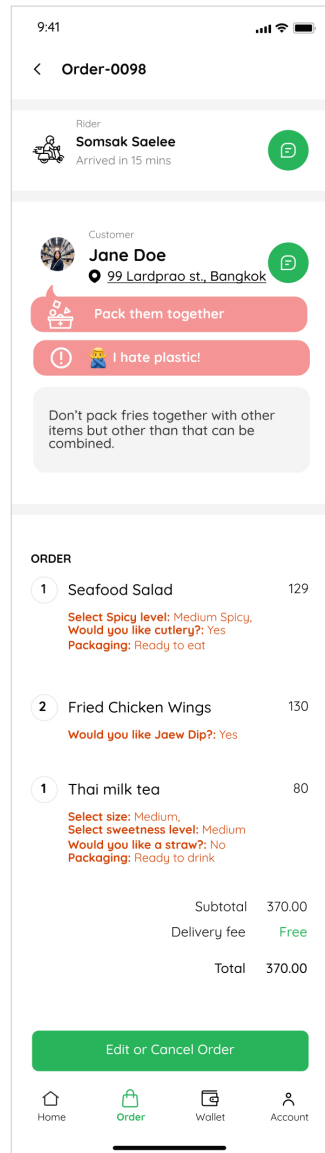
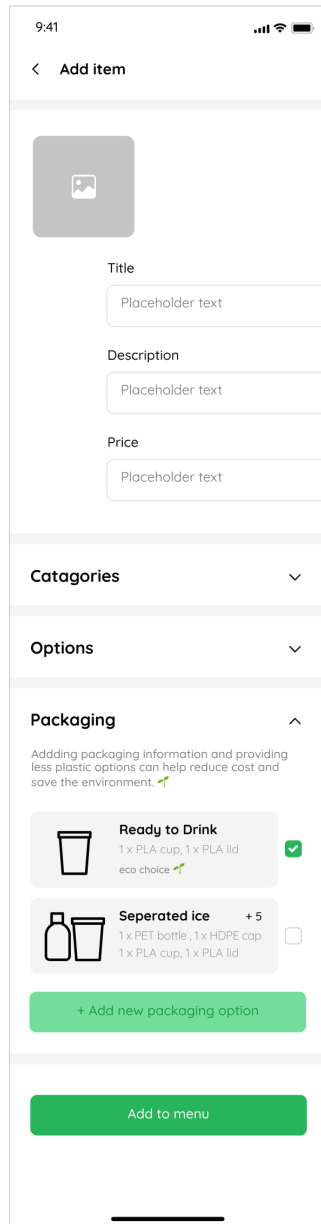
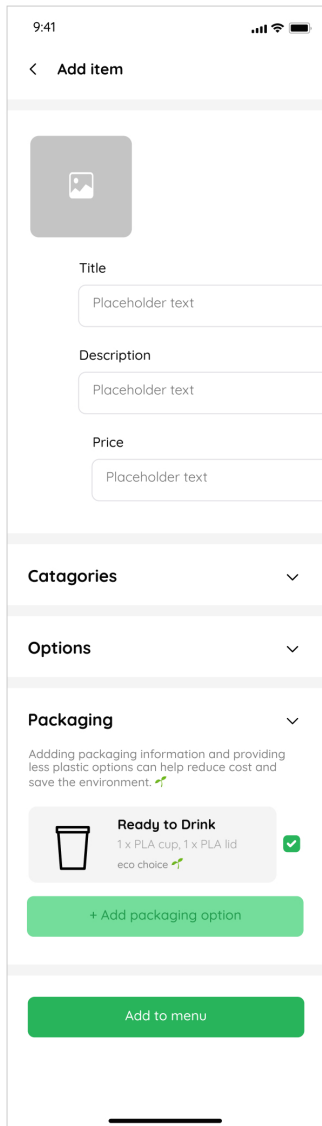
- Eco choice, customer will receive +1

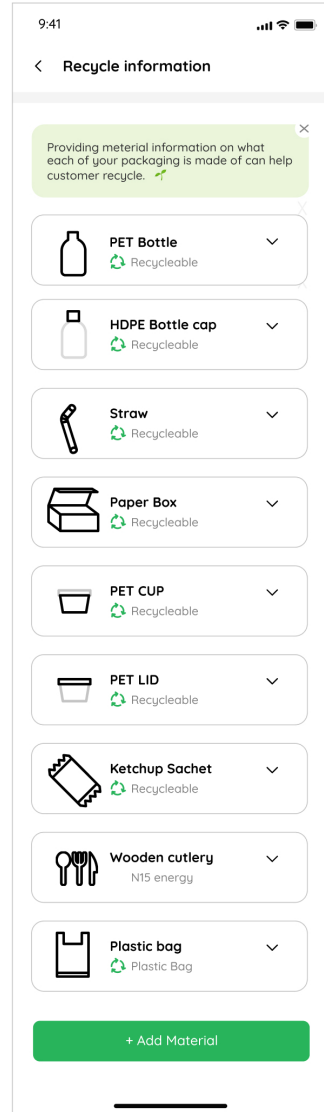
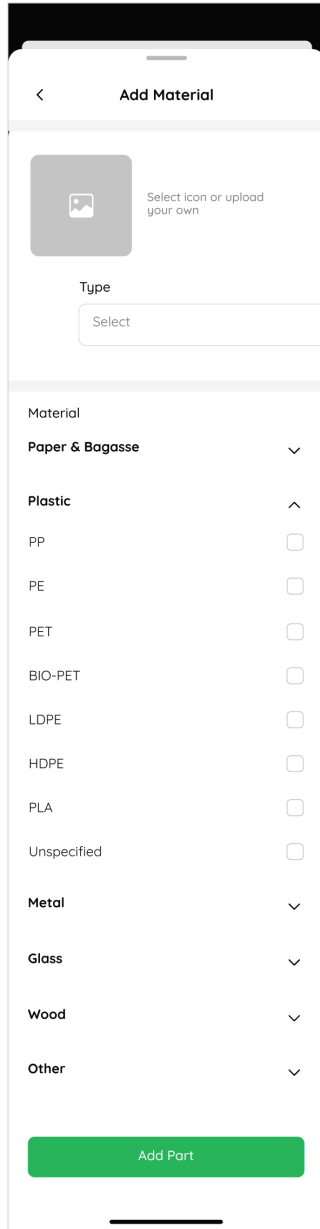
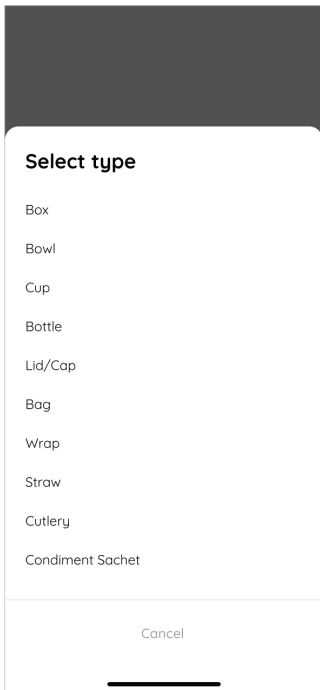
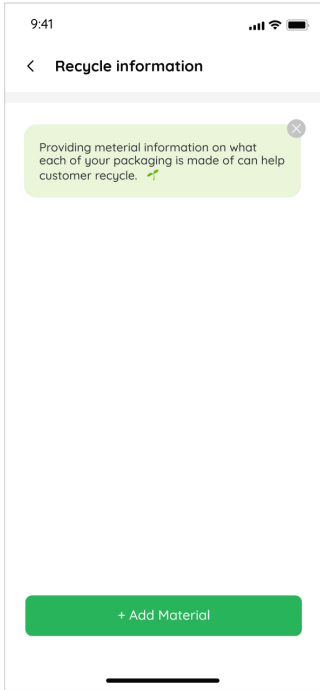
Add Choice











**Muthita Torteeka**  
muthitat@stud.ntnu.no  
Torteeka.com

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