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CASE STUDY ON REUSABLE TAKEAWAY PACKAGING

JOINTLY ISSUED BY

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Grateful acknowledgment is made to the following for their assistance in the preparation of this report.

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Break Free From Plastic
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Stephanie Northen | University of Portsmouth Global Plastic Policy Centre
Greenpeace Hong Kong Office
Gerson Lehrman Group (GLG)
Xie Wenbo | GLG Expert Member
Yang Qihang | Plastic Free China Intern
Zhu Hanqiang | Plastic Free China Volunteer

This English version is a summary, and its full report (Chinese version only) can be downloaded at this link: (http://www.plasticfreechn.org.cn/upload/ueditor/20240111/202401111509316113.pdf)

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Executive Summary

Plastic pollution is one of the most imminent global environmental crises. Throughout the world, China, as a major producer and consumer of plastics, plays an indispensable role in the governance of global plastic pollution. China is also known for its widespread use of takeaway services, with 521 million online takeaway users as of December 2022 according to the data from www.AskCI.com. In September 2022, Sinopec released the *Research Report on the Environmental Impact and Recycling of Packaging Plastics In the Takeaway Industry (2021)*, which estimated that a total of 574,000 tons of plastics were consumed by mainstream Internet takeaway platforms in 2020. While bringing convenience to daily life and accelerating the diversified development of catering industry, takeaway industry also generates substantial amounts of disposable plastic packaging waste, placing significant pressure and challenges to municipal solid waste (MSW) management and ecological environmental protection. Several studies suggest that the reusable mode holds higher potential for reducing environmental pollution and greenhouse gas emissions, and will take on a bigger role in plastic waste reduction and climate change response.

Plastic Free China is a private organization dedicated to addressing plastic pollution in China. We advocate for the reduction of single-use plastics in the Fast Moving Consumer Goods (FMCG) and retail industries, and assist the industry in breaking free from the environmental and health issues caused by over-reliance on single-use plastics via more sustainable solutions. Plastic Free China starts with reusable takeaway packaging in this case study, in an attempt to reveal the potential and feasibility of the reusable model to stakeholders such as governments, businesses, industry institutions and NGOs. The reusable model goes beyond the traditional "waste recycling" model, transforming the one-way "produce, use, and dispose" model of the linear economy into a "re-defining value and reuse" model of the circular economy.

The research team has selected 10 cases from Asia, Europe, and North America (of which 4 cases are analyzed in particular) from reusable practices in the global takeaway and catering industries. These cases cover large takeaway platforms, global restaurant chains and superstores (convenience stores), reusable packaging projects initiated by environmental organizations, as well as the application of reusable service providers' technologies, products, and models in the takeaway industry. We focus on analyzing the key nodes, infrastructures, participants and cooperation modes of the catering reusable system, and summarize the driving factors, commonalities of the modes, as well as the characteristics and success factors of the different actors, so as to assess the current situation, opportunities and challenges of the global takeaway industry in adopting reusable solutions, with a view to providing reference for the Chinese takeaway industry in advancing the path of reusable containers.

The first half of the report discusses the policy background of reusable models in the takeaway industry and presents the driving factors, collaboration models, utilization processes, and key findings of the research team through in-depth analysis of four key case studies, namely, Foodpanda Hong Kong, Greenpeace Hong Kong Office, Starbucks, and FamilyMart in Taiwan. The second half summarizes the model commonalities, success factors and differences through benchmarking cases, accordingly assessing the challenges and opportunities of advancing the reusable model in China's takeaway industry and providing recommendations for the roles of stakeholders such as governments, investors, and takeaway companies/platforms in the process.

We found that :

- Currently, the reusable models for the takeaway industry have shown strong similarities globally in terms of user usage processes and underlying collaboration models. Meanwhile, they also exhibit diverse formats to adapt to specific local conditions.

- Governments, businesses and consumers are key driving forces of the reusable takeaway system in catering and takeaway industries. Factors such as increasing plastic pollution, tightening regulations on plastic restriction and reduction, capital market demands for enterprises' disclosure of sustainable development information, and growing consumer awareness of sustainability have propelled the development of systematic solutions for reusable models. These factors have driven leading practitioners, represented by multinational enterprises, to establish sustainable value visions, goals and strategies. The chain catering enterprises and takeaway platforms that are heavily reliant on plastic packaging, such as Starbucks and Foodpanda, have incorporated "sustainable packaging" into the core of their ESG strategies.

- Reusable packaging in the catering industry demonstrates the potential to outperform single-use plastic packaging in terms of economic, environmental and social benefits. However, its implementation in China requires a gradual approach. Despite having the resources and some of the infrastructure needed to develop a reusable system, China has yet to develop an effective system, and stronger policy drivers, reusable system development, and systematic awareness-raising among all stakeholders are urgently needed to drive the overall shift to reusable models in the takeaway industry.

1. Regional Policy Analysis (Part)

Currently, from a global perspective, policy support for reusable takeaway packaging in various regions is mainly based on regional government measures restricting or banning single-use plastic packaging, represented by the EU *Packaging and Packaging Waste Regulation (PPWR)*. In addition to this, some regions have set targets for reusable packaging, such as the UK.A few countries and regions have other provisions to support reusable packaging at the regulation and policy level, such as deposit system for disposable cups in South Korea and initial financial support for reusable cups in Taiwan, China. Overall, at the regulation and policy level, there is a mix of approaches, including measures to increase the cost of using single-use packaging or compliance risk by banning and restricting the use of its opposite–single-use packaging, as well as setting higher-level reusable targets and formulating specific incentive and support policies.

Below is a summary of the relevant policies on takeaway packaging reduction in the regions where the cases covered in the report are located:

Hong Kong, China

In recent years, the HKSAR Government has progressively strengthened the legislative governance over the sale of disposable plastic tableware in the catering industry. One of the major measures is the Government's proposal to regulate disposable plastic tableware in phases. In this context, "disposable plastic tableware" generally refers to dining utensils made entirely or partly from plastic and designed for single or short-term use only; plastic refers to materials consisting of polymers to which additives or other substances may be added.

Plastic materials to be included in the regulation include:

1. Conventional plastics (e.g., expanded polystyrene (EPS), polyethylene terephthalate [PET], polypropylene [PP] and polystyrene [PS])
2. Oxo-degradable plastics
3. Biodegradable plastics (e.g., polylactic acid [PLA] and polyhydroxybutyrate [PHB])
4. Plastic films (e.g., polyethylene [PE] films and polylactic acid [PLA] films)

However, it does not include:

1. Natural polymers (e.g., plant fibers) that have not been chemically modified
2. Non-structural polymers used only as additives (e.g., adhesives, inks, and binders)

On October 18, 2023, the Legislative Council of the HKSAR passed the *Product Eco-responsibility (Amendment) Bill 2023 (Regulation on Disposable Plastic Tableware)* for the regulation of disposable plastic tableware and other plastic products. Major proposals include:

(1) Phased regulation of disposable plastic tableware

The Amendment Bill proposes prohibiting the local sale of any disposable plastic tableware and prohibiting catering premises from providing customers with any disposable plastic tableware, with implementation carried out in two phases covering nine types of disposable plastic tableware:

- **Phase 1**: The sale and provision to takeaway customers of EPS tableware and other disposable plastic tableware that are small in size and difficult to recycle or to which there are mature alternatives will be prohibited, and so will the provision of such tableware to dine-in customers;
- **Phase 2: Full implementation of all regulations.**

The Environment and Ecology Bureau of the HKSAR proposes implementing the first stage of regulation on April 22, 2024, The implementation timing of the second stage will depend on the prevalence and affordability of non-plastic or reusable alternatives for the relevant categories, tentatively set for 2025. Of these, Phase 1 will have a minimal impact on the takeaway industry, while Phase 2 is anticipated to bring about a significant impact.

Taiwan, China

Taiwan has been advocating for plastic restriction policies since 2002, with alternatives available (e.g., durable tableware for dine-in use), restricting the use of disposable products such as "plastic shopping bags" and "plastic-type no-wash tableware" by decree, and setting exclusion clauses for implementation-challenging situations. Starting in August 2018, the use of disposable containers such as plastic cups, paper cups, and plastic bowls was prohibited for dine-in services; by the end of 2018, large shopping malls had completely forbidden the provision of disposable plastic bags, and driven a 10-year phased regulation on plastics, escalating the ban on the use of plastic cups and straws, as well as excessive packaging of products.

In April 2022, the Environmental Protection Administration (EPA) officially implemented the *Parties Subject to and Means for Single-Use Takeaway Beverage Cups Restrictions*, focusing on:

- Starting from July 1, 2022, all beverage chains, convenience store chains, fast food chains, and supermarket chains across Taiwan must offer a minimum NT$5 discount to consumers who purchase beverages with their own containers.
- Starting from January 1, 2023, convenience store chains and fast food chains must provide reusable-rental cups service.
- By December 31, 2024, local governments will be required to report on the timeline for restricting the use of single-use plastic cups in beverage stores.

Table: *Product Eco-responsibility (Amendment) Bill 2023*

Types of disposable plastic tableware	Phase 1	Phase 2
EPS tableware, straws, stirrers, cutlery (forks, knives, spoons), plates	✅	✅
Cups	🟡	✅ ✅
Cup lids		
Food containers		
Food container covers		

✅ Prohibits the sale to local end-customers (including catering premises)
🟡 Prohibits the provision by catering premises to customers for dine-in services
✅ Prohibits the provision by catering premises to customers for dine-in and takeaway services

The current timeline for plastic reduction across Taiwan is as follows:

- In 2020, some places will limit the use of plastic shopping bags, no-wash utensils, disposable takeaway beverage cups, and plastic straws
- By 2025, the use of plastic shopping bags, no-wash utensils, disposable takeaway beverage cups, and plastic straws will be completely restricted
- By 2030, the use of plastic shopping bags, no-wash utensils, disposable takeaway beverage cups, and plastic straws will be completely banned

In addition, to align with the expanded implementation of the centralized plastic restriction policy, all parts of Taiwan have accelerated their plastic reduction schedules. For example:

City	Timeline for banning the provision of disposable plastic cups (Maximum fine of NT$6,000 for violation)
New Taipei City	Starting from May 1, 2023
Taoyuan	Starting from July 1, 2023
Taichung	Starting from October 1, 2023
Tainan	Earliest starting from October 2023
Taipei	Starting from December 1, 2023

In addition, the EPA issued the *Guidelines for Good Service of Reusable-Rental cups* in November 2022, providing an official reference for the catering industry. The guidelines cover six aspects, including material and labeling, borrowing and returning, cleaning, inspection/specification, communication of environmental protection concepts, and logo application; The guidelines specify that deposits should be accepted through multiple payment methods, provide a 3-day return period, ensure quality assurance controls, and adhere to cleaning specifications and publicity. This initiative is intended to standardize the management of hygiene and quality of the reusable-rentable cups service system. It enhances public confidence and engagement by awarding institutions the "*Good Service logo for Reusable-rentable cups*", assuring the public that they can feel relieved to borrow cups when they recognize this logo.

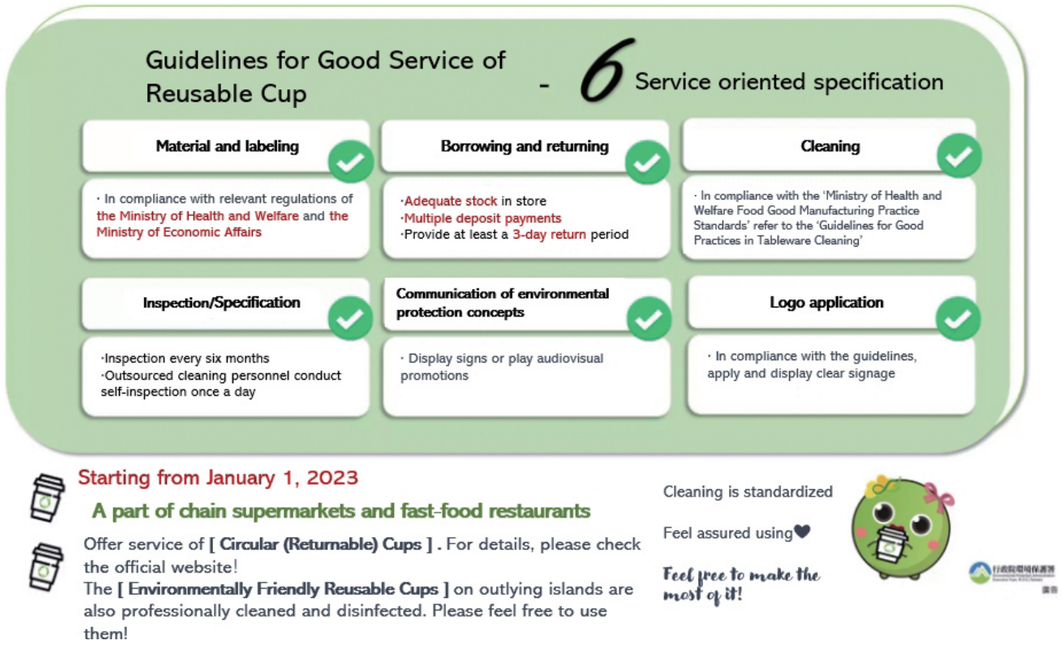


Figure: ***Guidelines for Good Service of Reusable-Rental Cups*** **(Source: Taiwan's EPA)**

Japan

In 2018, the Japanese government proposed a 25% reduction in single-use plastic waste by 2030 and a target of 100% reuse or recycling of plastic products by 2035. In May 2019, the Ministry of the Environment of Japan introduced the *Resource Circulation Strategy for Plastics* in response to issues such as marine litter and global warming, and in one of the key strategies of reduction, a measure to charge for plastic bags was proposed. In September of the same year, Japan amended the *Containers and Packaging Recycling Law* and issued a guideline on plastic shopping bag charges for reference by retailers to ensure the smooth implementation of the plastic bag charging system.

South Korea

South Korea began enforcing the *Law Concerning the Prohibition of Disposable Products in Establishments in the Catering Service Industry* back in August 2018, banning the use of disposable products in dining establishments such as cafes.

In an effort to reduce the use of single-use plastic products, the South Korean government has stipulated that starting from August 1, 2020, vendors that directly provide disposable cups without asking customers for their preference would face fines ranging from KRW 50,000 and KRW 2 million (about RMB300 to 12,000), and that by 2022, the goal is to reduce the use of disposable plastic cups in coffee shops from the current 6.1 billion to 4 billion, with a recycling rate reaching 50% (the recycling rate in 2020 was only 8%). In addition, the Ministry of the Environment amended the *Resource Recycling Law* in June 2020 to provide for a new deposit system for disposable cups from June 2022, whereby consumers purchasing products with disposable plastic cups will have to pay a certain amount of cup deposit in addition to the price of the product, and such deposit can be refunded by returning the used cups to the store.

In November 2022, South Korea significantly expanded the scope of the "Plastic Restriction Order". The new regulation requires all convenience stores to ban the sale of plastic bags for a fee, and restaurants are also banned from using plastic straws and paper cups, remarkably upgrading the intensity and scope of the restriction compared to previous measures. According to the South Korean Ministry of Environment, after the introduction of the new policy, retail stores such as convenience stores and pastry shops will be banned from using single-use plastic bags, similar to large stores with an area of more than 3,000 square meters and supermarkets with an area of more than 165 square meters. Public service establishments like restaurants are not allowed to provide disposable plastic bags and shopping bags for free. However, plastic bags used for packaging fish and other items with high moisture content, as well as bags with sizes below B5 paper or with a capacity below 0.5 liters will not be banned. The policy currently sets a one-year transition period.

2. Typical Cases of Reusable Containers (Part)

2.1 Case 1: Foodpanda "Choose to Reuse" Reusable Takeaway Packaging Program in Hong Kong

1. Case background

Foodpanda (Chinese name: 富胖达) is an Internet takeaway platform under Delivery Hero, a German takeaway company. The platform was founded in Southeast Asia in 2012 and was later acquired by Delivery Hero in 2016 and has expanded its business to cover multiple countries across Asia and Europe. The platform relies on mobile apps and websites to provide food ordering services for its users, and forwards orders to partner restaurants and delivers meals to customers.

1.1 Sustainable development of the enterprise itself

Foodpanda dominates the Hong Kong takeaway market, holding a significant market share of 64%[1] in Q2 2022. The widespread adoption of takeaway during the lockdown period has led to a notable increase in the use of single-use plastic food containers, contributing to environmental pollution caused by packaging from the platform. In response, Foodpanda's management has prioritized environmental protection and waste reduction as key initiatives for the company's sustainable development, and has worked with environmental organizations to implement plastic reduction practices within the company and in its network of partner restaurants:

- A "No Cutlery Needed" option has been added to takeaway orders starting from 2018;
- In March 2020, Foodpanda signed an industry pledge to join the "Plastic ACTion" of the World Wide Fund for Nature-Hong Kong (WWF-Hong Kong), pledging efforts towards achieving the shared vision of "No Plastic in Nature" by 2030;

- Starting from July 2021, Foodpanda has launched the "Sustainable Packaging Program", introducing six types of food containers made from compostable and green materials for purchase by partner restaurants. Restaurants adopting eco-friendly packaging will be given a special label on the Foodpanda platform, highlighting their contributions to environmental protection;
- In October 2021, Foodpanda Hong Kong launched the "Sustainable Restaurant Certification Program", with support from WWF-Hong Kong. Selected restaurants, after undergoing evaluation, will be awarded different levels of certification, encouraging the sustainable development of local dining outlets.

1.2 Plastic pollution crisis and policies in Hong Kong

The amount of disposable plastic tableware disposed of in Hong Kong has caused a severe environmental crisis. According to the *Monitoring Report of Solid Waste in Hong Kong*[2] published by the Environmental Protection Department (EPD), in 2021, the average daily disposal of plastic amounted to 2,331 metric tons, accounting for about 21% of the quantity of MSW disposed of at landfills, of which plastic bags were the largest component, followed by plastic tableware, about 225 tons per day, which is roughly estimated to be equivalent to approximately 14.6 billion pieces of plastic cutlery disposed of annually, or an average of approximately 1,940 pieces per capita per year.

In recent years, the HKSAR Government has been actively promoting recycling, reprocessing and green material solutions to reduce plastic waste. However, each solution has its shortcomings, resulting in ineffective plastic reduction. For example, not all types of plastics can be recycled; even if they can be recycled, the high cost of reprocessing often outweighs the value of recycled plastics, resulting in a significant amount of collected plastic waste being sent to landfills; and most of the plastics are extremely resistant to natural decomposition, with an estimated decomposition time of 4 to 5 hundred years. As a result, the continuous increase of plastic waste still puts tremendous pressure on landfills and poses a greater threat to the environment. As mentioned in the Regional Policy Analysis above, in response to the crisis, the HKSAR Government will progressively strengthen its regulatory policies on the use of disposable plastic tableware in the catering industry. It is noteworthy that Hong Kong's catering plastic ban has a tight timeline and that oxo-degradable plastics, biodegradable plastics and plastic lamination films commonly used for paper containers may fall within the regulatory scope, which restricts catering vendors and takeaway platforms from using alternative materials for disposable tableware, thus imposing a higher demand on compliance.

2. Project model

In September 2022, Foodpanda partnered with WWF-Hong Kong to launch Hong Kong's first-ever "Reusable Packaging Pilot", which aims to provide customers with a closed-loop takeaway experience and drive the takeaway industry towards a more sustainable business model to combat the single-use plastic waste crisis. The project is currently in its initial stage and is being piloted on Hong Kong Island. As of October 2022, Foodpanda has distributed a total of 8,000 food containers, covering takeaway districts in Causeway Bay and Central where office workers are densely populated and the demand for takeaway orders is high. Nearly 40 chains (e.g. Fairwood and Ippudo) and local independent dining brands are participating in it, which is applicable to both takeaway courier and in-store pickup services.

"Choose to Reuse" Reusable Food Container Scheme was initiated in October 2021. Based on discussions with the EPD of Hong Kong, Foodpanda sought professional advice from WWF-Hong Kong, and finally the latter applied for funding from the Environment and Conservation Fund Committee (ECFC) of the HKSAR Government for a waste reduction project and was awarded HK$2,995,704[3]

Source: www.wwf.org.hk

2.1 Project design

Identify partners and roles to build the recycling chain

In the operation of the project, Foodpanda acts as the main operator and coordinates the roles and operation of various partner organizations, including finding cleaning and transportation companies, and coordinating with real estate developers for recycling facility sites, etc.. The following is a list of partner organizations and their roles:

Table: Partner Organizations and Their Roles in Foodpanda "Reusable Food Container Scheme"

Type	Partner	Role
Funding partner	ECF	• Provides specialized funding
	WWF	• Technical support
Cleaning service provider	Gategroup Solutions Hong Kong Limited (catering service providers for airlines)	• Provides cleaning services for reusable food containers • All containers are cleaned using airport facilities in accordance with Gategroup Solutions' Global Food Safety Standards and World Food Safety Guidelines
Real estate developer	Chinachem Group, Hang Lung Properties, Hongkong Land, Sino Land, Swire Properties, Hopewell, Lee Tung Avenue, Central Market	• Provides site support for food container collection machines
Sustainability partner	Mass Transit Railway, Carbon Wallet (a social startup founded and supported by MTR Corporation)	• Supports customer incentives by providing one-stop carbon reduction rewards for customers returning food containers
	SideBySide of Hong Kong, Bright Services Co. Ltd. (a social enterprise of SideBySide)	• Logistics services
	Cornerstone Renewable Energy Limited	• Smart food container collection machine

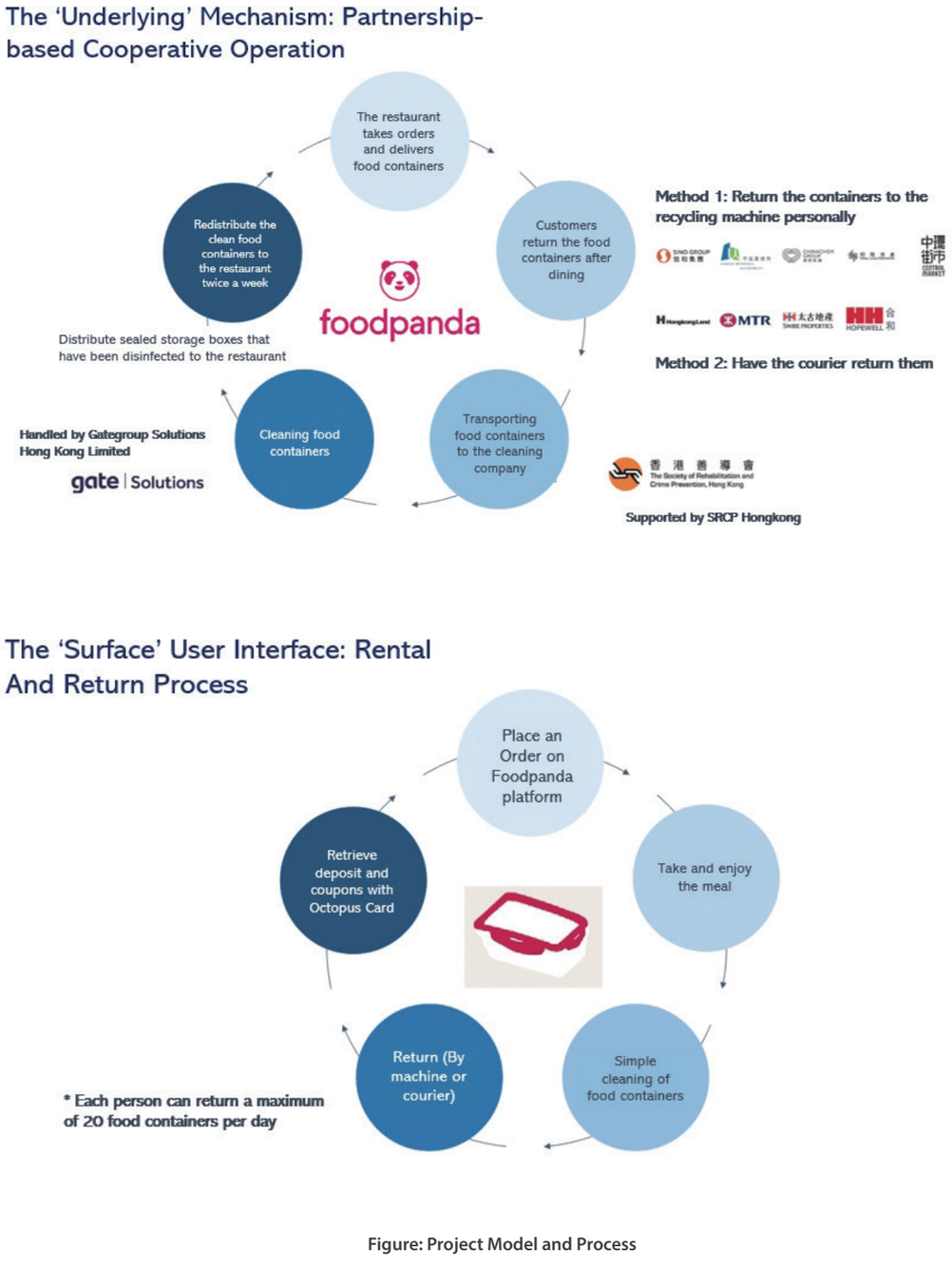


Figure: Project Model and Process

2.2 Food container design

In the development of its containers, Foodpanda prioritized various factors such as size, weight, heat resistance, microwavability, and tightness of the lids. The final design resulted in two shapes and capacities: 1,380 milliliters and 650 milliliters (see picture). Each container is equipped with a QR code for easy tracking of usage by the platform. and Foodpanda sends out regular emails and SMS to remind customers to return the containers.

The design of the collection machine incorporates hygiene and anti-counterfeiting considerations. Customers need to scan the QR code on the food container to open the machine gate, and after placing the container on the conveyor belt, the machine will automatically determine whether the container is suitable for recycling, and return the container if it does not meet the requirements. The machine is equipped with shape and weight sensors to detect the presence of food waste and other objects inside the container, preventing customers from placing containers with food waste into the machine.

Figure: Reusable Food Container (Source: Foodpanda Hong Kong)

2.3 Vendor invitation and food container pilot

It was planned to invite 60 to 80 restaurants with a high number of orders on the Foodpanda platform to participate in the program. However, some restaurants expressed concerns about the project, believing that using eco-friendly containers would increase the processes and that storing them would take up more space in their restaurants, finally, 37 restaurants were confirmed to participate. Prior to the pilot program, Foodpanda will provide participating vendors with the opportunity to try out the eco-friendly food container to help test which dishes are suitable for the containers, and then the vendors can present these suitable dishes on the menu of the Foodpanda platform. For instance, “TREEHOUSE”, one of the participating vendors, mentioned that apart from thin pancakes, other food items on the menu such as salads and burgers can fit into the food container.

2.4 Customer incentives

Foodpanda offers a dual incentives mechanism to customers using reusable containers. Customers will receive a refundable deposit for each returned container and will automatically receive a HK$15 coupon for ordering food on the Foodpanda platform. They can also earn “CW points” from Carbon Wallet, a one-stop carbon-reduction rewards platform and a social start-up established and supported by MTR Corporation. These points can be redeemed through the Carbon Wallet application for various benefits, including coupons for free MTR rides, green products, etc., thereby encouraging the public to practice a sustainable lifestyle.

3. Use steps

As shown in the picture, customers can select participating vendor partners from the Foodpanda app, when placing an order, they can choose reusable tableware, pay a deposit of HK$15, and select their preferred return method after finishing their meal and emptying all the leftovers and rinsing out the containers themselves.

Figure: App Order Page

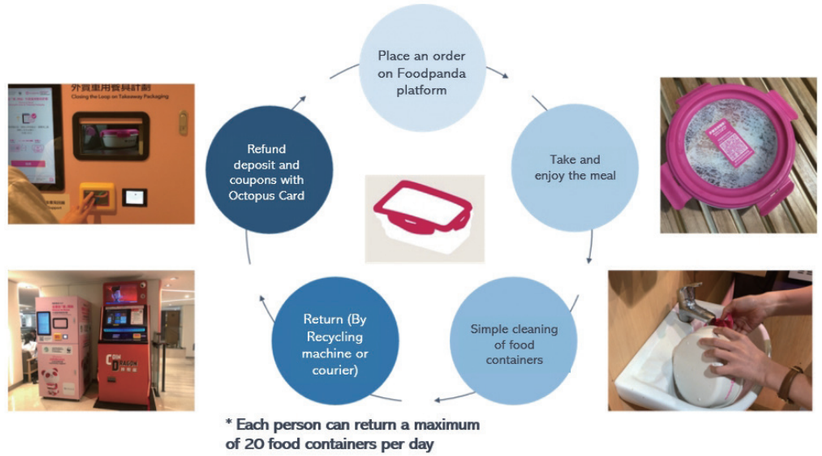
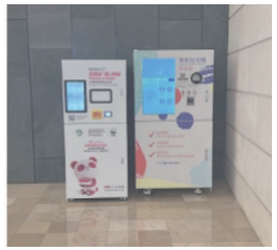


Figure: Use steps

Foodpanda offers two return options for customers:

(1) Return via collection machines

Foodpanda has set up nine collection machines in Central, Admiralty, Wan Chai and Causeway Bay (see picture). Customers can go to the nearest collection machine for cleaning and sanitizing, and retrieve the deposit via Octopus.



Pacific Place Phase 3 B1/F

Monday to Sunday and Public Holidays: 06:00 am to 12:00 am

Hoi Fu Shopping Centre 1/F

Monday to Sunday and Public Holidays: 09:00 am to 07:00 pm

Lee Tung Avenue B1/F

Monday to Sunday and Public Holidays: 06:00 am to 12:00 am

Hang Lung Shopping Mall 1/F

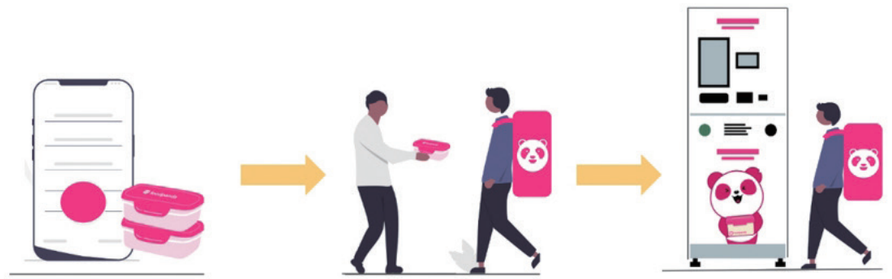
Exchange Square Tower 1 3/F

Times Square B3/F

Figure: Part of Collection Machines (Source: Foodpanda Hong Kong)

(2) Return via takeaway courier

Starting from February 2023, customers will have the option to hand over their food container to a courier on their next Foodpanda order, who will return it to a collection machine. Since the couriers are volunteering for the program, they will receive the deposit for the container and an e-coupon upon successful return.



The user places a returnable food container order on the Foodpanda platform (dependent on a delivery order)

When the courier arrives, the user hands over the empty food container

The courier returns the food container to the recycling machine

Figure: Flowchart of Courier Container Collection (Source: Foodpanda Hong Kong)

4. Key findings

According to the current feedback of the project, the participating vendors have indicated that the use of eco-friendly food containers does not impose significant additional burdens, and the operation process is comparable to the process of using disposable tableware to pack food, but it is necessary to allocate space in the store for placing the containers. At the same time, the project has encountered three major challenges:

(1) Urgent need for data support for Rational Allocation of Containers

According to the Foodpanda project team, the most difficult part of the operational stage is how to allocate the eco-friendly food containers. When the program was initially launched, Foodpanda distributed the containers according to the historical order volumes from restaurants, and delivered clean containers to the restaurants twice a week. If a restaurant had run out of containers before the scheduled delivery, it could request additional containers from Foodpanda through the communication software or online forms, and if the platform had sufficient capacity, the containers would be delivered in advance. Foodpanda hopes that as the program progresses, it will be able to get more data to rationalize the allocation of food containers.

(2) Dependence on Customer Awareness for Container Returns; Need for Enhanced Digital Tracking Processes

While Foodpanda has designed QR codes for food container tracking and offers customers incentives to return them, it still doesn't ensure where they go. Currently, the platform can track and record the number of containers delivered by a restaurant and the destinations to which they were sent. However, it cannot track precisely which specific container was delivered. To track the destination of a specific container, the restaurant needs to scan the QR code on the container before the delivery, which requires additional time cost, and thus the program's operation relies on customers voluntarily returning the containers while the tracking mechanism remains to be improved.

(3) Balancing "Environmental protection" and "quality"

Restaurants generally prioritize the appearance of their food. Some vendors reflected that the use of eco-friendly food containers will limit the plating method and the variety of food available for delivery, which will inevitably affect the appearance and taste of food. For example, the person in charge of TREEHOUSE mentioned that although they understand that the need for eco-friendly food container designs that cater to all restaurant needs, they still hope for more food container styles for restaurants that emphasize on the appearance of the food. However, they also expressed strong support for the "Reusable Food Container Scheme". This reflects the willingness of catering companies to embrace social and environmental responsibilities while recognizing the necessity of finding solutions to address the problem of excessive disposal of disposable plastic food containers.

2.2 Case 2: Taipei FamilyMart Reusable Cup Program

1. Case background

In January 2021, FamilyMart in Taiwan introduced the first "Reusable Lunch Boxes" at its store located in Taipei 101 building. Customers are required to pay for the food in the lunch box and a deposit of NT$100 for the reusable container, which can be retrieved by returning it to the store counter the same day as they finish their meal. The container is made of bamboo material and members choosing the reusable containers were eligible for a NT$100 discount after enjoying their meal.

Figure: Reusable Lunch Box at FamilyMart Store (Source: Greenpeace)

Figure: FamilyMart "Smart Rental Station" at Taoyuan City Hall Store (Source: Taiwan Media)

In April of the same year, FamilyMart designated its Taoyuan City Hall Store as a "Recycling Demonstration Store" and cooperated with the Taoyuan Department of Environmental Protection to launch the "reusable Cups" smart rental service, which provides two options: "Fresh Food reusable Food Containers" and "reusable (Returnable) Cups". The containers are provided by the reusable container supplier "Good to Go". Customers can easily complete the borrowing and returning procedures through a mobile application.

Through a full year of testing in the Taoyuan City Hall shopping district and Taichung Cao Wudao shopping district, FamilyMart has identified the difficulties in cooperation, promotion, and operation of the reusable tableware model. Building upon the success of the initial project with a 99% recovery rate and positive consumer feedback, the company decided to expand the pilot program. Starting in March 2022, FamilyMart introduced the reusable cup system to all Taiwan stores on a large scale through a series of deployments:

- Announced the introduction of reusable cups in 400 stores on March 31;
- Promoted reusable cups from corporate directly managed stores first on April 15;
- Worked with reusable packaging manufacturers to cover packaging materials for both physical stores and online stores to reduce plastic at source.

Figure: "Reusable Cup" Options Offered by FamilyMart in Taiwan (Source: Greenpeace)

1.1 Government participation

In addition to the information presented in the "Regional Policy Analysis" section of the report, it is noteworthy that the Taiwan government has been an active partner, funder, and regulator in the implementation of the reusable model, serving as the initial driving force. On the regulatory side, the EPA's 2018 vision of "banning plastic cups by 2030", a clear timeline, has helped driving the development of a reusable tableware model based on reusable cups. Meanwhile, Taiwan has also provided guidelines for reusable cup services for businesses and launched an official logo to boost public confidence in their use.

The EPA provides funding to local governments at the initial stage of model implementation to encourage voluntary local participation in the reuse model. Local governments with innovative plastic reduction programs are encouraged to partner with reusable program suppliers to cultivate the latter's capabilities and experience, and gradually develop a mature and scaled business model. This initiative has also given rise to suppliers such as Blue Ocean Vision, Good to Go and uCup.

For example, Taiwan's EPA, together with the Tainan City Government and takeaway platform Foodpanda, piloted the "Love the Earth Eco-Delivery" program, which partnered with reusable solution provider Good to Go. Subsequent government-enterprise cooperation programs led by the municipal government and supported by reusable suppliers have emerged in Taoyuan, Hsinchu, and Taichung. The Government actively invites restaurants, supermarkets and takeaway platforms to participate in the program and provides them with subsidies; after forming several demonstration sites, it summarizes successful experiences and gradually promotes the reusable model throughout Taiwan.

1.2 Initiatives of environmental protection groups and industry ratings

Taiwan's EPA announced a set of new regulations on plastic reduction in the catering industry under the framework of its 2018 vision for reducing plastic (*Restricted Applicable Objects and Implementation Methods of Disposable Drink Cups*), proposing a target for repeated use of drink cups and a timetable for banning plastic cups, and requiring vendors to provide discounts on bringing their own containers. The environmental organization Greenpeace Taipei Office grasped the policy window and invested in a reusable project in 2019, focusing on the practice of plastic reduction solutions in the mall supermarket retail industry (supermarkets, convenience stores, and mass sales) through reuse and advocating for policy and industry exploration of reusable models, and putting pressure on large brands by publicly disclosing the current status of brand plastic reduction through industry research and rankings. In 2019, nine brands including FamilyMart, Carrefour and Uni-President convenience stores were scored for the first time to drive the whole production supply chain and change the mode of relying on disposable plastic packaging. The plastic reduction rating report shows that the plastic reduction process in the retail industry was lagging behind, and all nine enterprises showed unqualified scores; FamilyMart, ranking second, had yet to introduce proactive policies or actions related to plastic reduction at that time. Moreover, the results of the 2022 report show overall progress compared with those in 2019, with multiple reusable pilot projects appearing across Taiwan and large-scale adoption of reusable cups in convenience stores.

1.3 Consumer awareness

The strengthened policies on reducing plastic have also raised public awareness of environmental protection. The environmental awareness of Taiwan consumers is growing rapidly, with a general focus on environmental pollution issues and active practice of the concept of responsible consumption. Many consumers have developed the habit of bringing their own tableware and shopping bags, contributing significantly to the plastic reduction efforts in the dining industry.

2. Partnerhsip model

FamilyMart has cooperated with Blue Ocean Vision and Good to Go, two reusable solution suppliers, in different regions. Taking Blue Ocean Vision as an example, this paper elaborates on its operation mode, usage process, etc.

Blue Ocean Vision:

As a start-up company founded in September 2020, it jointly launched the "Plasticircular® Reusable Cup Action" with FamilyMart Convenience Store. All the FamilyMart reusable cup stores except for those in Kinmen cooperated with Blue Ocean Vision. The market share of FamilyMart in Taiwan ranked second, next to 7-11. Among the 4,000 stores of 7-11, only one-tenth participated in the reusable cup lease of "Plasticircular® Reusable Cup Action". Other convenience stores participating in the Blue Ocean Vision Plan included 7-11 (80+stores) and OK Convenience Stores (40+stores). As of June 2023, a total of 560 franchise convenience stores in Taiwan participated in the "Plasticircular® Reusable Cup Action", including more than 400 FamilyMart stores.

The reusable cup is made of PP material locally produced in Taiwan, and the lid is disposable. With a capacity of 480mL, it has good thermal insulation performance and can withstand heat up to 120 degrees Celsius. The cup body and lid are both white, printed with the "Plasticircular" logo and a QR code that needs to be shown when leasing.

Figure: Plasticircular Reusable Cup

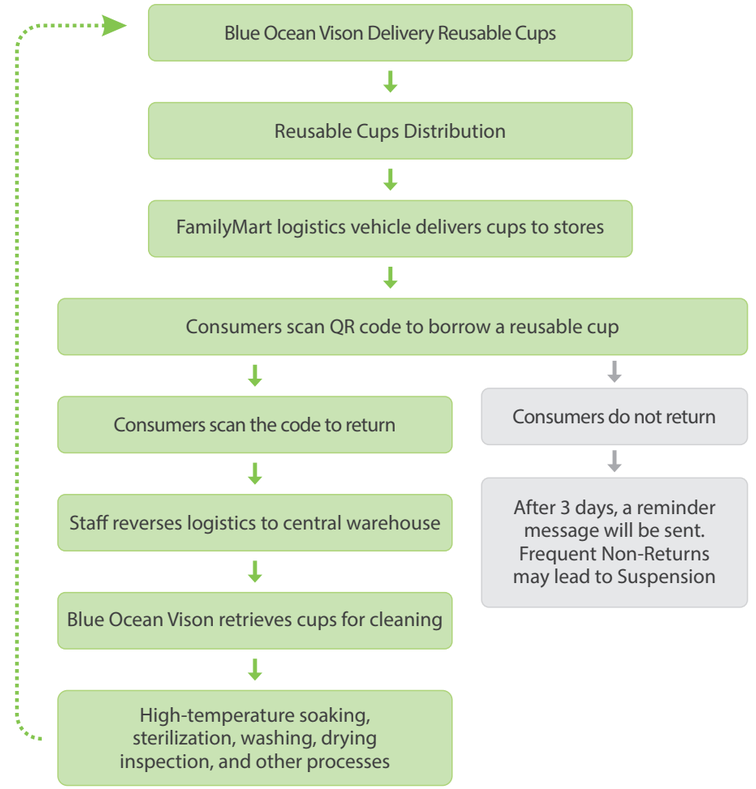


Figure: Plasticircular Reusable Cup Operation Process (Source: Taiwan media)

Blue Ocean Vision is responsible for:

- **Providing tableware:** Plasticircular reusable cups
- **Recycling and cleaning:**
  Blue Ocean Vision regularly collects preliminarily cleaned cups from various FamilyMart stores, and deeply cleans and disinfects the cups through the steps of "classification screening, dynamic cleaning and pre-soaking, high-temperature cleaning and sterilization, air knife drying, as well as quality inspection and control", all of which comply with local catering cleaning standards.
  In order to ensure cleaning efficiency and food safety, Blue Ocean Vision has invested over NT$10 million in establishing a dedicated cleaning line, machine inspection and testing are performed daily, and each reusable cup is individually inspected after the cleaning process.

3. Use steps

The "Plasticircular® Reusable Cup Action" is designed for Takeaway scenarios. Consumers who borrow cups for the first time are required to scan the QR code and join the membership of Plasticircular® Reusable Cup Action on the social media platform LINE ①.

Then the consumers can determine the borrowing and returning stores according to the instructions. After scanning the QR code on the reusable cup and showing the "successful borrowing" screen to the staff, the consumers can take the reusable cup for their use. No deposit is required for each use, and multiple cups can be borrowed at once by repeating the above steps.

Figure: In-store ads

Figure: Steps to Borrow Reusable Cups (Source: Blue Ocean Vision)

① As a kind of social software for the Taiwan people, LINE is similar to WeChat

After using the cup within the same day, consumers can return it to any participating FamilyMart store's counter, using the LINE official account of the "Plasticircular® Reusable Cup Action", clicking "I want to return the cup", and scanning the QR code on the cup again to complete the return process.

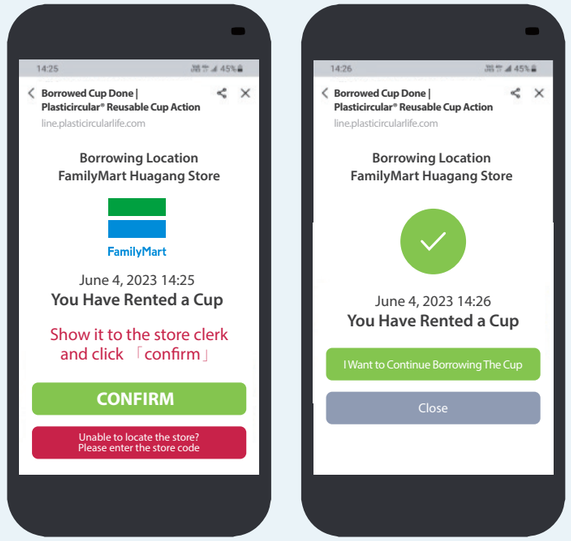


Figure: Diagram of Successful Cup Borrowing

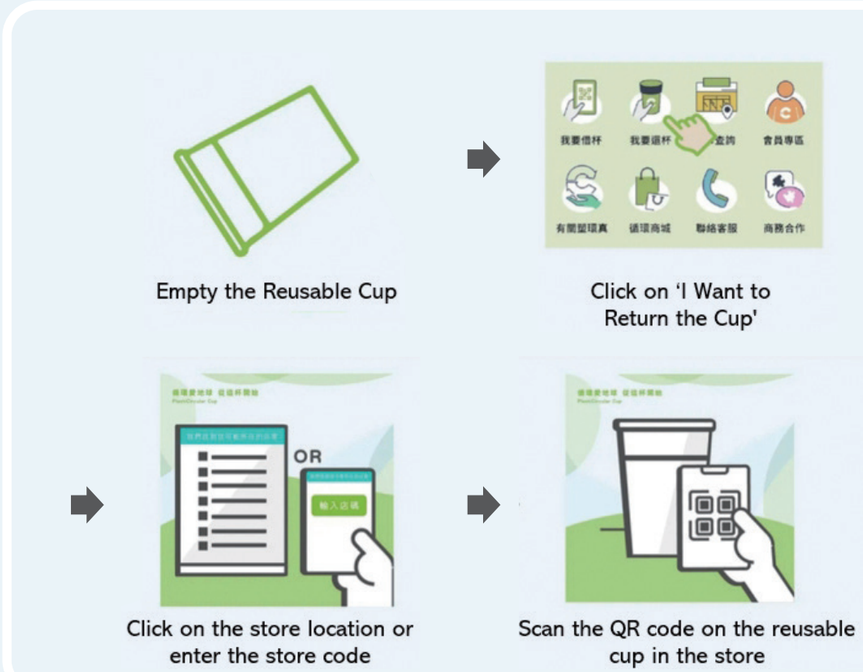


Figure: Steps to Return Reusable Cups (Source: Blue Ocean Vision)

4. Key findings

(1) This case illustrates a typical policy-oriented reusability practice. It demonstrates a clear path of NGO advocacy policies, promotes government legislation and industry standardization, and subsequently advances the corporate action. The government plays an active role in supervision, initial investment, and practice, provides funds for local governments and enterprises implementing the reusable model, supports startups to provide integrated reusable solutions, and gradually cultivates comprehensive reusable systems; additionally it also builds infrastructures, such as setting up return points in public space like stations.

(2) The development process of startups (such as Good to Go, uCup, and Blue Ocean Vision) drives the upstream and downstream of the industrial chain and pushes forward the large brand enterprises to develop their own packaging circular systems. For instance, FamilyMart and Uni-President Convenience Store (operator of Taiwan's 7-11) have attempted to work with different startups to accumulate experience. Subsequently, Uni-President Convenient Store worked with suppliers of their existing paper containers to develop a complete circular system independently.

(3) The challenges encountered by the project and corresponding solutions include:

- It takes time to understand consumer preferences and usage habits;
- Consumers attach great importance to the hygiene level of reusable containers, therefore, transparency in the cleaning process is crucial for gaining public trust and cultivating habits; the government should introduce corresponding hygiene standards, and suppliers should also disclose the standards they adhere to, along with relevant data and information.
- The initial cost is high, especially for single costs; however, after the model is established, matured, and scaled up, the costs of cleaning, reverse logistics, and other links will decrease.

(4) Convenient store brands have gradually embraced the reusable model, forming a positive competition within the industry. Uni-President Convenience Store (7-11) first introduced the reusable cups with the subsidies, guidance and administrative support from the Tainan City Government. This initiative played a crucial role in encouraging major competitor brands like FamilyMart to adopt the reusable cup. In addition, leading brands can drive the sustainable development of the entire industry by introducing the reusable project. FamilyMart convenience stores are partnering with Blue Ocean Vision to invite convenient stores, coffee shops, breakfast shops, fast food restaurants, bubble tea stores, and the catering industry to establish Taiwan's first cross-industry "Reusable Cup Alliance", providing free borrowing and returning and cross-industry reusable-rentable cups service for consumers across Taiwan. It is expected to set up more than 700 borrowing and returning stations in central and southern Taipei by the end of 2023, and consumers can experience the service of "borrowing from one store, returning to another" within the Alliance's cooperation network. This initiative contributes to the scale and systemization of reusable return facilities, transforming single-brand ownership into shared public facilities, thereby reducing costs.

As of now, the Taiwan region has formed a thriving reusable cup culture.In January 1, 2023, chain fast food restaurants and convenience stores took the lead, and Starbucks and other brands voluntarily participated. So far, 1,352 stores have provided reusable cup services. Taiwan's beverage industry is characterized by "a small store every three steps and a large store every five steps," If the majority of the stores can join the reusable model, the vision of every individual having a reusable cup is within reach.

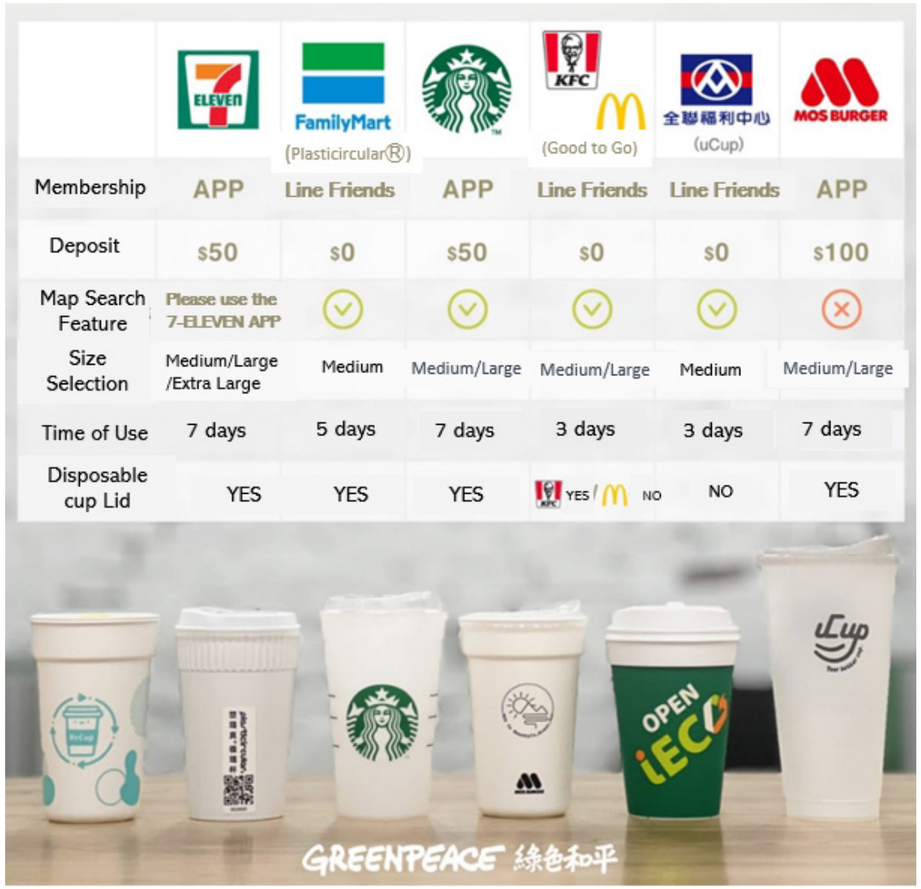


Figure: Enterprises Providing Reusable Cup Service in Taiwan Currently (Source: Greenpeace)

3. Case Comparison and Summary

3.1 Comparison of Reusable Container Model

1. Steps of using the reusable container

The case study shows that the reusable container model has strong commonalities, which can be summarized from two perspectives: the surface layer (consumer usage steps) and the underlying layer (cooperative institution chain):

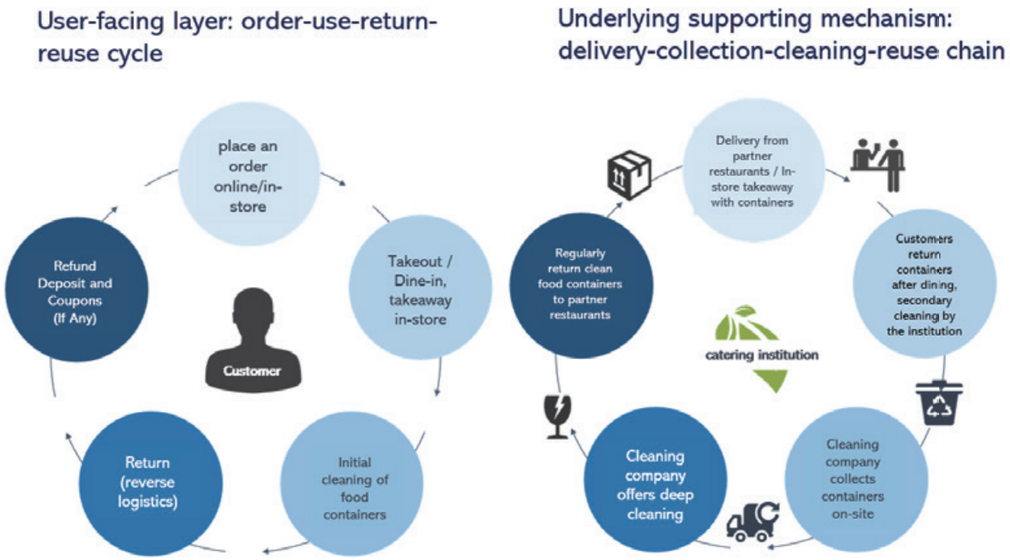


Figure: Surface and Underlying Operation Methods of the Reusable Containers

2. Cooperation models

Takeaway and catering platforms typically cooperate with local reusable container solution providers (such as Muuse, barePack and Re&Go). Besides providing their own designed and produced reusable containers (mostly customized branded ones for takeaway platforms), the latter also provide tableware distribution, post-use recycling, cleaning, as well as value-added services such as project management, ESG data collection and integration (development of data platforms or tools), and capacity building training. As shown in the picture, the services of solution providers can be categorized into three main levels:

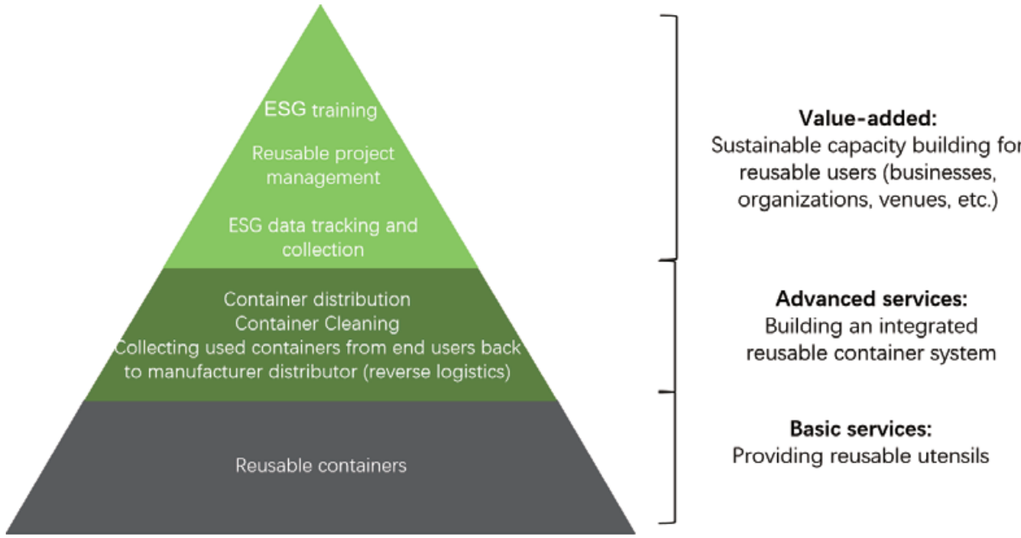


Figure: Service Level of the Reusable Solution Providers

3.The initial capital mainly comes from the companies'/institution's own funds

The funding for reusable container projects primarily stems from closed-loop capital②, with the main sources falling into the following categories:

② Closed-loop capital refers to a kind of capital flow mode where the investors of a company are also beneficiaries of the company's services. Investors are usually closely related to the success of the new products, companies, etc. they invest in.

- **Government funding or special funds:** For example, the Taiwan government provides funding for pilot projects of reusable containers and supports reusable service providers such as Blue Ocean Vision and Good to Go; the Foodpanda reusable container project in Hong Kong has received funding from the Hong Kong Environment and Conservation Fund, and the Starbucks Circular Cup project in Japan has received financial assistance from the Tokyo Metropolitan Government.
- **Enterprises' or institutions' own funds:** For enterprises that have established sustainability goals and have a strong value orientation towards circular economy, their project funds usually come from internal sustainable special funds (used for projects that meet their environmental goals, such as reducing plastic, carbon emissions and pollution, and promoting circular economy). Enterprises use these funds to purchase products and services from reusable container service providers.
- **Foundation or individual sponsorship:** Uber Eats London partner Again's funding comes from Starbucks Bring It Back Fund and Hubbub[4] ; the reusable cup plan of Greenpeace Hong Kong Office is funded by individual donations.

4. Types and materials of the reusable container

The types of reusable containers mainly include cups (including cup bodies and lids, with the lids divided into reusable and disposable ones) and food containers. Containers are mostly made of polypropylene (PP) plastic, with a lifespan ranging from 30 to 300 uses. In some cases (such as Starbucks in some regions), the non-reusable cup lids still can produce plastic waste.

Starbucks, Hong Kong Greenpeace projects, etc. in some regions also use reusable cups made of stainless steel. The reusable containers were designed with consideration for durability and suitability for different scenarios. Taking Foodpanda's food container as an example, its durability and sealing properties make it particularly suitable for Chinese food.

5. Current status of the reusable models on major global takeaway platforms

The following table summarizes the practices of the takeaway platforms covered by the cases in the reuse realm. As reusability becomes an important plastic reduction solution, takeaway platforms have been exploring reusable food packaging since around 2019, mainly through short-term pilot projects/plans. All projects are carried out in a cooperative mode, with the platform purchasing products and services from integrated reusable service providers (usually providing one-stop services such as container production, distribution, reverse recycling, and cleaning, forming a "reusable microcirculation system"), or outsourcing various processes to different suppliers. Most of the plans have a duration ranging from several months to three years, with only Grabfood's reusable plans in Singapore and SkiptheDishes' reusable plans in Vancouver continuing to this day, indicating that global large takeaway platforms are still in the stage of exploring reusable models and summarizing experience, and have not yet established systematic and widely applied solutions.

Table: Reusable Model Comparison in Some Takeaway Platforms

Takeaway platform	Implementation time	Cities covered	Number of participating vendors*	Long-term plan or not	Partner	Supported scenarios
Foodpanda	October 2022	Hong Kong	About 40	No (ended in September 2023)	WWF, Environment and Conservation Fund, Mass Transit Railway, real estate partners, etc. (see Case 1 for details)	Takeaway, pickup
	April 2020	Singapore	9	No	Muuse, barePack	Takeaway, pickup
	April 2020	Tainan	25	No	Environmental Protection Agency, Tainan City Government, Good to Go	Takeaway
Grabfood	December 2020	Singapore	80+	Yes (up to now)	Muuse, barePack	Takeaway
Uber Eats	April 2023	New York	80+	Yes (up to now)	DeliverZero	Takeaway
	April 2023	London	7	No (ended in October 2023)	Again	Takeaway
Deliveroo	June 2021	Paris	60	No	barePack France	Takeaway
	August 2019	Oxford, Cambridge	Unknown	No	OXWASH	Takeaway
	October 2020	Singapore	100	No	barePack	Takeaway
SkiptheDIshes	December 2022	Vancouver	50+	Yes	ShareWares	Takeaway
	June 2021	Guelph	6	No (ended in June 2022)	Friendlier	Takeaway

3.2 Analysis of Driving Factors

Case analysis reveals that the primary driving factors for the current reusable model of enterprises/institutions are local plastic reduction policies and clear sustainable value orientation of enterprises/institutions.

1. Policy:

According to the BFFP survey, half of the surveyed enterprises emphasized the importance of clear reusable policies, industry standards, government procurement or investment, as well as policies and measures such as bans and taxes on disposable plastics in promoting the reusable model[5]. The case analysis in this report aligns with the following findings: the countries/regions/cities where the ten cases are located have all issued clear plastic reduction policies, partially clarifying the timeline and path for the catering industry to gradually phase out disposable plastic tableware; furthermore, interviews indicate that stakeholders unanimously consider policies as the most important driving factor. It's noteworthy that:

- Most cases in this report demonstrate a certain degree of foresight, meaning they were strategically positioned before the implementation of policies or initiated during the early stages of policy implementation. This indicates that the emergence and promotion of reusable models are strongly correlated with policies but not the sole driving factor.
- The role of the government in promoting reusable containers varies. Except for the Taiwan cases (where the government directly launched reusable pilot projects with enterprises, supplemented by mandatory plastic reduction policies, phase-out roadmap and timeline, guidelines for industry practice, and financial support), in other cases, the governments introduced plastic reduction policies but didn't engage in direct cooperation with enterprises in the promotion of reusable containers.

2. Sustainable value vision and practice for enterprises/institutions:

As mentioned above, many enterprises had already adopted reusable models before the policies were introduced, indicating their values, strategic orientations, product and service models, or external pressure faced by large listed companies for their sustainable performance being the keys to the emergence of reusable models. The cases presented in our report illustrate three main driving factors:

Type	Driving factors	Cases
Enterprises	Stakeholder-driven: setting "circular economy", "waste reduction", and "carbon emissions reduction" as sustainable goals, and respond to stakeholder demands (such as ESG requirements from regulators and investors)	Foodpanda, Starbucks, Tim Hortons, Uber Eats, FamilyMart convenient stores
Environmental protection organizations	Mission-driven: aligning projects and initiatives with organizational mission/ goals to protect the environment	Greenpeace Hong Kong Office
Reusable container solution providers	Profit-driven: building profit-seeking business models upon reusable materials and solutions	Loop, Muuse, barePack, Re:Dish, Bold Reuse

3.3 Sustainable Benefit Analysis

The economic impacts of reusable alternatives, as substitutes for current containers, include the cost of packaging itself, cleaning and logistics costs, labor costs and more. Due to time, resources and other limitations, these costs are not quantified in this study. In terms of benefits, the analysis in this report focuses on the impact of reusable solutions from the following four dimensions:

1. **Cost reduction:** reducing procurement, inventory, and waste management costs
2. **Environmental benefits:** reducing waste, carbon emissions, etc.
3. **Economic benefits:** raising industry-wide sustainability awareness, consumer loyalty, and reinventing the enterprises' business model
4. **Social benefits:** the business and employment opportunities for stakeholders (such as disposable/ reusable packaging suppliers, vendors, and consumers) created during the introduction of reusable systems

Benefit Type	Overview
COST REDUCTION	**1.Traditional packaging procurement and inventory costs:** Although reusable containers have a relatively high upfront cost, they can reach a break-even point after a certain number of uses. By saving on traditional packaging procurement and inventory costs, enterprises realize significant packaging cost savings. **2. Municipal waste management costs:** • The time, manpower, and management costs required for waste management (including the collection, classification, and disposal of plastic and other waste); • The disposal costs incurred due to increasing waste amount; • The additional disposal costs incurred due to incorrect waste classification.
ECONOMIC BENEFITS	• **Increase profits:** **1. Reduce costs:** (as above) **2. Reduce compliance risks:** Governments in multiple countries are strengthening laws and regulations related to plastic reduction (ban) and waste reduction and urging the catering industry to gradually replace disposable plastic tableware with more eco-friendly solutions, which indicates that the reusable model is gradually becoming a mainstream solution for plastic reduction. With the strengthened policies and measures on plastic reduction and restriction, enterprises can prepare to respond to regulatory requirements and increase their sustainable value by deploying reusable systems in advance. **3. Increase consumers' repurchase rate:** Repurchase coupons or discount coupons are set in reusable projects to encourage consumers to use reusable containers, and consumers are required to return reusable tableware to the store, contributing to an increase in consumption frequency.

ECONOMIC BENEFITS

- **Marketing and brand building:**

  With the increasing awareness of environmental protection among stakeholders, excessive use of disposable packaging and the generation of a substantial waste by enterprises may impact their image, increase compliance risks, and lead to consumer loss (the research indicates that 28% of consumers worldwide stop purchasing specific products due to ethical or environmental concerns[6]).

4. **Build brand awareness:**
   Adopting reusable packaging/ containers helps enterprises build a responsible and sustainable corporate image, strenghten its stakeholders relations through the reusable model, and enhance brand awareness and loyalty.

5. **Enhance consumer recognition:**
   An increasing number of consumers hope to purchase from brands that support sustainable development (those brands that set goals, incorporate the goals into their strategies, and take actions). The catering enterprises that deploy development towards circular economy have witnessed an increase in consumer loyalty; in addition, catering enterprises can establish circular economy industry alliances or foundations by collaborating with reusable service providers, upstream and downstream of the industry chain, etc., to jointly enhance value, promote models, and explore market opportunities (such as the "Reusable Cup Alliance" established by FamilyMart or Bring It Back Fund launched by Starbucks).

- **Collaboration and industrial development:**

6. **Link upstream and downstream enterprises to optimize operation and realize scale development:**
   Enterprises can share reusable packaging among brands, industries, and broader ecosystems through reusable projects, achieving large-scale development of distribution and logistics, and reducing individual costs.

ENVIRON-MENTAL BENEFITS

1. **Reduce solid waste pollution:**
   The reusable model can reduce the amount of plastic flowing into landfills and incineration (currently, incineration is the main disposal method in China), and thereby reduce its pollution in terrestrial and marine environments.

2. **Reduce carbon emissions:**
   Generally speaking, a well-functioning reusable packaging system can reduce carbon emissions throughout its entire lifecycle by 60-80% compared with disposable plastic packaging[7]. Even if the carbon emissions from additional cleaning, logistics, and other processes of reusable takeaway packaging are included, the environmental impact of reusable takeaway containers/ cups is lower than that of disposable takeaway packaging; a study based in Europe indicates that the environmental impact of reusable takeaway packaging throughout its lifecycle is 4 to 13 times lower than that of disposable takeaway packaging[8].

3. **Save resources:**
   Research has shown that reusable packaging can reduce water consumption and waste generation.

SOCIAL BENEFITS

- **Create employment opportunities:**

  Reusable food containers have the potential to drive upstream and downstream industries, jointly build new growth points for the circular economy, and create employment opportunities in the distribution, cleaning, recycling, etc. of food containers.

4. Prospects for the Reusable Model in Chinese Catering and Takeaway Industries

4.1 Challenges

Case analysis and interviews indicate that China's reusable model still lacks the following enablers:

- Inadequate policy implementation and supervision mechanisms: The effectiveness of the disposable plastic restriction policy depends on robust policy implementation and supervision mechanisms. However, there may be loopholes in the implementation of regulations, leading to non-compliance with regulations by businesses, lacking sufficient motivation to explore alternatives to single-use packaging;
- Lack of legislation and policy guidance on the reusable model;
- The reusable model has not entered the scope of public discussion, and has not aroused the public voice and attracted industry attention;
- The takeaway and catering industries' long-term high dependence on disposable plastics is due to various reasons, including low cost and existing supply chains, etc.;
- The takeaway and catering industries lack standardized guidelines and agreements on plastic reduction, resulting in inconsistent directions in policy interpretation, practices, information tracking, disclosure, etc.;
- Insufficient financial resources: Adequate financial resources are crucial for the successful operation of the reusable models. Insufficient funding and budget constraints can limit its development and maintenance, affecting its effectiveness;
- Lack of infrastructures: including recycling points, large-scale and standardized centralized cleaning enterprises, etc.

4.2 Opportunities

1. Policy factor

The circular economy of plastics aligns with the global trend of carbon emissions reduction. Driven by China's goals of "peaking carbon emissions and achieving carbon neutrality", circular economy has become an essential approach for pollution reduction and carbon mitigation. On one hand, China's plastic pollution reduction regulation is constantly upgrading, and the packaging waste brought by Takeaways is

one of the key points in plastic pollution control; On the other hand, simply banning plastics or promoting biodegradable plastics cannot effectively alleviate the plastic pollution crisis. Efficient reusable utilization is the key to solving the environmental pollution problem caused by plastic waste, reducing carbon emissions, and achieving the "dual carbon" goals. It is evident that the carbon reduction requirements from the policy side present opportunities for reusable models.

2. The existing "nodes" of the reusable model need to be connected and integrated urgently

At present, mainland China has the resource foundation to establish a reusable container system, including mature third-party payment platforms, professional tableware cleaning facilities and service providers, digital management platforms, logistics manpower required, etc. However, these scattered nodes have not been effectively interconnected to form a system, and there is an urgent need for stronger policy driving forces, cultivation of the reusable systems, and systematic improvement of stakeholder awareness to drive the systemic shift of the takeaway and catering industry towards a reusable model.

After analyzing the successful global cases, we find the large-scale application of reusable systems requires industry upstream and downstream linkage. At present, the upstream and downstream chains of China's takeaway and catering industries are complex, involving multiple stakeholders and nodes. There are significant obstacles to collaboration and information communication, and an integrated third-party reusable platform is needed to ensure symmetrical information and integrate resources This approach will help "connect the dots" and establish a reusable system.

3. Enhance management effectiveness and information transparency disclosure by digital tools

The interview shows that all stakeholders believe that the key to success lies in the information exchange between key players (the 'nodes', each representing a phase within the reuse supply chain, such as vendor-to-consumer delivery, collection and cleaning) within the reusable system and between systems and consumers. Therefore, it is necessary to embed an intelligent data system into the system. Big data has been systematically applied in reusable project management, with higher added value and potential for application in more scenarios. Reusable service providers such as US reusable solution providers Bold Reuse and Re:Dish have adopted data technology by attaching QR codes and smart tags to containers, enabling the following functions:

- Data-driven project management: Quantify, track, and present the enterprise's reusable food container inventory, including utilization, durability, consumer usage, and project sustainability.
- ESG data collection: Track the environmental impacts of using reusable food containers (such as carbon emissions), assist enterprises in comparing the ESG impacts of reusable and disposable food containers throughout their entire lifecycle, and measure and disclose ESG performance.
- Insight into consumer behaviors: Track indicators such as the speed of consumer product usage and repurchase rate, providing a data foundation for production planning, product development, and improving consumer loyalty.

In addition, consumers are highly concerned about the hygiene level of containers. Therefore, improving the credibility, transparency, and traceability of cleaning services through data, such as disclosing cleaning nodes and their standards, processes, and related data, helps gain public trust.

4. Pick the "low-hanging fruit" ③ to scale up the reusable model

The reusable model of closed scenarios has been widely implemented in mainland China, such as dine-in services in the catering industry, and school or company canteens where the application is easy to collect, clean and manage. In the future, building on the existing practices, including recycling facilities, consumer awareness, and vendor engagement, the scope can be expanded to large event venues, parks (office parks, creative parks), and other settings. The scale of closed scenarios is gradually expanded and then we should strive to shift to open scenarios. In the future, after the reusable model is applied on a large scale and audience base and infrastructure networks (such as cleaning and return facilities) form, existing reusable facilities can be transformed into municipal facilities shared across institutions and even open to the public.

5. Combine ESG localization development to promote the reusable model

Clarify the correlation between reusability and circular economy, as well as enterprise ESG, combine big data to track ESG impact, and strengthen the motivation for Takeaway and catering enterprises to practice ESG

Policymakers, industry alliances, and non-governmental organizations should take the lead in incorporating reusability as a significant plastic reduction solution into the discourse of the circular economy, and enhance industry and public awareness of the concept and impact of reusability. In addition to clarifying its positive impact on society and the environment, it is crucial to emphasize its contributions to long-term business value and product sales. This approach can serve as motivation for businesses to voluntarily adopt reusable models. Listed companies under ESG pressure in the capital market should place their emphasis on reusable emission reduction potential and its connection to other key ESG indicators.

As Chinese enterprises strengthen their ESG awareness and practice, data and digital tools will become crucial for implementing reusable systems in the catering and takeaway industries. China has also witnessed the emergence of ESG data platforms and quantitative tools, which have the potential to be applied to the reusable model. However, it is still necessary to develop environmental impact calculation methods suitable for local conditions and the catering and takeaway industries. Meanwhile, the impact of social, economic, and corporate governance dimensions should be taken into account to fully demonstrate the positive impact of reusability and enhance the motivation for enterprises to adopt reusable systems.

③ Things that can be won, obtained, or persuaded with little effort.

5. Suggestions to Stakeholders

5.1 Government: driving and guiding the reusability practices

This report, based on case analyses and interviews, reveals that mandatory central and local government policies are the primary driving factors for the adoption of reusable models across various regions and institutions globally. For instance, in the Taiwan model, the government initially collaborated with local reusable service providers and brand chains to carry out pilot programs and summarize experience, and later set clear timelines, action routes, and subsidies for plastic reduction in the catering industry. Within about 5 years, it successfully guided the catering industry to adopt a reusable model in the mall supermarket system.

Buidling an efficient reusable systems requires strong government leadership, legislative guidance, and financial support. In this way, new norms may be adopted. Therefore, we suggest that the government should:

1. Actively assume leadership, subsidy, and collaboration roles, and gradually promote the reusable model through the following paths

- **Collaboration:** Collaborate with investors, enterprises, social organizations, academia, and other relevant parties
- Select industries and regions to start pilot programs, provide incentive measures such as tax reduction and subsidies for catering enterprises that participate first, accumulate experience, gradually expand the application scope of the reusable model, and lay the foundation for legislation;
- By collaborating with relevant parties to promote and cultivate consumer awareness of sustainable consumption, enhance public understanding of the concepts of reusable systems and circular economy;

- **Definition:** Clarify the definition of the reusable model, gain consensus from all parties, and avoid "Greenwashing" behaviors in enterprises, such as using reuse to refer to recycle, or considering the sale of reusable containers as a practice of reusable model;

- **Legislation:** It requires top-down guidance to promote the catering and takeaway industries to adopt the reusable model, and systematic reforms need to be coordinated from the central to local levels. Therefore, the focus of the plastic reduction policy for the catering and takeaway industries includes:
- Introduce a clear timeline for restricting the use of disposable plastic takeaway packaging, and encourage the pilot programs in first-tier cities. The implementation of the ban and restriction policies on disposable plastic takeaway packaging will effectively encourage the industry to actively explore feasible reusable packaging models;
- Incorporate reusable systems as high-potential plastic reduction solutions into macro-level frameworks such as circular economy, carbon emissions reduction, climate change, and sustainable development through policies and action guidelines for plastic reduction/reusability in the industry;
- Encourage the development of key infrastructures and nodes for reusable systems, rather than simply promoting the substitutes of disposable materials, and encourage social resources and funds to flow towards reusable sectors;

- **Research & Development:** Encourage the industry to develop reusable packaging materials and innovative solutions, cultivate a group of reusable service providers, link with the current scattered reusable node resources, and meanwhile encourage leading catering and takeaway enterprises, platforms, and large chain brands to take the lead, driving the industry to shift towards a reusable model with stronger management and implementation capabilities and brand effects;

- **Standardization:** Develop industry standards for reusability process nodes, such as standardized health and safety of reusable packaging, traceability label identification, cleaning and hygiene, and require transparent operation and data disclosure at each node to reduce consumers' doubts about the safety and hygiene level of reusable packaging and make them easier to accept the reusable model; and it is beneficial for stakeholders to track the actual reusability times of containers, assisting in the continuous optimization of the system.

2. Use multiple policy tools

According to the analysis, common policy tools for plastic reduction include:

Type	Tool	Cases
Administrative order (Compulsory)	Limit to/ban on disposable plastics	• *Product Eco-responsibility (Amendment) Bill 2023* of Hong Kong advocates the phased-out of disposable plastics and tableware
Economy	Taxation on disposable plastic packaging/containers	• The European Union has levied "plastic packaging tax" on disposable plastic packaging at a rate of EUR0.8 per kilogram since January 1, 2021
	Subsidy for reusability pilot areas	• Tainan City Government subsidizes the reusable cup pilot areas of Uni-President mall supermarkets
Industry guidelines	Industry goals and transformation ways	• The *UK Plastic Pact* sets a goal of recycling plastics by 2025, and proposes ways to achieve this goal through the manufacturing, use, and plastic disposal
	Guide for standardization of reusable model	• The *Guidelines for Good Service of Reusable-Rental cups* of Taiwan provides a practical reference for the catering industry in terms of reusable model (including standards for materials and labeling, borrowing and returning, cleaning, inspection, communication of environmental protection concepts, good service logos, etc.)
Requirements for enterprises	Extended Producer Responsibility (short for EPR)	• The *Extended Responsibility System Implementation Plan for Beverage Paper-based Composite Packaging Producers* of China stipulates that producers should perform their resource and environmental duties, take the lead in implementing the EPR system in drink paper-based composite packaging and other fields, and carry out the work such as the pilot alliance of drink paper-based composite packaging recycling
	Disclosure of enterprise sustainable information	• The *Environmental, Social and Governance Reporting Guide* of Hong Kong Stock Exchange requires listed enterprises to disclose environmental information • The Management Measures for the Use and Reporting of Disposable Plastic Products by Business Operators of China requires e-commerce platform (including takeaway platform) enterprises and takeaway enterprises to adhere to the true and complete report on the use and recycling of disposable plastic products on a regular basis

Based on the ways proposed in Item (1), it is recommended that the government uses various tools, such as ban or taxation on disposable plastics, the EPR system or sustainable information disclosure requirements for enterprises, to force enterprises to set goals for plastic reduction, and adopt the reusable model. Economic measures are particularly crucial, as significantly increasing the cost of using disposable products for businesses is essential to create the incentive to explore reusable models.

5.2 Investors: introduce financial resources, and cultivate the infrastructure and service providers in the reusable system

The complete infrastructure is the key to the success of reusable system. The processing, production, recycling, logistics, cleaning and other nodes of reusable system packaging are all inseparable from physical facilities. The scalability of the application requires the establishment of a dense network of nodes. This relies on the capabilities and resources of collaborative partners, including management and organizational abilities, resource allocation capabilities, and self-owned facilities. These capabilities and resources include:

- **Infrastructure & Facilities:** organization and management of cleaning, disinfection, logistics (including distribution and recycling of food containers, i.e. reverse logistics) at each node, as well as self-owned cleaning facilities (for example, Re:Dish and Again both have private professional cleaning equipment).
- **Software:** food container borrowing and returning app (e.g. Ch00ze App in the project of Greenpeace Hong Kong Office), payment platform, digital project management tool (e.g. 360 project management panel of Bold Reuse), etc.

Therefore, we suggest that investors should:

(1) Enhance awareness of sustainable development and circular economy:
Deeply understand the connotation, extension, relevant policies, good practices, key nodes, and environmental and social impacts of the reusable model. Purposefully guide resource flow towards the reusable sector.

(2) Foster integrated reusable service providers and connect dots within the reuse system:
These cases show that the surface and underlying models, participants and processes of the projects are similar, but each catering enterprise/takeaway platform is dependent on its own reusable system established with local partners (including food containers, logistics, cleaning, etc.). Multinational chain brands like Starbucks, representing a consistent macro framework, actively try to work with local reusable model suppliers around the world, diversifying the reusable models in various markets. In Taiwan, emphasis is placed on industry collaboration, allowing customers to borrow and return utensils at any participating vendor within the network, increasing customer acceptance and usage.
Therefore, investors should focus on three major aspects:

- Building reusable infrastructure, especially the collection, reverse logistics and cleaning process that are directly related to the experience of consumers and participating vendors;
- Cultivating integrated solution providers to effectively link the current fragmented reusable node resources:
- Intelligent technology related to key nodes (logistics and cleaning) of the reusable model. For example, RFID④ technology is widely applied to reusable packaging. It is expected that in the future, RFID technology will not only be applied to logistics tracking, but also be expanded to various links such as production, transportation, processing and sales of packaging materials. RFID tag and reading/writing are expected to become intelligent information transmission nodes to promote the digital transformation and intelligent upgrading of the reusable packaging industry and provide enterprises with more accurate, efficient and traceable logistics management solutions.

5.3 Takeaway catering enterprises/platforms: The Start is Crucial, Gradual Refinement in Practice

1. Start from the "low-hanging fruit" scenario, and design convenient and sustainable reusability pilot projects

It's low cost and easy to design packaging, recycle and clean by using the reusable model in the closed system. Enterprises can start from venues, office buildings, restaurants, gourmet plazas, schools and other scenarios to gradually promote the reusable model of pickup and Takeaway scenarios. Building reusable system infrastructure in a closed scenario will lay a foundation for more scenarios and scale applications.

④ RFID is the abbreviation of Radio Frequency Identification, which refers to the technology of transmitting digital IDs and other data between RFID tags and readers through electromagnetic waves in a wireless or non-contact manner. It is currently used in warehousing, logistics, supply chain management and other fields.

2. Smooth key nodes and make the use easier from the perspective of consumers

According to the research conducted by the Break Free From Plastic (BFFP), the current operational scope and impact of reusable models are constrained by factors such as consumer behavior and attitudes, convenience of the model, infrastructure, costs, financing, and other related elements.

The acceptability and loyalty of customers towards reusable containers are the key to the long-term success of the project. The convenience of project design has a direct relationship with consumer engagement, return awareness, and long-term loyalty to reusable containers. Therefore, enterprises should:

- **Conduct feasibility research on policies, business, and consumer consumption habits early,** select suitable pilot areas, fully understand the using habits of participating vendors and target consumer groups, and design available, durable and eco-friendly reusable containers;

- **Pay special attention to the nodes of the following borrowing and returning processes:**

- **Sign-Up:** Conveniently download the application, create an account, and link payment methods. Consider partnering with established third-party payment platforms such as PayPal, Alipay, WeChat Pay, Apple Pay, etc., allowing customers to avoid recreating accounts and linking bank cards for deposit payments, saving time and effort.

- **Cleaning:** According to the research team's interviews with experts and vendors, it can be seen that consumers pay high attention to the cleanliness and hygiene of reusable containers and the transparency of cleaning process. Enterprises can apply RFID technology to track the temperature, use, return and other data of each container, collaborate with reusable integrated solution providers with built-in cleaning services or third-party professional cleaning institutions, and gain trust from consumers through effective promotion (For example, FamilyMart publicly lists the five major cleaning processes of the partner "Blue Ocean Vision" on its project page);

- **Return:** provide clear return guidance on the app or website, including return address, route, return process diagram, and deposit return method.

- **Optimize incentive mechanisms** to enhance the degree of participation and loyalty of consumers.

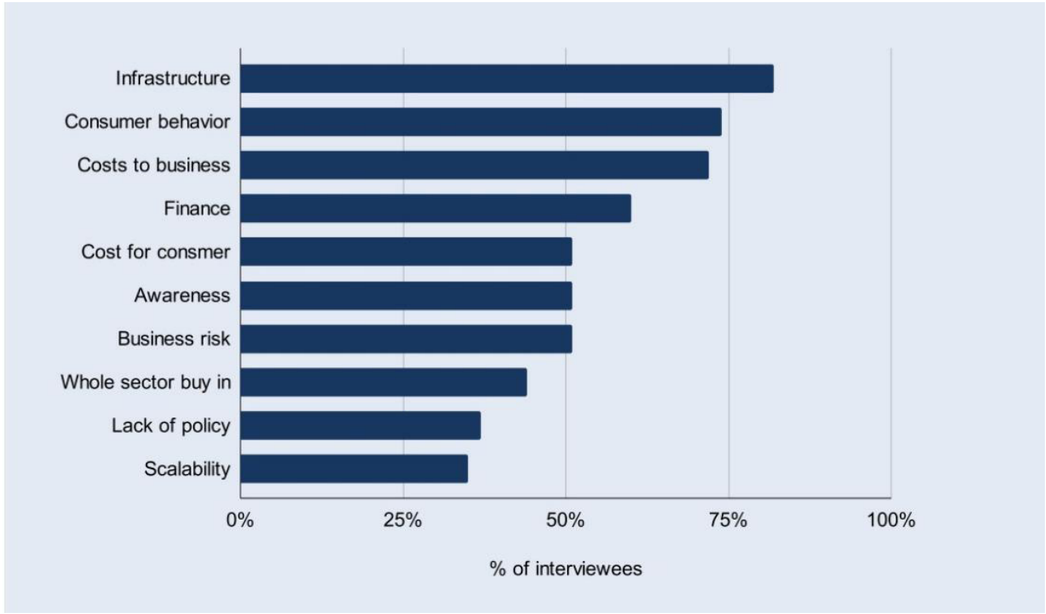


Figure: Influencing Factors of Reusable Model (Source: BFFP)

Note: number of respondents = 55

3. Takeaway platforms and leading brands take the lead in promoting industry standardization

The standardization of nodes such as design, logistics, recycling and cleaning of reusable containers is the key to the scale application of reusable models, the formation of networks, and the subsequent emergence of circular scale economy. In addition, standardization also makes the system more efficient in cleaning and delivery. Therefore, we suggest that:

- Relying on strong resources integration capability, data systems and management capability, industry-leading takeaway platforms, catering vendors, or chain brands take the lead in applying reusable models and supply chain logistics and cleaning services to form a standard model, so as to make use of brand influence to involve middle and small-sized enterprises in this;
- Standard infrastructure can be jointly funded and built by large enterprises and the government;
- After reaching a certain scale, it is feasible to work with stakeholders other than those of the reusable system, such as food material providers, retailers and consumer organizations, to establish an alliance for reuse and compile a standard manual for industry practices guidance.

4. Cultivate environmental awareness for consumers and enhance consumers' acceptability of the reusable model

The interviews reveal that the change in consumer awareness is conducive to the initiation and scale application of reusable containers. This process requires policies, industries, media, and non-governmental organizations to work together to change the system, enhance consumers' environmental awareness and guide responsible consumption choices. However, this process is not lengthy, as consumers will naturally adapt to new models as reusable facilities and systems mature. The global consumers' awareness of sustainability is now in the bud, but they know nothing about or they know little about but haven't put into practice the alternative solutions (e.g. reusable containers) to disposable plastics, so it's necessary to make policies to provide stronger regulation, require the catering industry to give clearer guidance, and build more reusable container pilot areas for the purpose of raising public awareness and developing the consumer market on a large scale. Additionally, companies should independently implement transparent information disclosure to enhance communication and trust with consumers.

Appendix:
Other Reusable Containers Cases

Name	Starbucks Borrow A Cup Program
Initiator	Starbucks
Type of the initiator: enterprise/ institution/reusable service provider	Global chain catering brand
Registration address of the institution	The United States
Business scope of the institution	Worldwide
Region	Seattle, California, Seoul, Jeju Island, Tokyo, Taipei, Taoyuan, Hong Kong
Main features	Driven by its sustainable goals, Starbucks encourages the markets of various regions to exploit advantages, and implements pilot programs for reusable models that are diverse but remain essentially the same in response to the policy requirements of various regions. In addition to valuing its own operations, Starbucks also exerts its brand influence to initiate a wider range of takeaway ventures in reusable models by working with environmental organizations to set up foundations, reflecting the responsibilities and commitment of international brands.

Name	The Re:Dish Reusable Container and Dishware Program
Initiator	Re: Dish
Type of the initiator: enterprise/ institution/reusable service provider	Reusable service provider
Registration address of the institution	The United States
Business scope of the institution	The United States
Region	New York
Main features	**1. Re: Dish Clean:** with a set of industrial cleaning, disinfection and sterilization equipment, it provides standard cleaning, packaging, and transportation services, facilitating the control of the quality and efficiency of cleaning the reusable containers recycled; **2. Digital inventory management + environmental performance Dish Track:** with the dashboard "Dish Track" specifically designed to monitor reusable container inventory and its environmental impact. According to the transparent and visual data, it helps consumers understand real-time usage models, track container flow and practices of sustainable development indicators (e.g. waste separation, Scope 1-3 carbon emission reduction, and water conservation), as well as helping enterprises disclose ESG data. **3. Added-value services:** provide the end-to-end project support called Re: Dish Program Support, with the goal of less managing the human and material resources required to reusable program to improve efficiency.

Name	BarePack Catering Platform Collaboration Program of Singapore
Initiator	BarePack
Type of the initiator: enterprise/ institution/reusable service provider	Reusable service provider
Registration address of the institution	Singapore
Business scope of the institution	Singapore
Region	Singapore
Main features	Collaborate with multiple takeaway platforms

Name	Uber Eats Reusable Container Program
Initiator	Uber Eats
Type of the initiator: enterprise/ institution/reusable service provider	Takeaway platform enterprise
Registration address of the institution	The United States
Business scope of the institution	More than 500 cities worldwide
Region	New York, London, Toronto, Vancouver
Main features	Collaborate with reusable service providers such as Deliverzero, Again, Reusables and Suppl in different cities

Name	Tim Hortons Reusable Cup and Food Container Project of Canada
Initiator	Tim Hortons
Type of the initiator: enterprise/ institution/reusable service provider	Chain catering enterprise
Registration address of the institution	Canada
Business scope of the institution	Regions such as North America, Europe, Asia, and the Middle East
Region	Toronto
Main features	Multi-party collaboration: Tim Hortons collaborates with the reusable solution service provider Loop, and Loop works with Tupperware to develop customized reusable food containers. This is the first time that Tupperware worked with Loop to enter the market through a catering project, and it is also the first time that the reusable food container model of Loop has been applied in restaurants. The program implemented in collaboration with Tim Hortons also aims to Tupperware's vision to significantly reducing food and plastic waste by 2025.

Name	"Community Reusable System" Program of Greenpeace Hong Kong Office
Initiator	Greenpeace Hong Kong Office
Type of the initiator: enterprise/ institution/reusable service provider	Environmental NGO
Registration address of the institution	Hong Kong
Business scope of the institution	Hong Kong
Region	Hong Kong
Main features	Centered on the environmental NGO, it coordinates all stakeholders, establishes a community reusable system, advocates policies as the NGO, and engages stakeholders in the program

Name	Bold Reuse of the United States
Initiator	Bold Reuse
Type of the initiator: enterprise/ institution/reusable service provider	Reusable service provider
Registration address of the institution	The United States
Business scope of the institution	Portland, Oregon; Park City, Utah; Bentonville, Arkansas; Seattle, Washington
Region	Portland; Online scenario
Main features	1. **Application scenario of grocery store - New Seasons Market:** reduce disposable packaging bags in prepared food area and provide consumers with reusable packaging bags; 2. **Application scenario of fresh vegetable platform - Imperfect Foods:** a closed-loop reusable packaging circular system, including reusable plastic cryo-gel bags.

Name	Skip the Dishes Reusable Container Program of Canada
Initiator	Skip the Dishes
Type of the initiator: enterprise/ institution/reusable service provider	Takeaway platform enterprise
Registration address of the institution	Canada
Business scope of the institution	Canada
Region	Ontario, British Columbia
Main features	Collaborate with the reusable solution service providers Friendlier and Shareware

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