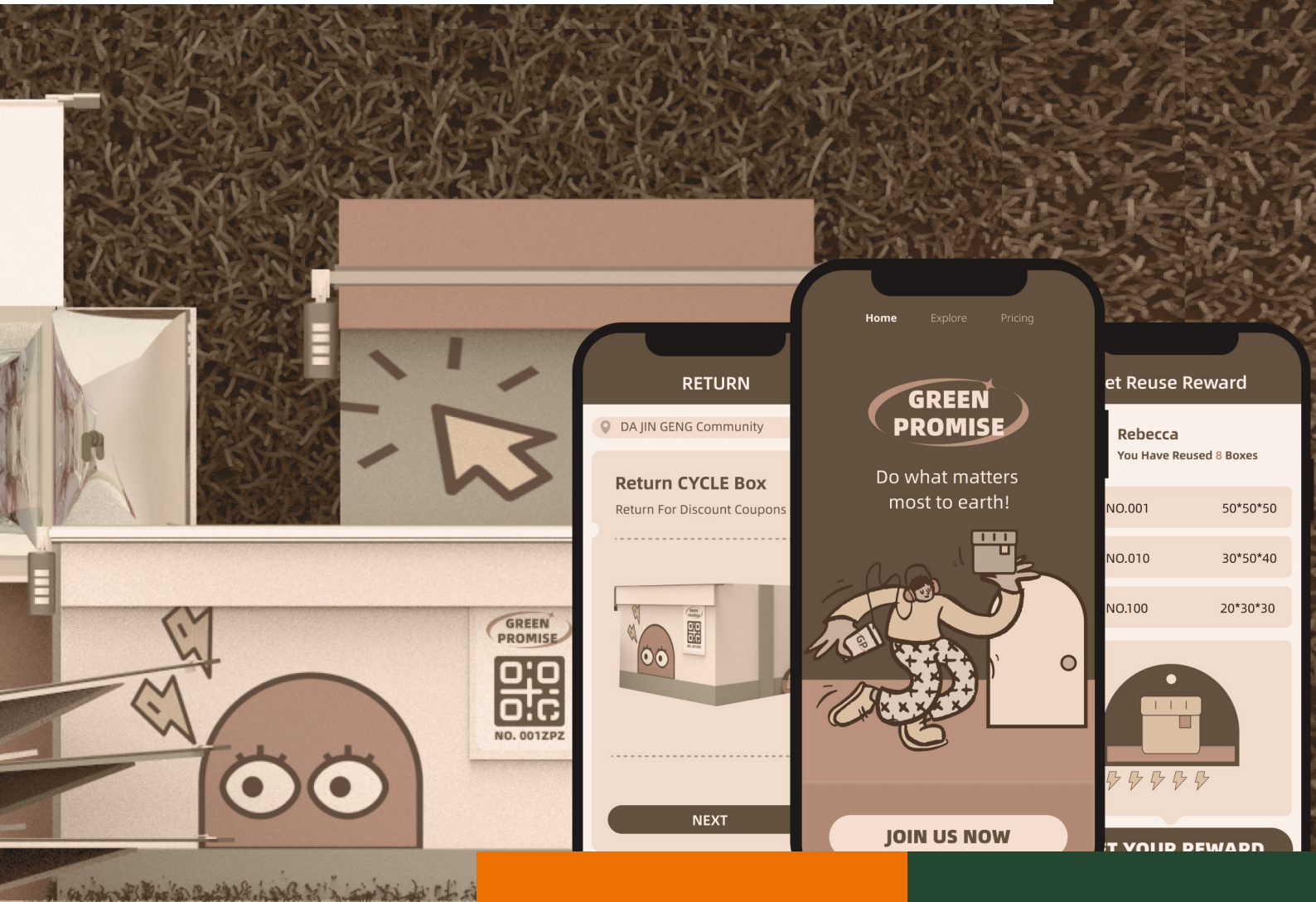




Politecnico  
di Torino

Department of Architecture and Design  
Master Thesis in Systemic Design

# A SYSTEMIC DESIGN OF EXPRESS PACKAGING IN CHINA



Supervisors

Pier Paolo Peruccio  
Maurizio Vrenna

Candidates

Peizhang Zhao S273902  
Huimin Cao S274592







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Academic Year

**2022/2023**



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**01**

# **Introduction**

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# Introduction

The development of e-commerce has brought great environmental problems for China, It's necessary to deal with the rapidly growing express waste problems. After researching the current situation and finishing the case study of different regions, we found that although there have been some attempts, now in China there is no effective solution to this problem on a large scale. So we confirmed the research question of our thesis: **How to adopt systemic design thinking to reduce the quantity of express packaging garbage?** To define the research direction more specifically, we come up with 3 concrete issues:

- 1) **How to improve the recycling rate of express packaging in China?**
- 2) **How to build a green express packaging system that users are willing to use?**
- 3) **How can this system balance making a profit and providing a green delivery service?**

Then we investigated the current situation of express packaging in Shanghai, China. Shanghai is the first city in China to implement garbage classification, and it is also a pioneer in the development of Chinese modernization. A study based on Shanghai has a reference and learning significance for other regions in China. We took the Shanghai DaJinGeng community as the sample. Under the guidance of systemic design methodology, we conduct field research, the contents include the express delivery method, the distribution of garbage stations and express stations, express package types, and the current situation of packaging recycling...Next, We summarized the life cycle of express packaging, including the production, transportation, usage, discard, and recycling or leftover process.

We found that **now express packaging is difficult to recycle, the recycling rate is low, people lack the motivation, and plastic packaging is difficult to classify...** We brainstormed many solutions to these problems and found that **improving the recycling rate of packaging is the key point.** So we designed a reusable express packaging system, including 3 parts:

## 1) The reusable packaging

A newly designed recyclable box, made of recycled plastic with a certain hardness, which is easy to fold and pack up, and can be used many times. Also, it has an inflatable airbag, which can replace filling material. When users receive packages that use reusable packaging, they can scan the QR code to unlock the box, which can replace plastic tape.

## 2)The reuse platform

Users can book a door-to-door service to use or recycle the reusable box on the reuse platform. They can also get digital recycling rewards, find more stores that use reusable packaging, and increase environmental awareness and enthusiasm on this platform

## 3) Smart recycling bins

As for the smart recycling bins, we put in enough ones to ensure that users can easily find it. Users can use the reuse platform's navigation function to find the recycling bin near their home and complete self-service recycling.

When the recycling bin is full, it can automatically send a message to the couriers, asking them to help redistribute the reusable packaging and improve the reuse rate.

By using this reusable express packaging system reusable packaging, we can achieve the purpose of saving energy, low carbon and environmental protection.

02

Project

Background

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## 2.1 The Booming E-commerce Has Brought Great Packaging Waste

### 2.1.1 The express delivery industry is booming

Although the history of world-famous express companies can be traced back to the business activities in a city at the beginning of this century, and the history of China's post station can be traced back to 2000 years ago or even earlier, it is an indisputable fact that the idea of modern express industry was gradually established after World War II, especially in the 1960s and 1970s, with the introduction of advanced management means and methods based on computers and the development of large aviation aircraft on highways, Although the history of world fame express companies can be traced back to the business activities in a city at the beginning of this century, and the history of China's post station can be traced back to 2000 years ago or even earlier, it is an indisputable fact that the idea

of modern express industry was gradually established after World War II, especially in the 1960s and 1970s, with the introduction of advanced management means and methods based on computers and the development of large aviation aircraft on highways, So that the express industry began to develop rapidly to the scale of national network and global network.

The express delivery industry is maintaining rapid growth in many countries. The global express delivery cost, excluding pick-up, long-distance transportation, and sorting, is approximately 70 billion euros. China, Germany, and the United States account for over 40% of the market. It is predicted that the delivery volume of Germany and the United States may double by 2025, reaching approximately 5 billion and 25 billion packages per year, respectively (Joerss et al., 2016)



Figure 2-1. [Development of China's express delivery industry] [Online image]. (2020). Sohu.com [https://www.sohu.com/a/403353047\\_199708](https://www.sohu.com/a/403353047_199708)

## 2.1.2 The e-commerce shopping festival has propelled China's express delivery business to the top of the world

With the development and popularization of the Internet, online shopping has become a part of daily life worldwide (Hao et al., 2019). Online retail is one of the fastest-growing industries globally, especially in developing countries. The express delivery industry is an important component of China's modern service industry, and is a modern leading industry that promotes the transformation of circulation methods and consumption upgrading.

Since 2009, the influence of Taobao's "Double Eleven" activities has gradually become apparent, and the explosive growth of online retail has also driven the vigorous development of the express delivery industry (Fan et al., 2017). Double Eleven, 618 is currently the most popular e-commerce promotion festival, bringing a large number of online shopping orders on the day of promotion. With the rise of e-commerce live streaming, online shopping sales continue to rise. In 2022, China's online retail sales reached 13.8 trillion yuan, an increase of 9.5 times compared to 2012, ranking first in the world. Subsequently, it also brought a large amount of express delivery business.

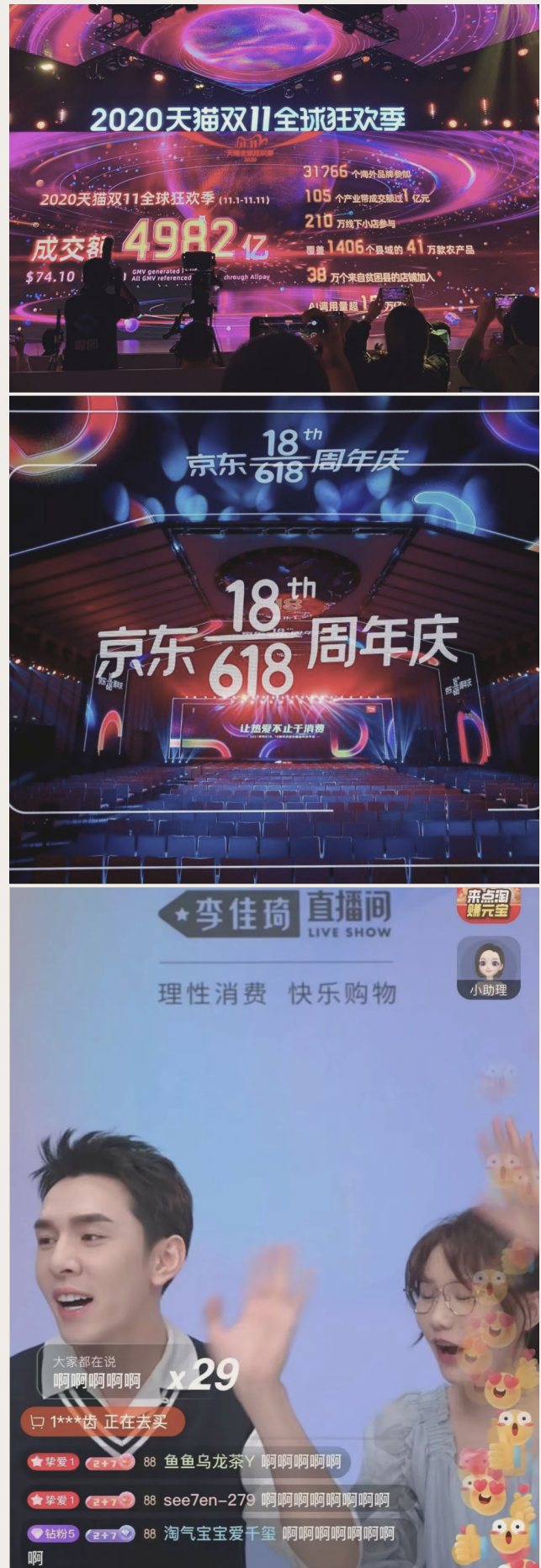


Figure 2-2. [Current Situation of E-commerce Development in China] [Online image]. <https://item.btime.com/31pv0mncleq8dm85icbv5ovjk90>

In 2014, China’s express delivery business volume reached 14 billion pieces, surpassing the United States for the first time and ranking first in the world. It still maintains a leading position by breaking records every year. In 2017, the online retail sales in China reached 1.1 trillion US dollars (the National Bureau of Statistics (NBSC, 2018), with orders in the Chinese express delivery market exceeding 40 billion (over 100 million packages per day, an increase of 28% compared to last year) (State Post Bureau of The People’s Republic of China (SPBC, 2018), accounting for approximately half of the global total package volume (Loesche, 2017)), In 2018, the total volume of China’s express delivery business exceeded the combined network sales of the United States and the United Kingdom (Deloitte China Research (DRC, 2017), with a total of 50.71 billion items, an average annual growth of 26.6% (SPB, 2019), surpassing the total volume of the United States

and developed countries such as Japan and the European Union (Chen, 2020). The online retail sales in 2019 were approximately 110 million yuan, an increase of 16.5% compared to 2018 (National Bureau of Statistics, 2020). In 2020, the business revenue of Chinese express delivery service enterprises reached a total of 879.54 billion yuan, a year-on-year increase of 17.3%, achieving a growth of 100 billion yuan. The State Postal Administration of China has announced the operation of the national postal industry in 2021. Statistical data shows that in 2021, the annual business volume of express delivery nationwide exceeded the 100 billion mark for the first time, ranking first in the world for 8 consecutive years. In 2021, the total business volume of express delivery service enterprises nationwide reached 108.30 billion, a year-on-year increase of 29.9%; The accumulated business revenue reached 1033.23 billion yuan, a year-on-year increase of 17.5%.

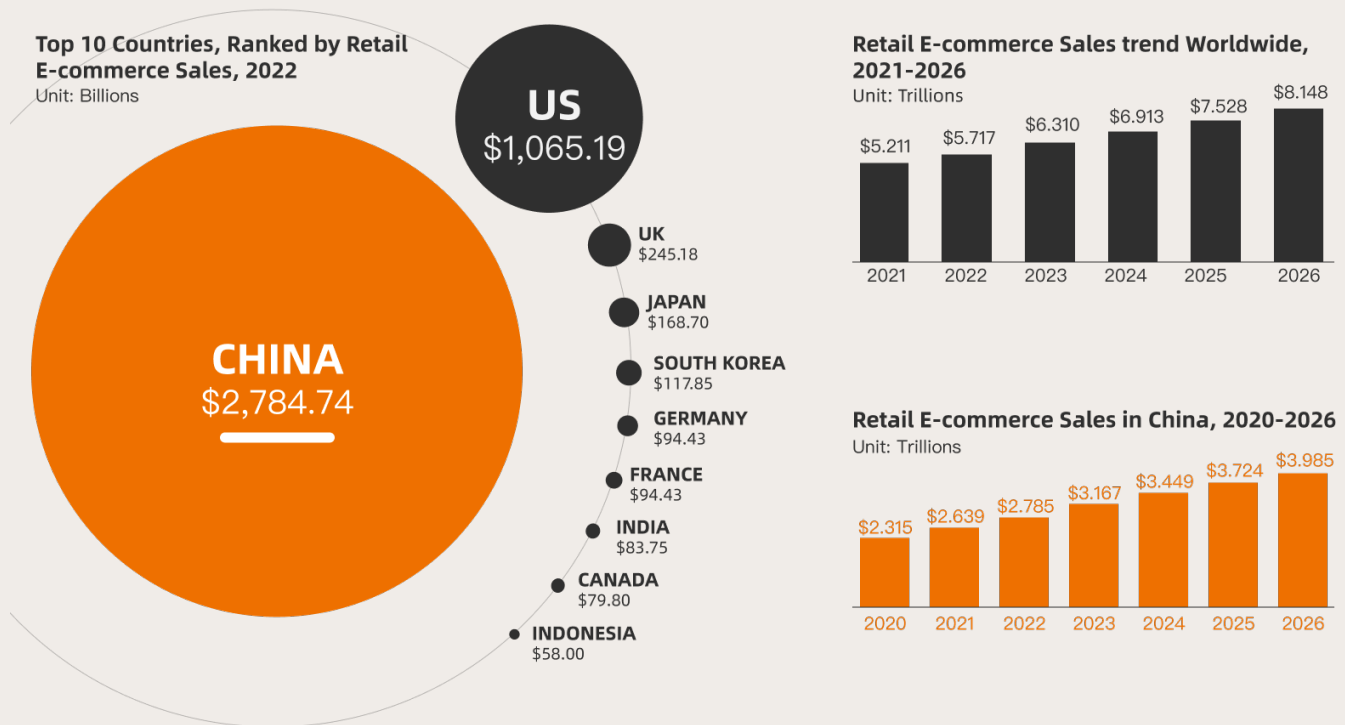


Figure 2-3. Retail E-commerce Sales data in China

References: Ethan Cramer-Flood, 2022; State Postal Administration of China , 2018



### 2.1.3 The development of e-commerce and express brings environmental problems

The express industry is an important socio-economic logistics system, and the environmental problems caused by express packaging are becoming increasingly prominent (fan et al. 2017; Duan et al. 2019). A large number of packaging materials are used to avoid product damage during transportation (Xiao and Zhou 2020; Lu et al. 2020). The lack of relevant standards and effective government supervision has led to an alarming increase in the number of excessive packaging. The main problems in the express delivery industry are:

#### 1. Express packaging emits a large amount of greenhouse gases (GHG) during its lifecycle.

Duan’s studies have analyzed the amount of carbon dioxide produced by packaging waste and found that China’s carbon emissions in the whole life cycle will reach 57.061 million tons in 2025 (Duan et al. 2019; Kang et al. 2021). The data show that the average greenhouse gas

emissions per express delivery are 0.27 kg CO<sub>2</sub>. In China, the express service greenhouse gas emissions in developed coastal areas are much higher than those in underdeveloped areas.

According to the Research Report on the generation characteristics and management status of express packaging waste in China, in 2018, 99% of domestic express packaging materials were paper packaging materials and plastic packaging materials. The CO<sub>2</sub> released from the production, use, and treatment of these materials needs to be absorbed by planting 710 million trees ( Sanitation technology 2019) .

#### 2. The amount of waste generated by express packaging has skyrocketed

In 2017, express packaging generated 7.8 million tons of waste, while in 2018, this figure reached 9.4 million tons (Duan et al. 2019). If effective measures are not taken to control it, the consumption of express packaging materials in China will reach 41.2705 million tons in 2025, which will cause a huge burden on the environment and resources. It is estimated

### 2010-2021 China express package volume trend

Unit: Billion Pieces

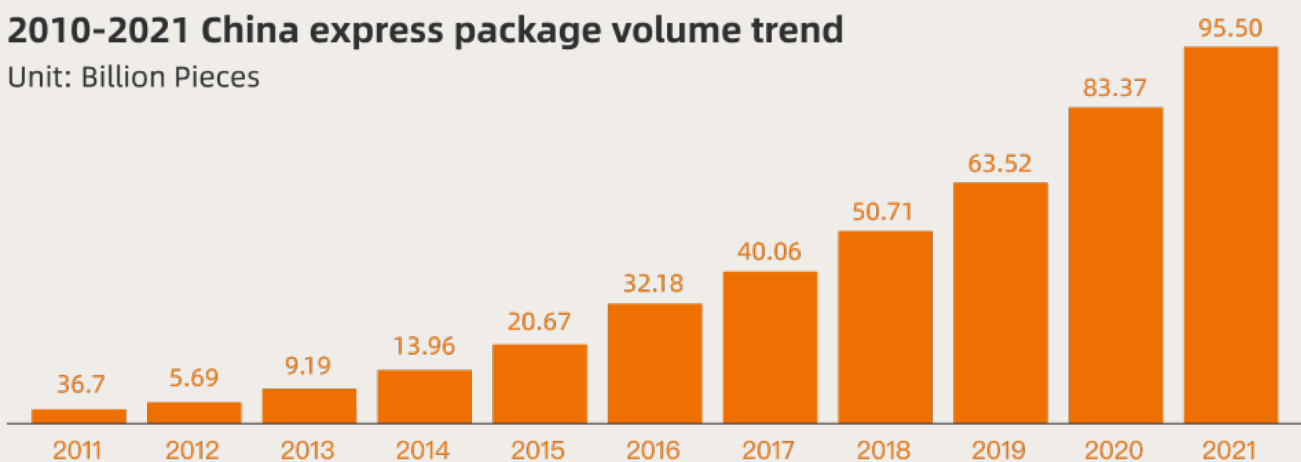


Figure 2-4. 2010-2021 China express package volume trend

References: State Postal Administration of China , 2022



that 7.8 million metric tons (MMT) (one-time standard deviation: 0.5) of packaging waste were generated from 40 billion packages or packages delivered in China in 2017. This is equivalent to about 4.1% (± 0.3%) of China’s total municipal solid waste production in 2017, or the total municipal solid waste production in some countries such as the Netherlands, Malaysia and Algeria in 2016. In 2017, express packaging generated 7.8 million tons of waste, while in 2018, this figure reached 9.4 million tons (Duan et al. 2019).

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Malaysia and Algeria in 2016. (Hoornweg and Bhada Data, 2012)

### 3. Low recovery rate of express packaging

According to the report entitled “the recovery rate of China’s express packaging is less than 20%, and some harmful substances exceed the standard” in PEOPLE’S DAILY, about 90% of the express packaging is composed of cartons and plastic bags, but the final recovery rate after they are unpacked is less than 20% (People’s daily 2016), and most of the rest are directly sent to the landfill, This has caused great pressure and damage to the urban ecological environment and natural resources. (Dong Hehua 2018).

According to the Research Report on the generation characteristics and management status of express packaging waste in China, 95% of the growth of domestic waste in first-tier cities from 2000 to 2018 was express packaging waste, while in some large cities, the figure was 85% ~ 90%, which was amazing. ( Sanitation technology 2019)

## Estimation of express packaging waste in 2021



Figure 2-5. Estimation of express packaging waste in 2021  
References: State Postal Administration of China , 2018

## 2.2 China Express Packaging Status and Problems

### 2.2.1 Category of express packaging

Each express delivery order requires multiple packaging materials, such as cardboard boxes, plastic bags, woven bags, waybills, envelopes, tape, and cushioning materials, which are commonly used in the express delivery industry. Data shows that in 2016, China's express delivery "direct use" packaging consumed approximately 3.2 billion woven bags, approximately 6.8 billion plastic bags, 3.7 billion boxes, and 330 million rolls of tape (National Postal Administration of the People's Republic of China, 2017).

In 2017, China delivered over 40 billion packages and parcels (China National Postal Administration (SPBC, 2018)). 46.5% of these deliveries used corrugated boxes, followed by plastic bags (30.4%), mixed packaging (10.1% of corrugated boxes covered with plastic bags), envelopes (5.0%), polystyrene foam boxes (4.2%) and woven bags (2.8%). These packages are either directly disposed of as garbage or directly landfilled, resulting in a low overall

recycling rate, which not only wastes resources but also puts great pressure on the urban environment.

### 2.2.2 Main express packaging recycling methods

#### 1. Incineration or landfill

At present, the lives of urban residents in China are mainly cleaned and transported by the Ministry of housing and urban rural development and the Ministry of environmental protection, transported to the treatment center, and treated by landfill or incineration. Landfill is the most original waste treatment method. Due to its simple technology and low cost, it is the main way of waste treatment in China. However, because domestic waste contains residues or waste materials, it will not only cause certain land resource pollution, but also lead to the generation of viruses and bacteria due to residue decay or reaction. The incineration method will inevitably produce thick smoke.

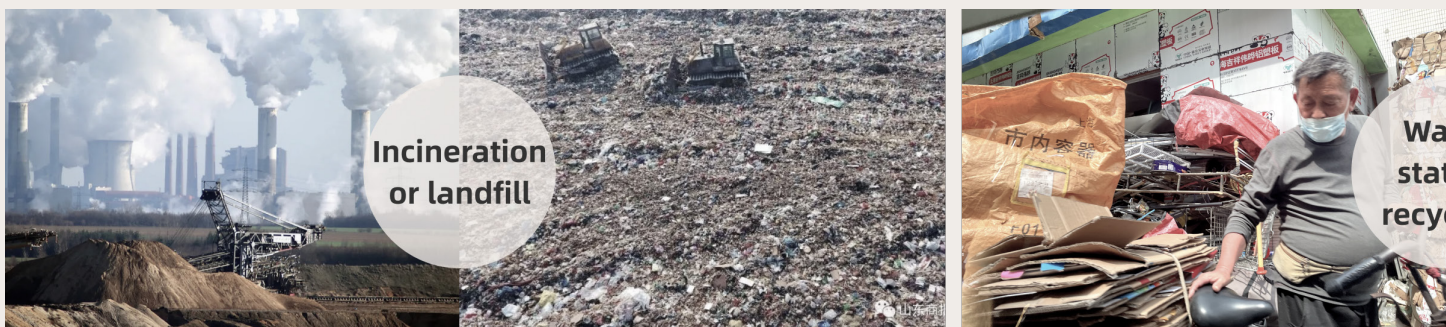


Figure 2-6. Main express packaging recycling methods  
Author's research and photography

For some plastic materials or articles that are difficult to burn, the combustion time is long, the smoke particles are large, and some even emit toxic gases, which has an adverse impact on the environment and residents' health. It can be seen that the unified treatment of express packaging waste and domestic waste will produce secondary pollution, which may further damage the environment.

## 2. Waste collection station recycling

Generally, only paper packaging among express packaging waste will be sold again; The packaging with reuse value shall be sorted, processed and reused. However, the proportion of recycled packaging is less than half of all recycled paper. Most of the "scavengers" at the forefront of recycling are just personal behaviors to obtain economic benefits, and can not make professional judgments and estimates on the recycling value of waste packaging. The recycling personnel at the waste acquisition station are also untrained and can hardly guarantee the health and safety of packaging by relying on experience.

From recycling to storage and sorting, express packaging waste is completed manually, and all are for the purpose of profit. There are limitations in capacity and level, which leads to the lack of standardization and standard-

ization of express packaging waste recycling. Although this recycling method of waste purchase station can alleviate this problem to some extent, it can not be completely eliminated, It is also unable to keep up with the development of the increasingly intelligent express industry.

## 3. Enterprise recycling

As a social organization, enterprises should not only pursue economic benefits, but also bear certain social responsibilities. Some e-commerce enterprises and express enterprises try to recycle express packaging waste.

JD launched the "carton recycling and green protection" plan in September 2016. When users receive the delivered express, if there are idle cartons or packaging waste, they can be handed over to the courier for recycling. From March 2017, the recycling plan will be upgraded. As long as they submit waste packaging, residents can receive a certain amount of "Jingdou" as a reward, and "Jingdou" will be directly entered into the resident account. The plan was initially put into trial operation in four cities: Beijing, Guangzhou, Shanghai and Shenzhen, and will cover more cities later. Suning Tesco launched the activity of "recycling packaging and sending cloud diamonds" in 2015, and



obtained the corresponding cloud diamonds according to the submitted packaging specifications, which can be used for cash offset in the next shopping.

The recycling of express packaging waste by express enterprises can be divided into two situations. One is that residents go to the rookie post station to pick up pieces or couriers send pieces to the door. If the unpacked packages are no longer needed, they can be handed over to the couriers for recycling. This recycling method has achieved certain results in the early stage. Residents can submit waste packages through this channel, but this has reduced the efficiency of couriers. The other is that the courier puts the express into the express cabinet. This delivery method has a certain delay.

Residents cannot directly hand over the waste packaging to the courier, which is not conducive to the recycling of packaging. Whether e-commerce enterprises or express delivery enterprises, most of them are "incidentally" recycling packaging at the same time of delivery, and most of them do not form a special recycling channel. On the one hand, due to the large volume of express business, on the other hand, due to the small number of recycling, setting up special recycling personnel, the money, time and labor cost invested are not proportional to the benefits brought by recycling activities in the short term, As a result of the slow growth of enterprise economic income, it will be difficult for enterprises to adhere to recycling for a long time.

### **2.2.3 The Problems Faced by Chinese Express Packaging**

In China, the main treatment mode of express packaging waste is dominated by the government and multi-agent cooperation between individuals and enterprises. However, due to the huge differences in the goals and characteristics of behavioral decision-making between government enterprises and individuals, there are many problems in the recycling of express packaging at present, which is mainly manifested in the low recycling rate of express packaging (Cao and Liu,2019; Fang,2016; Chen,2020; Dong and Hua, 2018 ; Huang,2020 ; Zha and Wang,2012 ).It can be summarized into the following 4 points:

#### **1. Low recycling value, imperfect recycling system**

High cost and low profitability are the main reasons why the recycling system cannot be established. In many cases, the cost of starting a waste recycling economy is higher than the cost of purchasing new materials (Huang, 2020; Zha Ho Wang, 2012). The low recycling value of these materials, coupled with the difficulty of collection and the lack of effective management, will result in the majority of express packaging going to final disposal through the Solid Waste Management Route (SWM) for landfill or incineration, or simply being dumped without proper treatment and not recycled at all.

#### **2. Various packaging materials, recycling classification is difficult**

Although the current recovery rate for carton packaging is the highest at about 50%, there is still a lot of room for improvement. While the recovery rate of plastic-based packaging



is close to zero, basically no recycling (Huang, 2020). While many packaging materials such as corrugated boxes can be recycled or reused, much of the packaging waste generated by express delivery ends up in the municipal Solid Waste (MSW) stream, given that many packaging wastes contain non-degradable materials such as PVC plastics, polyethylene plastics, foamed polystyrene plastics, polyester plastics, etc., Improper disposal of packaging waste will lead to serious environmental impact (Rochman, 2013; Li et al., 2016).

### **3. Insufficient recycling technology and lack of intelligent mechanisms**

Recycling is a relatively effective way to deal with express packaging waste (Hu, 2017). However, currently, the recycling, storage, and sorting of express packaging waste are all done manually and for the purpose of profit. The individual's ability and cognitive level involved in recycling are limited, leading to the lack of standardization and regularization of express packaging waste recycling. Although this method of recycling through waste acquisition stations has alleviated this problem to some extent, But it cannot be completely eliminated, let alone keep up with the increasingly intelligent development of the express delivery industry.

### **4. Weak awareness of recycling among the public**

According to data from a survey of 298 people, Only 11.09% of people think the recycling problem of express packages is very serious and needs to be solved as soon as possible, 44.95% of them think it is only a slight problem, and even 6.14% of them think it is not a problem and does not need too much attention. Residents, e-commerce enterprises and express delivery enterprises do not have a positive attitude

towards recycling, with weak awareness of recycling and poor action, which increases the difficulty of recycling from the source.

### **5. Lack of incentives**

Lack of effective incentive means for residents to participate in the recycling of packaging, and residents' awareness of recycling is weak, which leads to express delivery

Root cause of packaging waste dilemma. Although some residents can recognize the importance of recycling, the inherent thinking and habits make it difficult to maintain their enthusiasm for recycling. According to the survey on residents' participation in urban household waste resource treatment, 61.11% of respondents believe that appropriate incentives, rewards and punishments can improve the efficiency and quality of waste disposal. Related theories are involved such as Maslow's Hierarchy of Needs, Hertzberg's two-factor six-year theory, and Skinner's reinforcement motivation theory.

## 2.3 Opportunities For Applying Systemic Design To Packaging Problems In China

### 2.3.1 Systemic design thinking

#### 1. Introduction

The systemic design integrates systems thinking and human-centered design, with the intention of helping designers cope with complex design projects. The recent challenges to design coming from the increased complexity caused by globalization, migration, and sustainability render traditional design methods insufficient. Designers need better ways to design responsibly and to avoid unintended side effects. The systemic design intends to develop methodologies and approaches that help to integrate systems thinking with design towards sustainability at the environmental, social, and economic levels. It is a pluralistic

initiative where many different approaches are encouraged to thrive and where dialogue and organic development of new practices is central (Bistagnino, 2011)

#### 2. Differences between systemic design methodology and ordinary design methods

Compared to traditional design methods, systemic design advocates a more exploratory, open, comprehensive, collaborative, and centralized mindset. Its goal is to cultivate champions, establish a core team with minimal scale/maximum diversity, and attract widespread public participation.

The systemic design is also influenced by the viewpoints and interests of participants, constantly reconfiguring the stakeholder

#### How systemic design differs from smooth-water approaches

Smooth-Water Approaches	Systemic Design
Scientific model of decision making	Designer form of reflective practice
Assumes objectives can be clearly defined from the top down	Assumes objectives are ambiguous and contested
Requires statistically significant data, expert analysis, persistent monitoring and consistent evaluation	Requires thick description, stakeholder participation, prototyping in context, and selective retention
Logical, sequential, convergent, repeatable process	Messy, parallel, divergent, recoverable process
Privileges rigour: "Prove it!"	Privileges relevance: "Show me!"

Figure 2-1. How systemic design differs from smooth-water approaches.  
 Source: Capra & Luisi, 2014 Bistagnino, 2011 Barbero, 2017

relationship network and generating new collaborations among unusual suspects. Surround a compelling and diverse vision, expose costs and risks during the process, and continuously optimize and adjust.

The ultimate goal is to promote people's health, profits, and sustainable development of the Earth, attempting to create a future through prototype design, catalyzing interconnections across multiple levels and time scales, committed to slow, long-term systemic change, and building momentum through rapid and practical local actions.(Barbero, 2017)

### **3. Core concepts of systemic design**

As a designer, the concept of sustainability has been regarded as a core value of a project. According to the systemic design methodology, which treats the output from a system as a new raw material able to be input in a new system. New products and more jobs can be achieved while designing the new system (Bistagnino, 2008).

## **2.3.2 Opportunities for Systemic Design to Solve China's Express Packaging Problems**

### **1. Complex problems involve many stakeholders, which is suitable for systemic design thinking**

Express system includes business, buyers, Courier, multiple stakeholders such as government, business transactions involving electricity, express logistics, express multiple subsystems such as packaging recycling, satisfy

the core of the system design methodology, there's plenty of opportunity to one of the output of the system, and used as the raw material of another system, and achieve the ultimate goal of sustainable environmental protection. As a theoretical methodology, system design methodology is fit to solve the problems brought by current Express packaging systems in China.

### **2. It is necessary to handling express packaging garbage in China**

With the development of express industry and bring more and more problems, it is very necessary to solve the problem of express packaging, I will elaborate from the following aspects:

**Necessity of sustainable development:** In recent years, China is facing the challenge of CO2 emission reduction (Dong et al.2019). As a responsible country, the development goals of ecological civilization and beautifying China were put forward by the Chinese government (Hua and Dong 2019). The government also proposed to gradually strengthen the control of the recycling industry and pay more attention to the management of express waste (Xiao et al. 2018). Some strategic decision-making systems for product development have also introduced "sustainability" into their work plans (Ren et al. 2015). However, at the implementation level, there is no mature system yet.

**Economic necessity:** With the improvement of environmental protection awareness and the demand of enterprises to reduce costs and increase efficiency, classified recycling of express packaging will also become the general trend. All walks of life have called on the express industry to use recyclable and recyclable packaging. The government and all sectors of

society are also actively working to establish a green recycling system, and encourage suppliers, manufacturers, express enterprises, and end consumers of express packaging to participate in the classified recycling of waste packaging from the perspective of the supply chain.

Technical opportunities: In recent years, China is vigorously developing intelligent logistics

technology, Internet of things technology (IOT), big data technology, automatic sorting technology, unmanned storage and distribution technology, etc. These technologies have an inseparable relationship with packaging and will provide technical support for the classified recycling of express packaging.

## Research

How to adopt systemic design thinking to reduce waste, especially in the background of the

## Research

To build an co-creative express packaging system to improve the reuse rate of China's express packaging

Figure 2-8. Research Question and thesis target  
Source: Capra & Luisi, 2014 Bistagnino, 2011 Barbero, 2017

### 2.3.3 Research Question and Research objective

#### 1. Research Question

How to adopt systemic design thinking to reduce the quantity of the express packaging garbage, especially in the background of the rapid development of e-commerce?

#### 2. Research objective

To build an co-creative express packaging system based on systemic design thinking, to improve the reuse rate of China's express packaging and reduce the express garbage.

## Question

How to adopt systemic design thinking to reduce the quantity of the express packaging garbage, especially in the background of the rapid development of e-commerce?

## Objective

To build an co-creative express packaging system based on systemic design thinking, to improve the reuse rate of China's express packaging and reduce the express garbage.

# 03 Case Study

---

## 3.1 Summary Of Cases

Studied 30 excellent cases of express packaging in both China and other countries. Then analyze and summarize various aspects of recycling express packaging from these cases, such as material, usage mode, recycling and disposal mode, etc.

	Project name	Country	Designer	Problem solving methods
01	Bamboo packaging	US	Dell Inc.	Sustainable materials
02	Mushroom packaging	French	Amen fragrance	Sustainable materials
03	Popcorn express buffer	UK	Bristol University	Sustainable materials
04	Bio-based customized packaging	Netherlands	Paperfoam	Sustainable materials
05	Cocoa bean shell snack box	UK	PriestmanGoode	Sustainable materials
06	Recycled plastic as suede	Brazil	Undo for tomorrow	Material recycling, Business model innovation
07	Truck tarpaulin bag	Switzerland	Freitag	Material recycling, Business model innovation
08	White T recycling lifestyle	China	Delicates	Material recycling, Business model innovation
09	Recyclable express packaging	Finland	RePack	Packaging reuse, Business model innovation
10	Online delivery platform with durable package	US	Loop	Packaging reuse, Business model innovation
11	Online grocery with zero waste	US	Zero Grocery	Packaging reuse, Business model innovation
12	Recycling bag	US	Limeloop	Packaging reuse, Business model innovation
13	Returnable packaging	US	The Wally Shop	Packaging reuse, Business model innovation
14	Easy packaging project	US	Amazon	Reduce consumption, Green logistics
15	Reduce unnecessary transportation	China	Suning Tesco	Reduce consumption, Green logistics
16	JD green Logistics	China	JD logistics	Reduce consumption, Green logistics
17	GoGreen Project	Deutsche	DHL	Green logistics, Service design
18	Free no-rush shipping	US	Amazon	Green logistics, Service design
19	Reduce unnecessary transportation	US	Amazon	Reduce consumption, Service design
20	Express staff education	Deutsche	DHL	Service design
21	Degradable express packaging	China	Suning Tesco	Sustainable materials
22	Green packaging	China	Suning Tesco	Packaging reuse
23	Reduce tape width	China	Suning Tesco	Reduce consumption
24	Intelligent recycling system	China	LOVERE	Business model innovation, Service design
25	Professional disposal company	China	Minions recycling	Business model innovation, Service design
26	China Post Green Logistics	China	China Post	Packaging reuse, Green logistics
27	Campus plastic recycling cabinet	China	Tmall Inc.	Service design
28	Circular express box	China	SF express	Packaging reuse
29	Clean flow boxes	China	JD logistics	Packaging reuse
30	Recycling box plan	China	Cainiao post station	Green logistics, Service design

Table 3-1. List of excellent cases of express packaging  
Arranged by the author



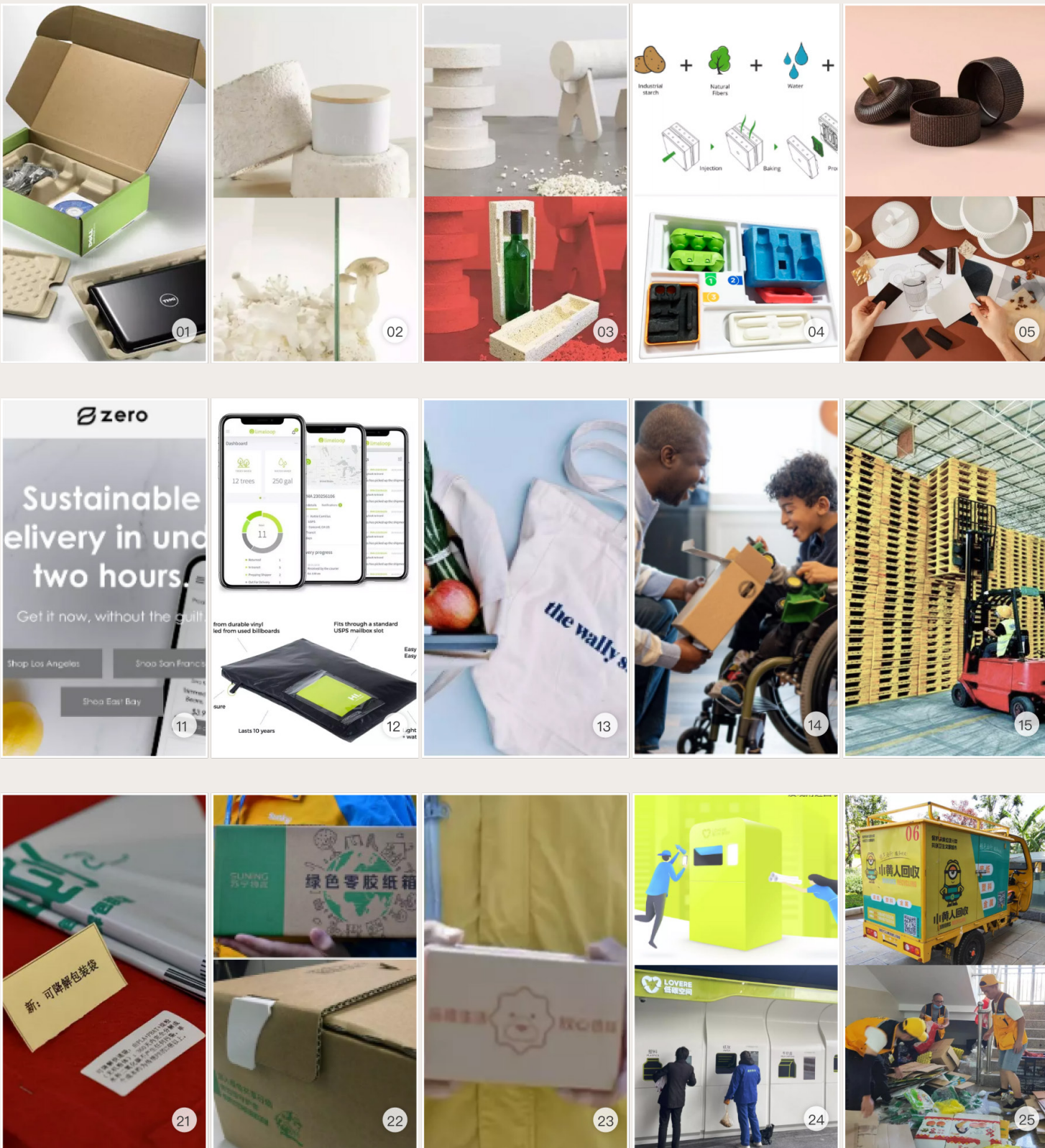
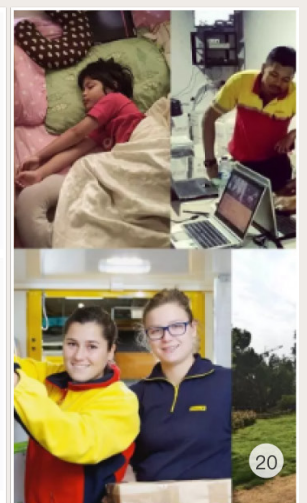
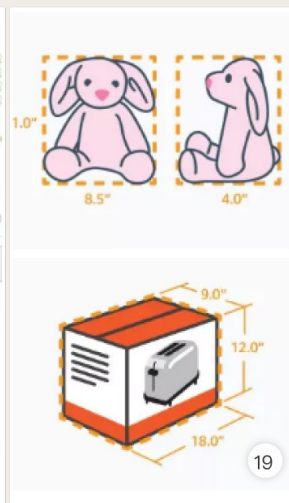
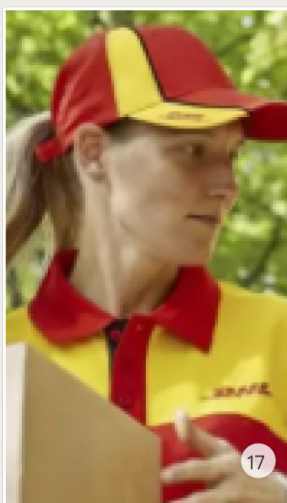


Figure 3-1. Picture of excellent cases of express packaging  
 Drawn by the author





## 3.2 Cases Introduction

### 01 Bamboo packaging

US - Dell Inc.

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#### Sustainable materials

Dell has committed to testing for renewable packaging materials to help drive cost and environmental savings. Apart from bamboo, it also tests materials such as pulp from sugar cane and mushrooms to create a bio-based, biodegradable product that resembles styrofoam. As part of its Global Green Packaging Strategy launched in 2008.



Figure 3-2. Recycled Material Packaging  
<https://www.dell.com/learn/cn/zh/cnhea1/campaigns/bamboo-packaging?c=cn&l=zh&s=hea>

### 02 Mushroom packaging

French - Amen fragrance

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#### Sustainable materials

Amen, a French fragrance brand, has come up with a creative mushroom wrapper for candles. Developed by biotech startup Grown, this particular box is made from a mixture of mycelium and other organic plant waste. The filamentous mycelium is initially inoculated on plant waste, which is used as a base for continuous growth, and eventually binds all materials together. It takes seven days to produce mycelium material, which has relatively low consumption of water and electricity. After use, the box can be completely degraded in about a month.



Figure 3-3. Amen candles' mushroom wrapper  
<https://www.163.com/dy/article/GV0C86RF0525B-FP8.html>

### 03 Popcorn buffer

UK - Bristol University

#### Sustainable materials

Polystyrene, the filler, is a good packaging material. It's 95 percent air. But producing them takes oil and the finished product is hard to break down. Corn, however, is easily regenerated, biodegradable, and can be composted at home. And corn is also very light, so when corn expands into popcorn, it expands like a beehive and increases in volume by 15% to 20%. The corn used as filler does not need to be grown separately because it can be made directly from the by-products produced during the processing of corn products. Just coat it with a thin biofilm, and the popcorn is just as water-proof as regular stuffing.



Figure 3-4. Popcorn express buffer  
<https://www.163.com/dy/article/GV0C86RF0525B-FP8.html>

### 04 Bio-based customized packaging

Netherlands - Paperfoam

#### Sustainable materials

Paperfoam uses biodegradable packaging materials, which can be molded into any shape by injection molding. The packaging material is made by mixing four ingredients: industrial starch, natural fiber, water, and a premix. By choosing PaperFoam packaging, we can make a contribution to sustainability, which is embodied in: a reduction of carbon footprint by up to 90%, personalized and biodegradable design, multiple colors, details, and textures, and protection of products through excellent fit. Provide green solutions for product packaging.



Figure 3-5. Making customized paperfoam process  
<https://www.163.com/dy/article/GV0C86RF0525B-FP8.html>



## 05 Cocoa bean shell snack box

UK - PriestmanGoode

### Sustainable materials

The cacao shell snack box was created during celebrations marking the 50th anniversary of Earth Day. Based on the circular design approach, reusable fast-food boxes made from ingredients such as cocoa bean shells, mycelium and pineapple shells hope to encourage consumers to move away from the culture of disposability and focus on the circular economy by offering an attractive product.

The whole design adopts the universal bento box container shape, convenient packaging and transportation, focusing on the temperature control and delivery efficiency of takeout transportation, which can reduce the use of plastics, reducing the impact on the environment and creating a more comfortable dining experience. (PriestmanGoode 2020)



Figure 3-6. PriestmanGoode's cacao shell snack box <https://baijiahao.baidu.com/s?id=1736510961636378341&wfr=spider&for=pc>

## 06 Recycled plastic as suede

Brazil - Undo for tomorrow

### Material recycling

Undo for tomorrow brand invented nuven, a sustainable board shoe. The rubber outsole of the shoe is made of leftover materials of car tires and party balloons. The upper is made of 100% all vegetable leather, the inner lining is made of bamboo, and the outer layer is made of suede made of recycled plastic. (Undo for tomorrow 2021)

Compared with other shoes, these materials are not only more "sustainable" but also enhance the performance of shoes. For example, the anti-skid function of the sole made of the balloon and tire leftover materials is very powerful. The lining of bamboo material has the function of anti-bacteria and anti-odor. The suede made of recycled plastic makes the shoes waterproof. (BottleDream 2022)



Figure 3-7. A sustainable board shoe of 'Undo for tomorrow' <https://www.163.com/dy/article/GV0C86RF0525BFP8.html>

## 07 Truck tarpaulin bag

Switzerland - Freitag

Material recycling Business model innovation

Freitag uses all kinds of colorful recycled truck canvas, which can be said to be a pioneer in keeping with environmental protection.

Due to the recycled materials, each bag has old wind and frost marks on its body, If you don't use the new bag at all, you will worry about getting dirty. Customers can use it without hesitation or distress. Another feature is that each bag is cut by hand. Different canvas has different patterns and different cutting positions. Therefore, each bag can be said to be one of a kind. Each bag is unique unique. There is no need to worry about bumping the bag. Due to the use of recycled materials as materials, it has a unique sense of second-hand and unique patterns and colors, which are widely loved by consumers. (FREITAG 2022)

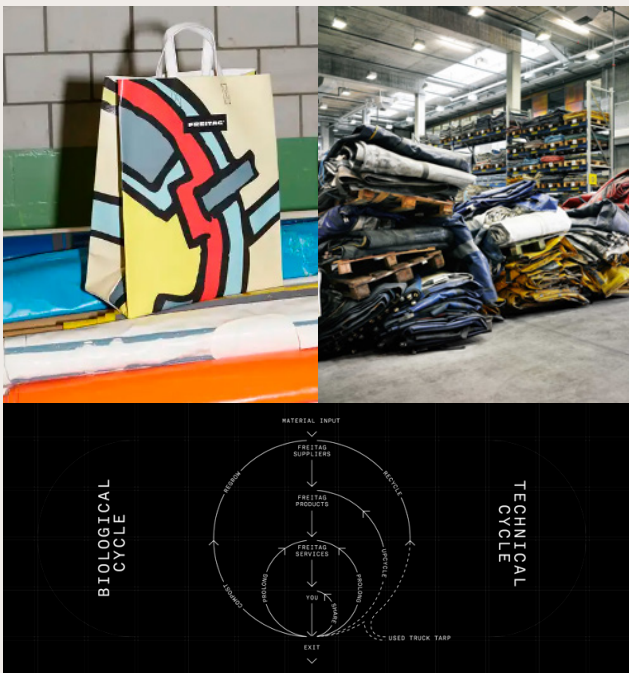


Figure 3-8. Freitag 's environmental bags made from recycled materials  
<https://www.freitag.ch/zh>

## 08 White T recycling lifestyle brand

China - Delicates

Material recycling Business model innovation

Through recycling old clothes, delicates gives everyone a corresponding discount to buy new white T, and makes recycled clothes into recycling bags to produce more value. The brand's "recycling program recycling program" provides a "sustainable solution" for the fashion industry. (MalltoWin Log 2021)



Figure 3-9. Delicates's products made from recycled materials  
[https://www.sohu.com/a/504317904\\_119216](https://www.sohu.com/a/504317904_119216)

## 09 Recyclable express packaging

Finland - RePack

Packaging reuse Business model innovation

Taking RePack in Finland as an example, the company launched repack, a recyclable express package, which realized the idea of recycling express delivery. The repack bag consists of an outer bag and an inner buffer layer. The outer structure is made of polyester fiber, and the buffer layer is made of microporous polyurethane. This allows each package to be used at least 20 times, reducing 80% of carbon dioxide and 90% of waste. (RePack 2022)

**Reusable packaging has never looked so good. Durable RePack bags are designed for soft goods and fold into letter size when empty.**

- Durable, recycled material, upcycled at the end of life.
- Three sizes, adjustable so you never ship air.
- Sealing solutions to secure the package.
- Certified for ethics and sustainability.

**Reusable Packaging for Online Stores**  
Ideal for online stores wishing to reduce the environmental impact of their e-commerce shipping.

- You purchase RePack cycles from us
- You ship to your customers in RePack bags
- Your customers return the empty RePacks to us
- We take care of the reverse logistics and cleaning

**Reusable Packaging for Circular Businesses**  
Great fit for business with existing circular models and where reusable packaging is needed: rentals, take-back, samples...

- You rent the RePack bags for a monthly fee
- You exchange RePack parcels back and forth
- You control shipments, reverse logistics and cleaning
- We make sure you don't run out of RePack bags

Figure 3-10. RePack’s reusable packaging bag and use process  
<https://www.repack.com/?lang=en>

## 10 Platform with durable packaging

US - Loop

Packaging reuse Business model innovation

Loop is an online delivery service that relies on high-quality and durable packaging, which is designed to be reused many times before recycled. As a consultant, supports the packaging innovation of each brand and sells these innovative recyclable packaging products on the loop website.

Customers choose products on loop, then products are packed in reusable handbags. Once these items are used up, customers can wait for the delivery service to pick up the used containers. The improvement of consumer awareness continues to promote the sustainable packaging mission of brand owners. About 74% of consumers said they were willing to pay extra for products with sustainable packaging. (Pierce 2019)



Figure 3-11. Reusable packaging on loop platform  
<https://www.packagingdigest.com/sustainability/loop-and-big-brands-boldly-reinvent-waste-free-packaging>



## 11 Online grocery with zero waste

US - Zero Grocery

Packaging reuse

Business model innovation

A startup called Zero has started a zero-waste scheme via its online grocery store. It is gaining more and more businesses offering services that allow their consumers to avoid generating single-use plastic waste. The need for sustainable shopping practices into sharper relief as home deliveries have become more popular than ever and most of those deliveries generate plenty of excess waste.

Zero Grocery, which currently operates in the Bay Area of San Francisco, delivers some 400 items of groceries from fresh produce to meat products to popcorn in reusable containers, mostly made of glass and silicon. The containers are cleaned by costumers and picked up the next day for use in a new delivery.

(Zero Grocery 2021)

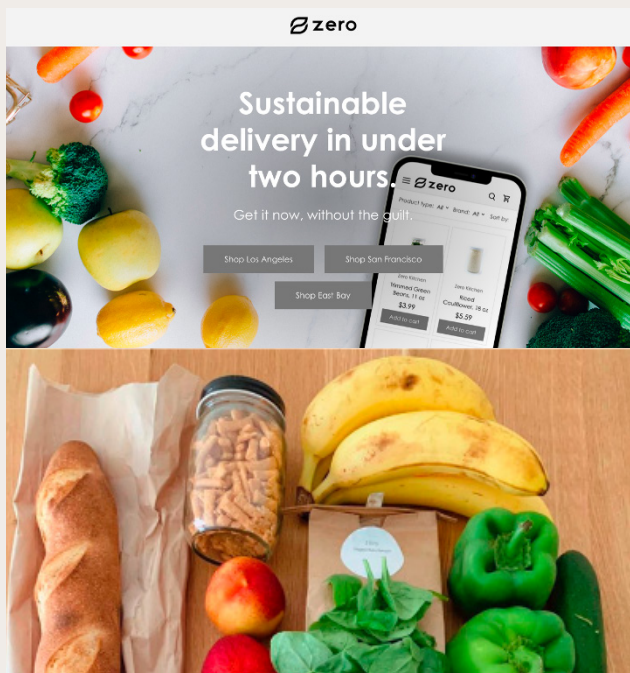


Figure 3-12. Zero online grocery store <https://www.sustainability-times.com/green-consumerism/zero-waste-online-shopping-offers-a-welcome-solution/>

## 12 Recycling bag

US - Limeloop

Packaging reuse

Business model innovation

Limeloop's recycling bags, advertised for 10 years and up to 2,000 cycles, are made from recycled vinyl billboards and lined with recycled cotton.

The platform has an app that tracks where your packages go, and how many times you use Limeloop bags equals how much water and trees you save. Bags are easier to use. In partnership with the US Postal Service, they are used to mail documents or clothing. Each time you receive a package, you just need to attach the return label attached and drop it into any US mailbox.



Figure 3-13. Limeloop's recycling bags <https://zhuanlan.zhihu.com/p/65435487>; <https://thelimeoop.com/>

### 13 Returnable packaging

US - The Wally Shop

Packaging reuse Business model innovation

In 2017, Tamara Lim, who spent two years working in Amazon’s packaging division in the US, found that 91% of the plastic waste generated on a daily scale was not recycled. This inspired Tamara to leave Amazon and start The Wally Shop, an eco-friendly platform focused on everyday food delivery services. (The Wally Shop 2022)

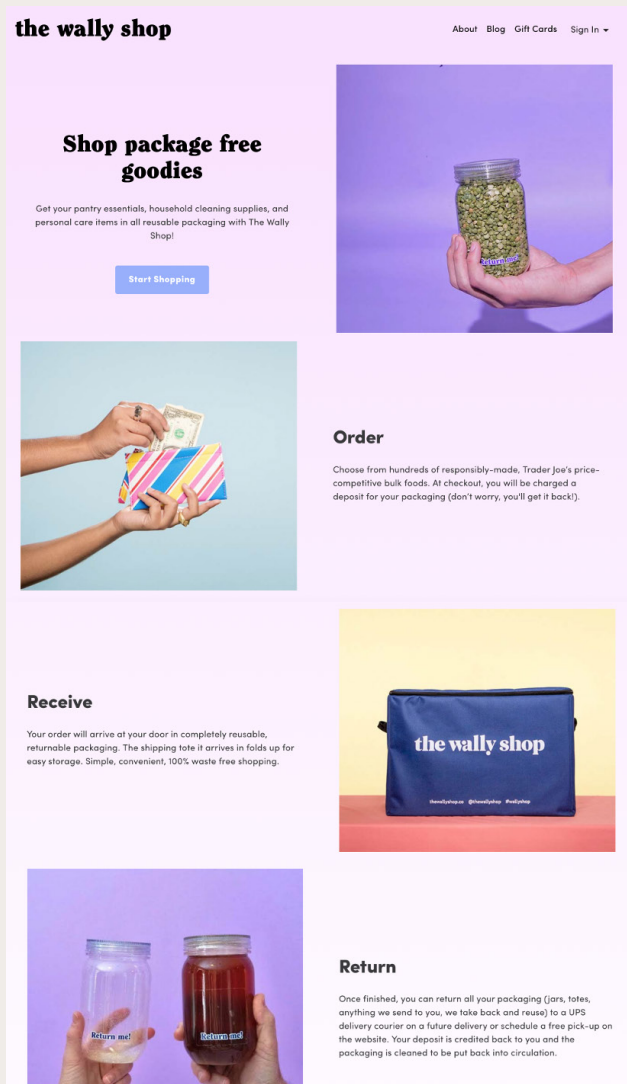


Figure 3-14. The Wally Shop website <https://thewallyshop.co/>

### 14 Easy packaging project

US - Amazon

Reduce consumption Green logistics

E-commerce platform can also promote the development and application of green logistics. In 2008, for example, Amazon launched the No Setbacks Packaging Program (FFP) which encourages merchants to redesign and simplify packaging to make it more environmentally friendly. To help companies meet FFP requirements, Amazon works with major brands to redesign packaging so products can be shipped in their original packaging without amazon providing an outer box. This innovative business model reduces carbon emissions and transportation costs for customers. Since FFP’s launch, Amazon has removed 665,000 tons of packaging materials and replaced 1.18 billion cartons with recyclable or original packaging. (Amazon 2021)

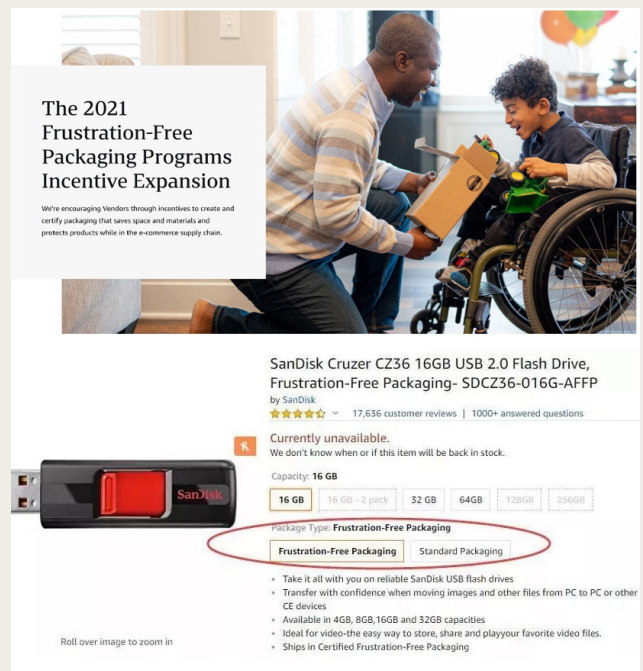


Figure 3-15. Amazon Simplified Packaging Project <https://www.aboutamazon.com/packaging/overview/2021-incentive>



## 15 Reduce unnecessary transportation

China - Suning Tesco

Reduce consumption

Green logistics

Automobile emission and commodity loss in transportation are also aspects that need to be improved. Suning logistics adopts the mode of belt transportation. To put it simply, a large board is placed under the goods, the goods are stacked on the board, and there is space for forklift forks to enter and exit, so that the goods can be transported as a whole with the pallet as a unit. This method not only greatly improves the efficiency of logistics operation, but also reduces the number of transportation, fuel consumption and emission. At the same time, the tray is reinforced with winding film, and the damage rate of goods is almost 0. (Suning Tesco 2017)



Figure 3-16. Reduce unnecessary transportation  
<https://baijiahao.baidu.com/s?id=1627153071382578888&wfr=spider&for=pc>

## 16 Jingdong green Logistics

China - JD logistics

Reduce consumption

Green logistics

JD launched the Green Flow Plan in 2018, From the three aspects of environment, humanity, society and economy, focusing on green logistics as a sustainable development strategy for the whole JD Group. By 2020, JD will reduce the use of disposable packaging cartons in the supply chain by 10 billion, which is equivalent to the number of express cartons used in the whole country in 2015; From the brand to the supplier of e-commerce enterprises, JD Logistics will achieve 80% of commodity packaging consumables recyclable, unit commodity packaging weight reduced by 25%. At the client part, more than 50% of the plastic packaging of JD Logistics will use biodegradable materials. (JD logistics 2018)



Figure 3-17. Jingdong green Logistics  
[https://www.jdl.com/plan/?ivk\\_sa=1024320u](https://www.jdl.com/plan/?ivk_sa=1024320u)

## 17 GoGreen Project

Deutsche - DHL

Green logistics Service design

Express services and e-commerce platforms need to find ways to optimize packaging and recycling in order to achieve circular economy. Taking DHL as an example, it has helped to achieve its own goals and customers' environmental protection goals through the Gogreen project. The specific measures of the project include providing customers with carbon emission calculation reports, carbon neutralization services, customized green logistics solutions and other services to support customers' green choices. By 2025, DHL hopes to make the revenue of green solutions account for 50% of the total sales, make it the main source of revenue, and create a competitive advantage in the process of going green. (DHL 2022)



Figure 3-18. We Strive for a Consistent Balance Between Ecology, Economy and Society. <https://www.dhl.com/cn-en/home/about-us.html>

## 18 Free no-rush shipping

US - Amazon

Green logistics Service design

Amazon is allowing customers to receive future discounts or incentives in exchange for slower delivery. In February, Amazon launched Zero Shipping, which aims to make half of amazon's deliveries zero-carbon by 2030, according to a statement from an Amazon spokesperson. What's more, Amazon plans to publish its own carbon report for the first time later this year. They have more than 200 scientists, engineers and product designers dedicated exclusively to inventing new ways to harness our scale to benefit customers and the planet. Prime customers can even receive a monthly email reporting how their carbon footprint from their order compares with that of others in their area.



Figure 3-19. Amazon Simplified Packaging Project <https://www.ozy.com/the-new-and-the-next/now-lets-limit-amazon-customers-to-one-delivery-a-month/94570/>

## 19 Reduce unnecessary transportation

US - Amazon

Reduce consumption

Service design

E-commerce platform Amazon can also promote the development and application of green logistics through business model innovation.

The product can be shipped without any operation after being transported to Amazon warehouse. The product packaging must comply with: easy to open, 100% recyclable, and not easily damaged during transportation.

1. Simplify packaging, reduce packaging material consumption and cost expenses
2. Save product storage space;
3. Reducing product damage rate is equivalent to reducing return rate
4. Reduce carbon dioxide emissions
5. The savings in space have led to an increase in the number of packages loaded by the delivery truck each time;



Figure 3-20. Amazon Simplified Packaging Project  
<https://www.aboutamazon.com/packaging/overview/2021-incentive>

## 20 Express staff education

Deutsche - DHL

Service design

DHL has 550,000 employees worldwide and believes that employees play a vital role in protecting the environment. DHL consistently emphasizes the concept of environmental protection among its employees, and trains and encourages them to adopt sustainable development practices. DHL plans to have 80% of its employees trained as GoGreen-certified experts by 2025, to ensure that they can actively participate in environmental and climate protection activities.



Figure 3-21. Express staff education  
<https://www.dhl.com/cn-en/home/about-us.html>



## 21 Degradable express packaging

China - Suning Tesco

### Sustainable materials

In December 2021, the staff of the state post office came to Suning Tesco Beijing base for investigation. Xu Wei, vice president, showed a new degradable express bag on site: The material is mainly PLA+PBAT+ starch, This bag can be completely decomposed into water and carbon dioxide within 360 days without any pollution, But the individual cost is about three times more than the traditional PE material. (Science and Technology News 2021)



Figure 3-22. Suning’s Degradable packaging bag  
[https://business.sohu.com/a/513570959\\_120618466](https://business.sohu.com/a/513570959_120618466)

## 22 Green packaging

China - Suning Tesco

### Packaging reuse

The zero glue carton, launched by Suning has also become a “net red product” that is “hard to find” for many online shoppers. This express carton is purely based on the principles of physics and mechanics and discards all kinds of sealing tapes. It not only achieves real zero tape pollution and waste, but also is commendable in the user experience. There is no trace of tape sealing in the express packaging box. Gently break the sealing buttons on both sides of the box to open the package. After taking out the snacks, the courier can fold the carton and recycle it directly. (Nail Technology 2017)



Figure 3-23. Suning Commerce’s Recyclable plastic express box  
<https://tech.huanqiu.com/article/9CaKrK20JT>

## 23 Reduce tape width

China - Suning Tesco

### Reduce consumption

The large use of plastic tape and its difficulty in recycling and degradation have always been a pain point that restricts the green development of the industry. For this reason, express delivery companies are trying to do subtraction on packaging, which can meet packaging needs and be more environmentally friendly.

The surface sheets of the Suning logistics package are 100\*100mm and 100\*150mm, and the packaging tape is 48CM wide, Compared with the 53cm wide packaging tape in the industry. Suning logistics has never given up its efforts in streamlining the details of the packaging. (Li 2017)



Figure 3-24. Reduce tape width  
<https://baijiahao.baidu.com/s?id=1723797594151285085&wfr=spider&for=pc>

## 24 Intelligent recycling system

China - LOVERE

### Business model innovation Service design

“LOVERE” is committed to creating intelligent recycling system independent research and development of intelligent classification recycling machine, has been put into use in Beijing, Shanghai, Guangzhou and other cities, can meet the residents’ 24 hours of recycling needs. By encouraging residents to carry out garbage classification and recyclables trading, promote the source classification and reduction of household garbage, practice “garbage classification is the new fashion”, and build a high-tech, green, ecological and smart city of sustainable development.



Figure 3-25. LOVERE system  
<https://www.aifenlei.com/>

## 25 Professional disposal company

China - Minions recycling company

Business model innovation Service design

Minions recycling company is recycling the Internet plus recycling mode of resource recycling platform, and are committed to creating innovative professional recycling and joining, waste paper recycling, waste recycling, renewable resource recycling, garbage classification and other professional recycling service platform.

Citizens only need to make an appointment on the platform, and the recycling personnel will come directly to help citizens classify and weigh waste products for free. The income from the sale of waste products can also be exchanged for daily necessities in the mall of the platform. Take the waste carton as an example, their daily volume reaches about 3 to 5 tons.



Figure 3-26. Minions recycling company  
<https://www.xhrhs.com/>

## 26 China Post Green Logistics

China - China Post

Packaging reuse Green logistics

The China Post industry has vigorously promoted the whole network circulation management mode of transfer bags of logistics enterprises such as postal express, SF, Zhongtong and Debang. 1.3 million recyclable transfer bags have been put into the main distribution centers in the urban area, 503 express packaging recycling outlets have been built, 16 postal express campus service centers have been established, covering nearly 200000 teachers and students, and nearly 6 million pieces of mail have been processed in total. In the whole year, 28000 tons of express packaging waste were reduced, with a reduced rate of 10.15%. (Yitao, Guangju, and Difeng 2022)



Figure 3-27. China Post Green Logistics  
<https://www.xhrhs.com/>



## 27 Campus plastic recycling cabinet

China - Tmall Inc

### Service design

Tmall has launched a sustainable project - 'Clean Plastic Action'. They deploy multiple intelligent recycling bin scenarios in offline urban digital life cooperation communities and administrative service centers, among others. Consumers can receive 1g of green energy from Ant Forest by delivering plastic bottles, as well as various product coupons. Consumers can directly use coupons on Tmall, meeting the closed-loop practice of circular economy.



Figure 3-28. Intelligent recycling bin  
[https://www.sohu.com/a/429958024\\_114930](https://www.sohu.com/a/429958024_114930)

## 28 Circular express box

China - SF express

### Packaging reuse

SF Express uses box recycling boxes instead of cartons. On average, a single recyclable express packaging box has been recycled nearly 10 times (SF technology, 2018). However, recyclable express packaging boxes also face many obstacles in the process of re-implementation. Although many enterprises have launched their own brand recyclable express packaging boxes, most of them are in the wait-and-see stage and have no long-term sustainable development plan. Due to the lack of mandatory requirements in national policies, relevant enterprises are unwilling to invest high costs in green reform, resulting in the poor promotion effect of recyclable express packaging boxes (Huang, 2020; cha Hewang, 2012).



Figure 3-29. SF Circular express box  
<https://m.163.com/dy/article/HDBVS-N720514AABA.html>



## 29 Clean flow boxes

China - JD logistic

### Packaging reuse

In 2015, JD used folding insulated turnover boxes to replace disposable foam boxes in fresh food business. The service life of this insulation box exceeds 1.5 years, and the average number of uses per box can reach 130 times. In 2021, JD will use recycling incubators more than 60 million times, equivalent to reducing the use of the same number of disposable foam boxes. And due to its improved insulation performance, the use of disposable ice bags has been reduced by about 60000 tons and dry ice by about 30000 tons simultaneously. In addition, JD Logistics utilizes unique codes and Radio Frequency Identification (RFID) technology to build a circular packaging management system, it can achieve full process monitoring of each circular packaging.



Figure 3-30. Clean flow boxes  
<https://www.sciencedirect.com/science/article/abs/pii/S0048969721040687#bb0030>

## 30 Green recycling action

China - Cainiao post station

### Green logistics Service design

Cainiao post station launched the recycling plan, with the goal of setting up 5000 recycling facilities in 200 cities. In 2018, during the mall's double 11, 13 million express packaging cartons were recovered offline.

For example, in Jinan, nearly a thousand Cainiao stations have actively participated in the green recycling action, promoting consumers to further develop the habit of green recycling of express delivery cardboard boxes by participating in activities such as exchanging eggs for cardboard boxes. Since January 2022, users have accumulated 20 tons of carbon emissions by participating in green recycling actions and retaining the number of recycled cardboard boxes in post stations. (Cainiao post station, 2018).



Figure 3-31. Green recycling action  
<http://www.expressboo.com/content/index/view/aid/12631/catid/1.html>

## 3.3 Considerations Of Cases Study

### 3.3.1 Problems and opportunities about packaging solution

At present, solutions that make express packaging more green are more focused on optimizing a single point, such as choosing more environmentally friendly materials, designing more material-saving packaging, recycling packaging after use, etc, lacking an overall and systematic solution. The production, use and recycling of express packaging are separated, the manufacturer is only responsible for production, the express company is only responsible for transportation, and the express packaging after use is generally treated as garbage, which is handled by the community garbage station.

Some e-commerce or express delivery companies in China have also implemented some reform programs of express packaging, such as providing recyclable express boxes, but there are problems such as small scope of implementation, recycling difficulties, and low willingness of customers to use.

We want to design a system that would take into account the entire life cycle of the package, and also be efficient and convenient enough that users of different roles would be willing to use our package. While taking into account green environmental protection, it can also achieve sustainable profits in order to carry out large-scale promotion.



Figure 3-32. Problems about current green packaging solution  
Drawn by the author

### 3.3.2 Opportunities brought by new user groups and new consuming concepts

#### 1) New users (Generation Z)

##### Definition

Generation Z includes people born between 1996 and 2010. The identity of this generation is influenced by climate anxiety, the digital age, the constantly changing financial landscape, and COVID-19. (McKinsey, 2023)

##### Have environmentalist values

Generation Z is also widely known for their idealism, they are part of the new wave of 'inclusive consumers' and social progress dreamers. Generally speaking, Generation Z believes in doing its part to help prevent the exacerbation of climate change and establish greater fairness for all. Compared to any other generation, the collective of Generation Z needs more goals and a sense of responsibility, creating more opportunities for people with different backgrounds and insufficient representation, and strict sustainable and green practices.

Climate change is one of the top concerns of Generation Z. They often call for reforms at the

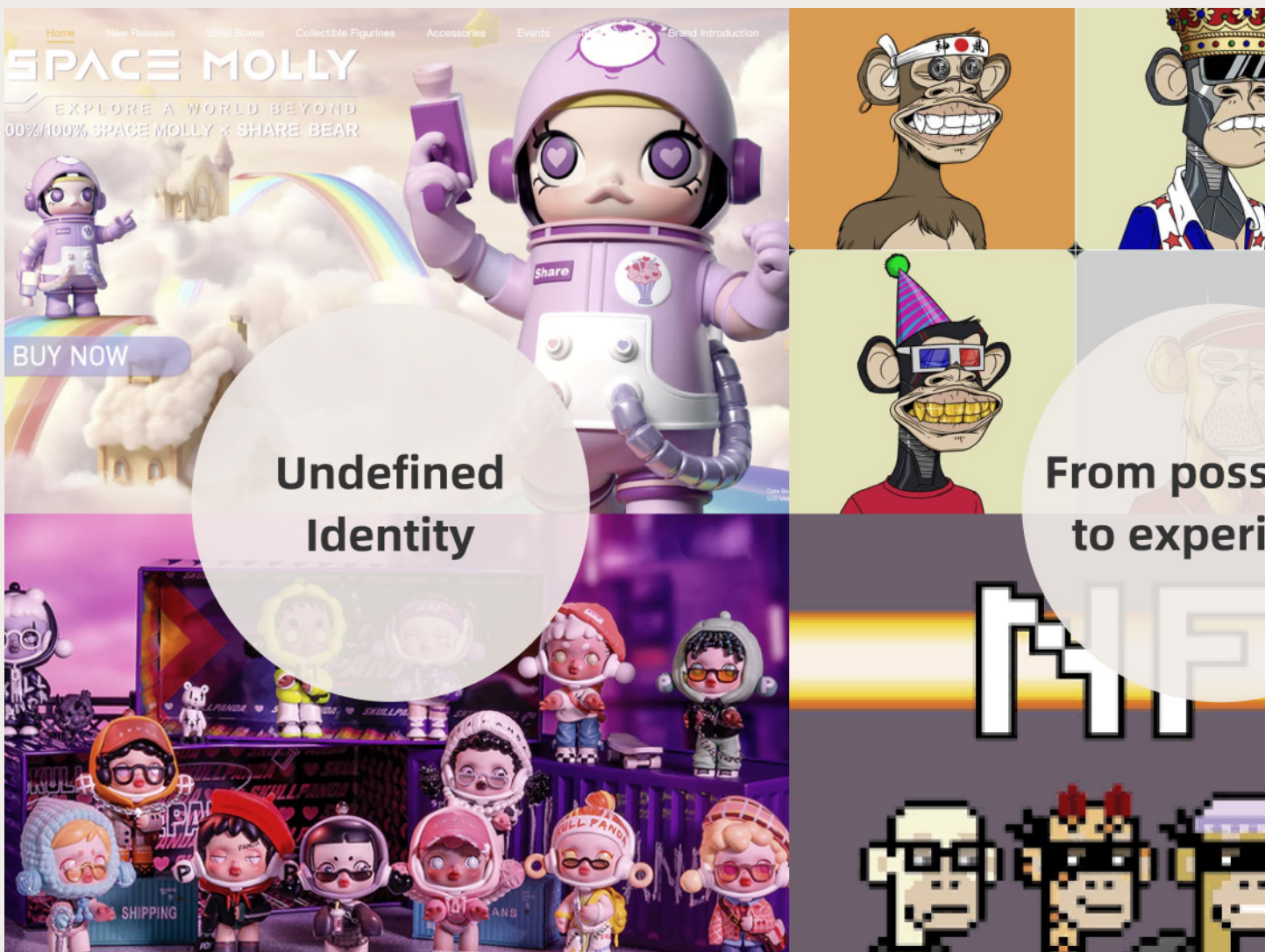


Figure 3-33. Generation Z preferences mood board  
Source: POP MART, The Bored Ape Yacht Club, Freitag, Overwatch



individual, public, and global levels to prevent future disasters. Many Generation Z claim to be environmentally conscious, and most of them hope to see companies and organizations make sustainable development commitments.

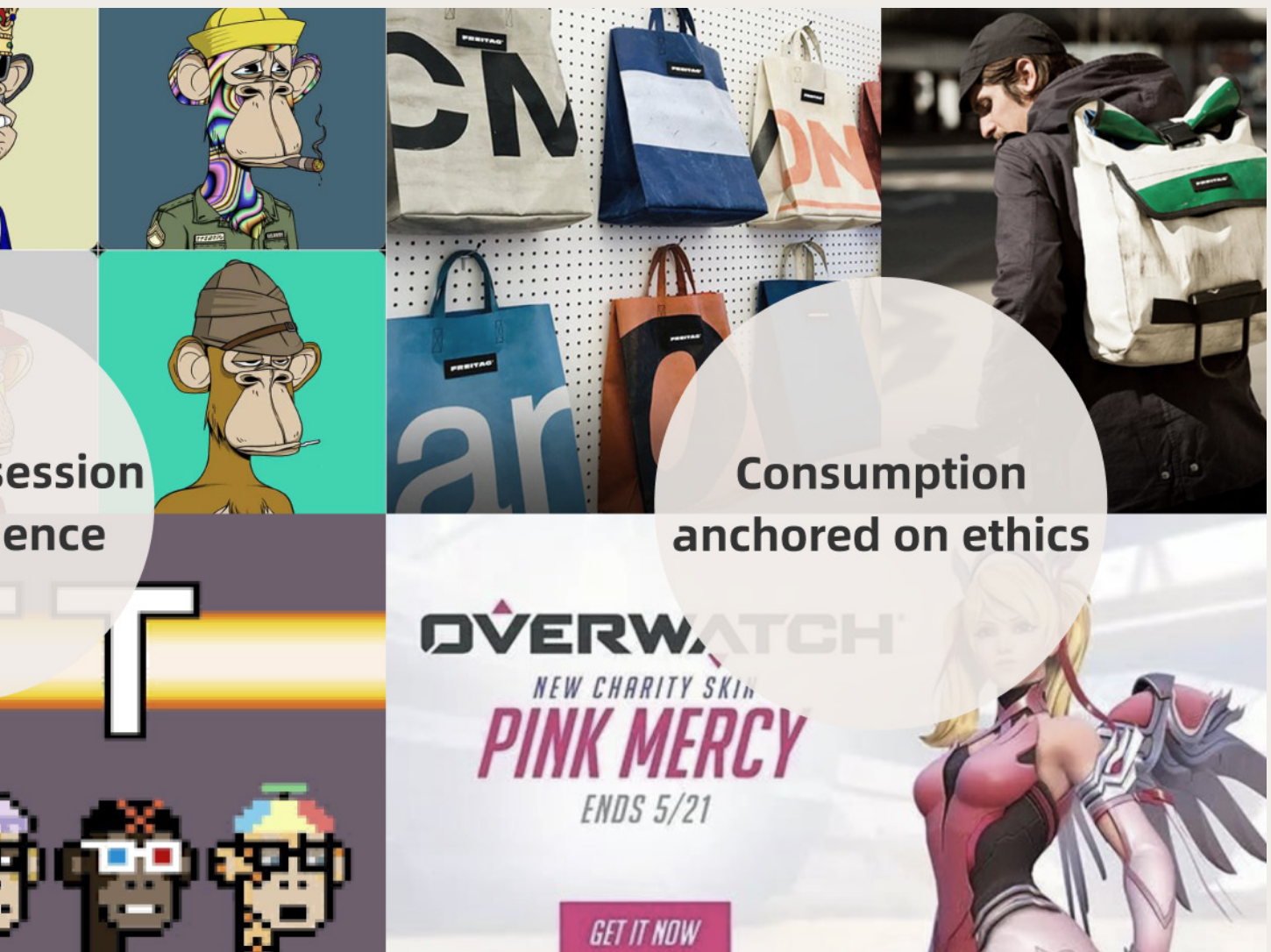
### Shopping preferences

The internet has forever changed the retail industry and shaped the taste of digital indigenous people. Consumption is about access rather than ownership: Generation Z subscribes to streaming platforms rather than purchasing movies or music. This trend even extends to service areas such as car sharing or luxury clothing rental.

Generation Z's acceptance of their taste may change, and they are more likely to spend money on enriching their daily life experiences than the millennial generation, who are more likely to splurge on luxury goods.

This generation is concerned about usability: mobile payments, application based services, and simple online transactions are important, and brands have achieved significant success by restructuring to adapt to the tastes of Generation Z.

Compared to the millennial generation, Generation Z prefers physical stores, but they



still hope to have an excellent online shopping experience. Some brands have even achieved success through prioritizing online releases, usually with the support of Generation Z consumers. Advertising is everywhere; Generation Z experiences the brand 'every moment' as it moves through the digital and physical worlds.

As a generation dedicated to its values, Generation Z has the same expectations for its retailers - Generation Z typically chooses brands with strong stories or purposes, as well as brands dedicated to green practices.

In a McKinsey study, 73% of Generation Z stated

that they attempted to purchase products from companies they deemed ethical, and nine out of ten believed that companies had a responsibility to address environmental and social issues. However, they can determine when a brand is just a verbal service, rather than supporting diversity or sustainability claims through real changes.

Many Gen Z people throughout Asia view the internet as their first choice when researching new products to purchase; In the United States, 40% of Generation Z admit to being influenced online, usually by the brand influence in the videos they watch. Members filter a large amount of information from influential

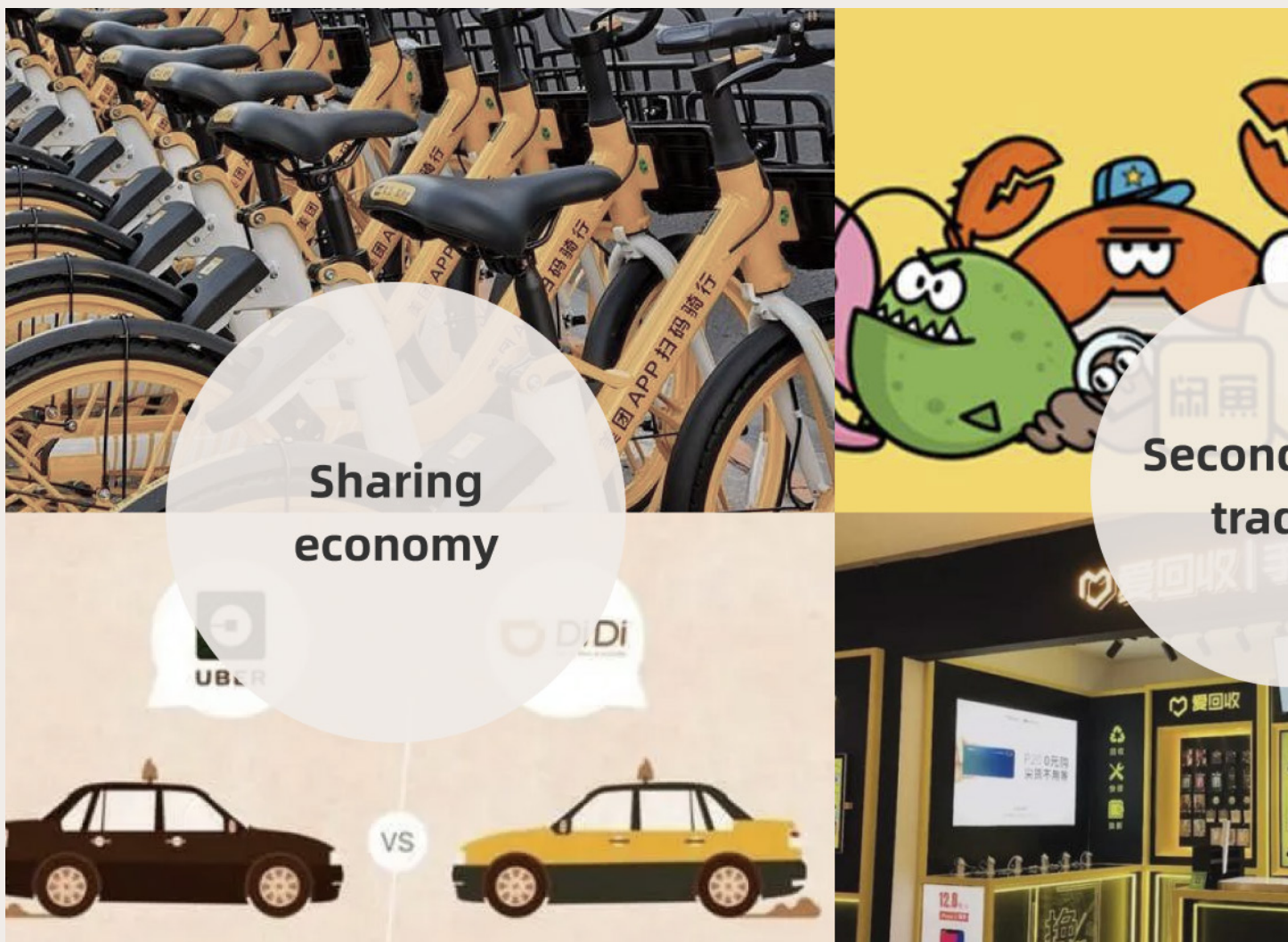


Figure 3-34. Recycling economy mood board  
Source: Meituan shared bicycle, Didi Chuxing(ride-hailing) , Xianyu (Second-hand trading) , Aihuishou(Electronic products)



individuals, family, and friends to determine where and how they want to spend. (McKinsey, 2023)

## 2) New economy (Recycling economy)

### Definition

Circular economy is a mode of production and consumption that involves sharing, leasing, reusing, repairing, refurbishing, and recycling existing materials and products for as long as possible. By doing so, the product's lifecycle has been extended.

In fact, this means minimizing waste. When the product reaches its service life, due to recycling,

its materials will be retained as much as possible within the economic range. These can be effectively used time and time again, then creating more value.

This is contrary to the traditional linear economic model, which is based on the model of acquisition production consumption discarding. This model relies on a large amount of cheap and easily available materials and energy.

### Why do we need a circular economy

Protecting the environment. Reusing and recycling products will slow down the use of natural resources, reduce landscape and habitat damage, and help limit the loss of biodiversity. Another benefit of circular economy is the





reduction of total annual greenhouse gas emissions.

Creating more efficient and sustainable products from the beginning will help reduce energy and resource consumption, as it is estimated that over 80% of product environmental impacts are determined during the design phase.

Turning to more reliable products that can be reused, upgraded, and repaired will reduce waste. Packaging is an increasingly serious problem, and on average, Europeans generate nearly 180 kilograms of packaging waste per year. The purpose is to address the issue of

excessive packaging and improve its design to promote reuse and recycling.

Reduce dependence on raw materials.

The world population is constantly growing, and the demand for raw materials is also increasing. However, the supply of key raw materials is limited. Recycling raw materials can alleviate supply related risks, such as price fluctuations, availability, and import dependence.

Create job opportunities and save money for consumers. Turning to a more circular economy can improve competitiveness, stimulate innovation, promote economic growth, and create job opportunities. Redesigning recycled

## Opportunity

New thinking  
**Systemic Design**

New users  
**Generation Z**

Foundation  
**Recycling Economy**

## What We Want

### Solve The Problem



**Reduce The Quantity  
Of Express Packaging  
In China**

Figure 3-35. Research objectives  
Drawn by the author

materials and products will also promote innovation in different economic sectors. Consumers will receive more durable and innovative products, which in the long run will improve their quality of life and save them money.

### 3.3.3 Research objectives and research framework

This research will take systemic design thinking as a guidance, Pay attention to the special preferences of Generation Z users towards Recycling economy, to solve the problem of express packaging waste in China ,and

ultimately achieve the following 3 goals (As shown in the figure 2-35) :

**1) Improve the reuse rate of express packaging in China**

**2)Build a green express packaging system that users' are willing to use**

**3)This system can generate profits and support its own sustainable development**

In order to achieve the research objectives, conducted the following research framework (As shown in the figure 2-36) ,and the next chapter will conduct design research.

## nt To Do...

### Problem

Quantity  
ing Waste  
a

### Target

Establish a reuse system  
**Improve Reuse Rate**

Improve users' motivation  
**Co-Create With Users**

Build a self-sustaining business  
**Gain Revenue**

# Research Framework

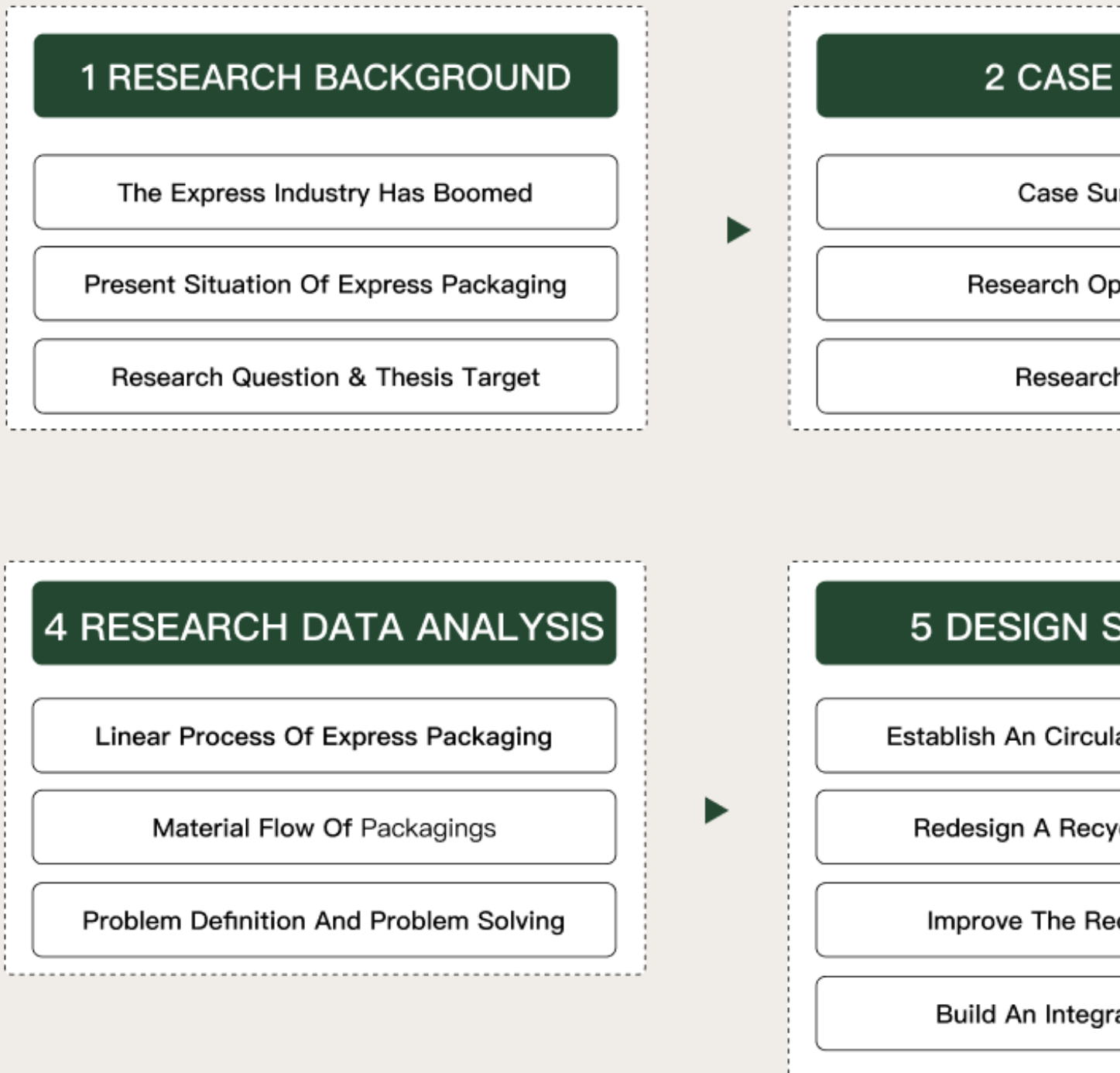
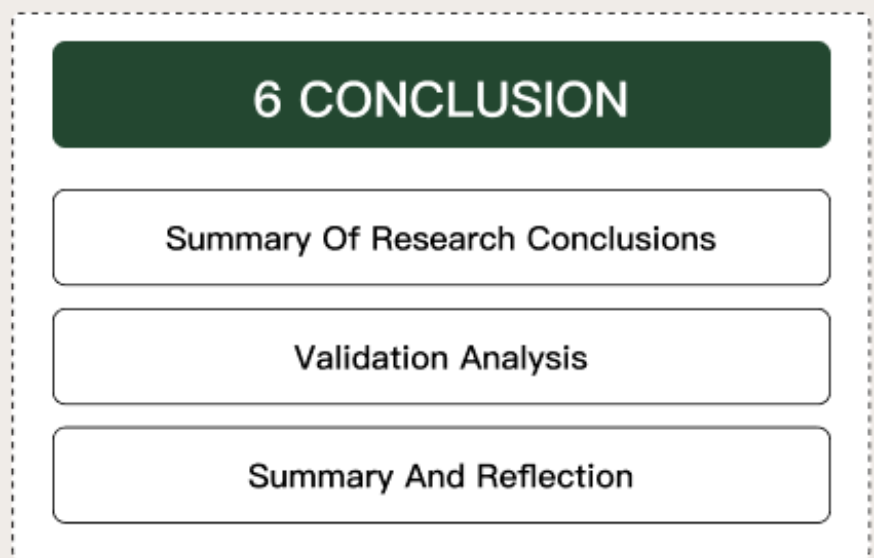
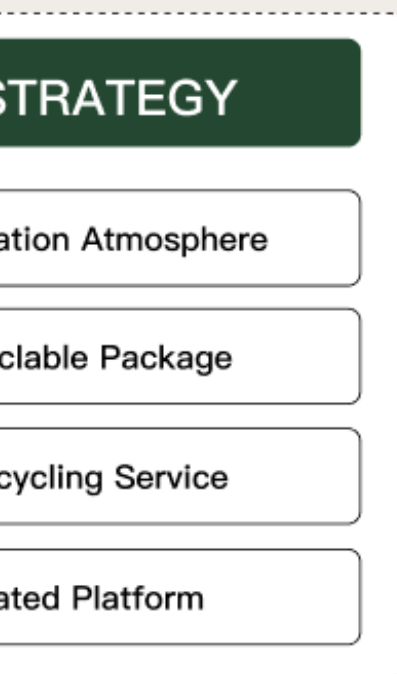
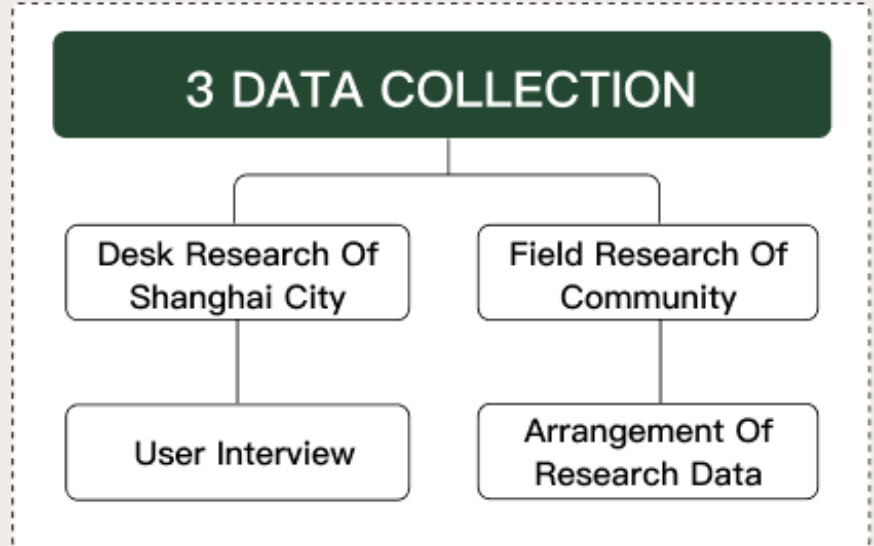
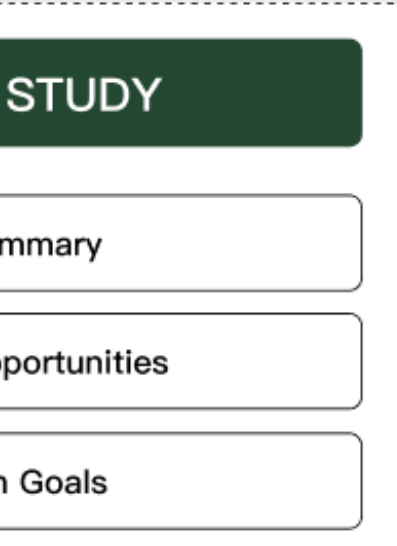


Figure 3-36. Research Framework  
Drawn by the author

# framework



04

Field

Research

---

## 4.1 Research Plan

This paper takes the systemic design method as the research guidance. Our main objective in this chapter is to complete the territory diagnosis and the express packaging disposal model. Through the existing literature research, it is found that to comprehensively improve the recycling efficiency of express packages, it is necessary to understand the usage habits of different stakeholders for express packages, the life cycle of express packages, the material flow, energy flow of express package and other relevant information.

### 4.1.1 Semi-structured interview

The Interview is widely used as a relatively flexible research method to obtain a large amount of in-depth information quickly. To understand the thoughts and experiences of express package-related users more widely and deeply, the semi-structured interview is adopted. According to the key points of the research, relevant general questions are put forward, but there is no limit to the range of answers.

By carefully listening to the answers of the respondents and constantly inquiring from them, more in-depth data are mined, and the depth and breadth of the collected materials are taken into account. To avoid the omission of important information in the interview materials, it is necessary to brainstorm and classify all relevant topics in the design of the interview outline, to ensure that the coverage is extensive enough and there is no lack of important dimensions.

### 4.1.2 Non participative observation

To reduce the interference caused by the presence of researchers on users' behaviors and daily express situations, non-participatory observation is chosen to collect data and try to restore the most real interaction between users and express packages and their personal preferences. And in the process of field observation, fully collected graphic materials, as auxiliary analysis data. Choosing non-participatory observation to collect data can reduce the interference to the real situation caused by the presence of researchers, and restore the most real interaction between users and express package and their personal choice preferences. In the process of field observation, fully collect graphic materials.

### 4.1.3 Desk research

Desktop research is to organize, analyze and study existing research materials directly through computers, magazines, books, documents, Internet search, etc., which can also be called desk research and secondary data research. It focuses on searching, screening, sorting, and analyzing secondary data according to the research question or objective. It can quickly form a preliminary cognition of the research content and avoid repeated research. In this paper, we can obtain regional characteristics, express distribution status, express recycling status, garbage disposal status, and so on in Shanghai through desktop research.



## 4.2 Regional Characteristics of Shanghai

### 4.2.1 Basic information of Shanghai

Shanghai, located in the east of China, is at the mouth of the Yangtze River, facing the Pacific Ocean. It is a provincial administrative region, a municipality directly under the Central government, a megacity, and China's international economic, financial, trade, shipping, scientific and technological innovation center (The State Council of China 2017).

By the end of 2020, the administrative area of Shanghai will be 6,340.5 square meters, accounting for 0.06 percent of the country's total area. Shanghai has 16 districts, a total of 107 subdistricts, 106 towns and 2 townships (Shanghai Municipal People's Government Information Office 2021) with a permanent population of 24.8709 million and an average life expectancy of 83.67 years, leading the world. The male population was 1,287,5211, accounting for 51.8% of the female population was 1,1995,684, accounting for 48.2%. (Shanghai Municipal Bureau of Statistics 2021) Shanghai's economy will reach \$22,583 in 2020, reaching the level of high-income countries and regions according to the standards of the World Bank. In 2020, faced with the impact of the economic recession and the COVID-19 epidemic, Shanghai's GDP reached 3,870.58 trillion yuan, still increasing by 1.7% over the previous year.

Shanghai is located in the center of China's Yangtze River Delta Economic Circle. Its superior geographical advantages, abundant transportation resources, and favorable policy environment make it the best place for the

agglomeration and development of the express logistics industry. Shanghai is an express logistics hub not only in China but also in the Asia-Pacific region.

At present, among the 9 listed express delivery companies in China, 6 are located in the Qingpu District of Shanghai: ZTO, STO, YTO, Yunda, Deppon, and Anneng. These 6 companies are responsible for most of the e-commerce logistics business in China. Shanghai's comprehensive competitiveness in global logistics is also the reason why so many express logistics companies choose Shanghai. Shanghai boasts Shanghai Port, the world's largest container throughput for 12 consecutive years, and Pudong Airport, the world's third largest cargo airport. In 2021, nearly one-half of China's inbound and outbound air supplies, nearly one-third of inbound and outbound flights, and nearly 30 percent of imported cold chain food were secured here.

### 4.2.2 Overview of express business in Shanghai

In 2021, the volume of the express deliveries in Shanghai reached 3.74 billion, up by 11.2% year on year, and the business growth reached a three-year high. The revenue of express delivery business reached 171.58 billion yuan. In 2022, due to the epidemic, the volume of express delivery business in Shanghai was 2,857,704 million, 883,675 million fewer than in 2021, a year-on-year decrease of 23.6 percent. In 2022, the revenue of Shanghai express business was 184.543 billion yuan, an increase of 12.961



## Basic Information Of Shanghai



Shanghai Population 24,878,859

Male To Female Ratio



MALE 51.8%



FEMALE 48.2%

4 big express companies's headquarters locate in shanghai



The administrative area of Shanghai will be 6340.5 square meters, accounting for 0.06% of the total area of China. In 2022, Shanghai's permanent population was 24.759 million.

The Yangtze River Delta has developed an e-commerce industry, and China's express delivery giants have flocked to build headquarters here. There are 14 national and regional express headquarters located in Shanghai.

Figure 4-1. Basic information of Shanghai  
Drawn by the author

# Shanghai Area And Territory

## Logistics Park



Shanghai Northwest  
Comprehensive  
Logistics Park



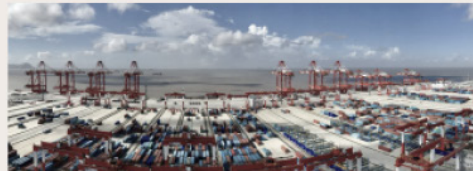
Shanghai's Qingpu  
Express Company  
District



Shanghai Southwest  
Comprehensive  
Logistics Park



Shanghai  
Waigaoqiao Bonded  
Logistics Park



Shanghai  
Pudong Airport  
Logistics Park



Shanghai Yangshan  
Deep Water Port  
Logistics Park



Figure 4-2. Shanghai area territory overview  
Drawn by the author





## Waste Incineration Plant

**1** Jiangqiao Waste Incineration Plant



**2** Yuqiao Waste Incineration Plant



**3** Old Port Comprehensive Treatment Base



By The End Of 2019, Shanghai Had A Total Of 16 Waste Incineration Projects (Some Of Which Were Constructed In Phase I And Phase II According To The Number Of Approved Projects) And 49 Incineration Lines, With A Total Scale Of 28,895 Tons Per Day.



Constructing Waste plant



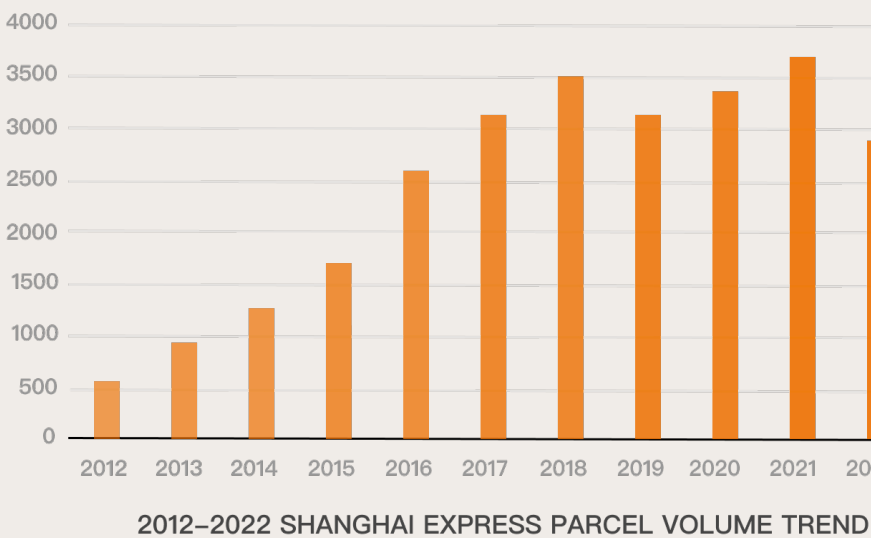
Planning Waste plant

billion yuan compared with 2021, with a year-on-year growth of 7.6%, accounting for 17.46% of the national revenue of the express business.

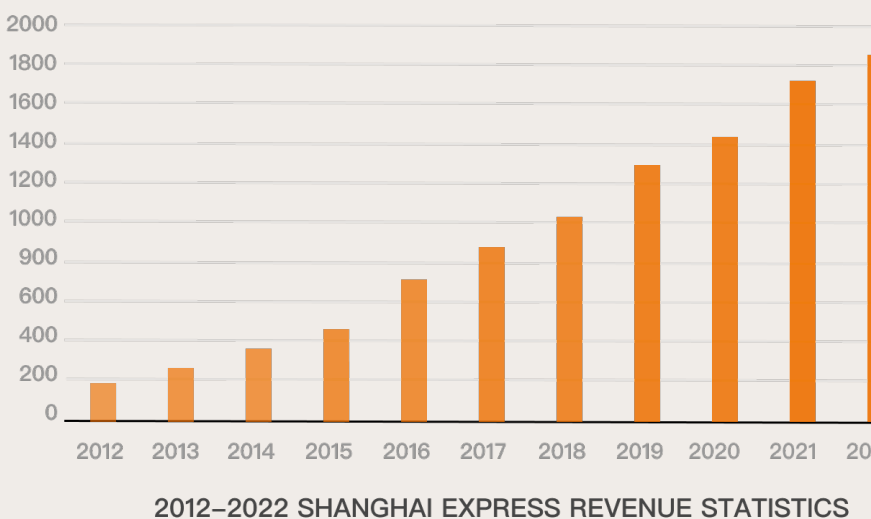
In recent years, Shanghai's express delivery industry has maintained a sound development trend. In 2021, the growth rate of the express delivery business exceeded 20%, 2.5 times that of Shanghai's GDP growth in the same period, and its contribution to economic growth has gradually

increased. Among the service industries, express delivery has been at the forefront of growth and has become an important force driving the rapid development of the service industry. Supported by the express delivery industry, the added value of the service industry in Shanghai in 2021 increased by 7.6% year-on-year, 5.8 percentage points higher than that in 2020.

UNIT: MILLION PIECES



UNIT: HUNDRED MILLION RMB



## Shanghai Logistics

Shanghai Northwest Comprehensive Logistics Park



Shanghai's Qingpu district is home to many express delivery compa



Shanghai Southwest Comprehensive Logistics Park



Figure 4-3. Distribution map of main logistics parks in Shanghai  
 Drawn by the author

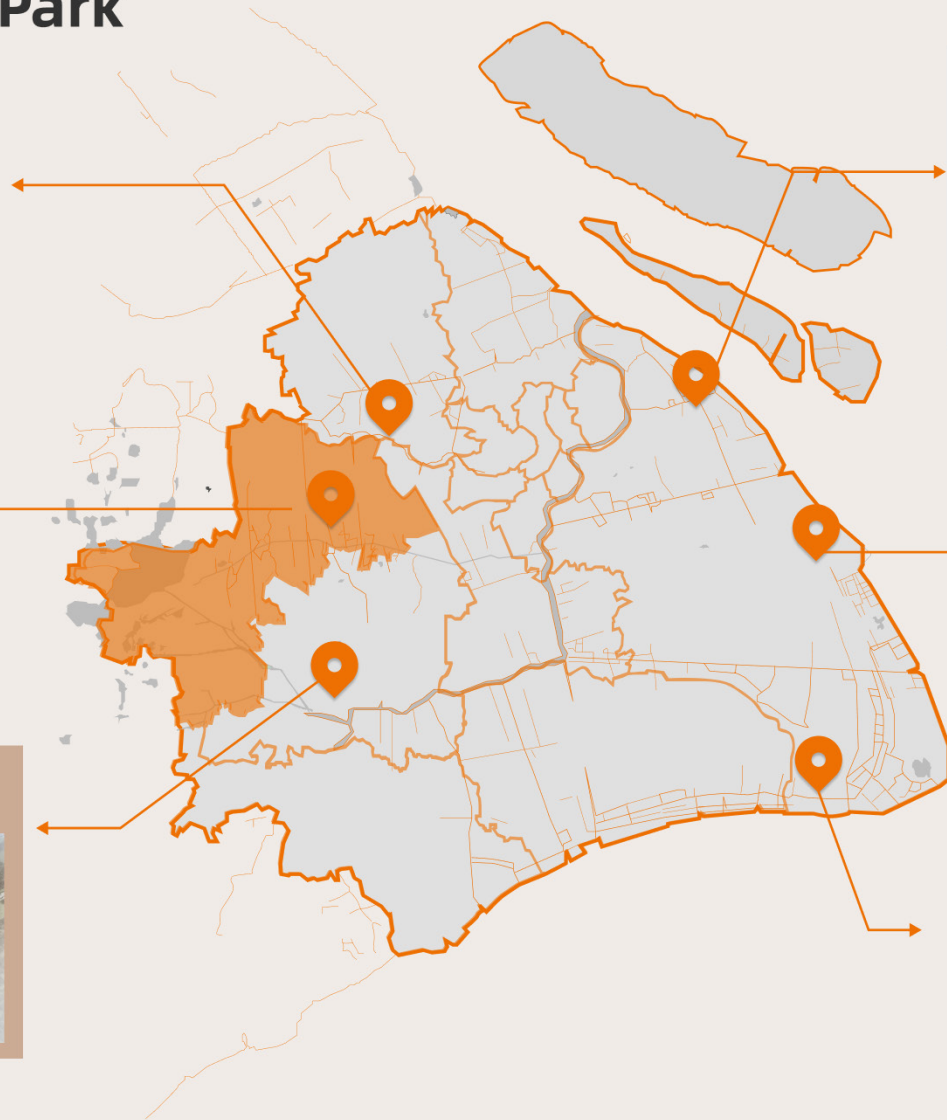


At the same time, Shanghai express industry continues to strengthen the construction of infrastructure, promote the upgrading of equipment, and further enhance the development capacity of the industry. In 2021, Shanghai will continue to strengthen the transformation and upgrading of the distribution center and the construction of parks. The headquarters parks of STO and Deppon located in Qingpu District will accelerate their progress towards the

construction and implementation stage. Through the expansion of space and capacity, Shanghai's express delivery processing capacity has been improved year by year, with the average daily express delivery volume exceeding 10 million for the first time. Delivery network construction is improving day by day.

The three logistics parks in the east coast (Waigaoqiao Logistics Park, Deep-water Port

# Park



Logistics Park and Pudong Airport Logistics Park) are connected to the international market. Guided by the bonded area of the Shanghai Pilot Free Trade Zone, they will strengthen the linkage effect between port and airport industries and modern logistics, further optimize the international logistics environment, and build a new system of open economy. The two western land logistics parks (Northwest Comprehensive Logistics Park and Southwest Comprehensive Logistics Park) are connected to the Yangtze River Delta, highlighting the coordination and integration of logistics development, transportation location, industrial advantages and urban functions, and promoting the transformation and upgrading of traditional logistics.

### 4.2.3 Overview of waste disposal in Shanghai

On July 1, 2019, the "Regulations of Shanghai Municipal Household Waste Management" was officially implemented, and Shanghai began to enforce garbage classification. Household garbage is classified according to the standards of recyclables, hazardous waste, wet waste, and dry waste.

By July 2023, four years since the garbage sorting work in Shanghai has achieved remarkable results, citizens' sorting habits have been basically formed, and the sorting system has been basically completed. In the process of source delivery, more than 21,000 classified delivery points have been standardized, and nearly 22,000 sets of road waste box delivery ports have been upgraded. In the process of collection, transportation and transportation, 1,706 wet garbage trucks, 3,296 dry garbage trucks, 116 harmful garbage trucks and 364 recyclables were properly equipped. In the terminal disposal link, terminal facilities such as Laogang Wet Waste Phase II, Jinshan Incineration

Phase II and Fengxian Incineration Phase II have been completed and put into operation, and the utilization of wet waste resources and dry waste incineration and treatment capacity of the city has reached 31,000 tons/day, realizing zero landfill of raw domestic waste.

The level of resource utilization has steadily increased. More than 15,000 service points for recyclables, 198 transfer stations, and 15 collection and distribution yards have been built, and a system of "points, stations and yards" for recyclables has been basically formed. All districts formulated and implemented subsidy policies for recyclables, and promoted the application of food and kitchen wet waste resource products and soil conditioners. The recycling rate of household waste has reached 40%. In 2020, Shanghai will invest 108.786 billion yuan in environmental protection, equivalent to 2.8% of the city's GDP.

The city cleared and transported about 8.6734 million tons of domestic garbage (dry garbage + wet garbage), with an average daily average of 23,700 tons, of which 5.1949 million tons of dry garbage, or 14,19 3.82 tons/day, a year-on-year decrease of 20%. Wet waste 3.4785 million tons, 9,504.01 tons/day, up 27.5% year on year. The incineration and disposal volume of domestic garbage is 18,337 tons/day, the biochemical disposal volume of wet garbage is 3,463 tons/day, and the landfill volume is 1,810 tons/day. Domestic waste incineration and wet waste recycling capacity of 28,095 tons/day, and emergency landfill capacity of 5,000 tons/day. It has built 12 incineration plants with an incineration capacity of 21300 tons/day.

The wet waste treatment capacity is 6,795 tons/day, and there are 10 centralized wet waste treatment facilities with a treatment capacity of 5,530 tons/day and another dispersed treatment capacity of 1,265 tons/day. The volume of



Figure 4-4. The sorting bins in the residential area in Shanghai  
<https://www.jianshu.com/p/42b9867bb492>

recyclables collected was 2,333,400 tons, or 6,375.42 tons/day, with a year-on-year growth of 57.5%; The amount of hazardous waste treated was 940.62 tons, or 2.57 tons/day, with a year-on-year increase of 328.5%. Shanghai been completed and put into operation, and the utilization of wet waste resources and dry waste incineration and treatment capacity of the city has reached 31,000 tons/day, realizing zero landfill of raw domestic waste. The level of resource utilization has steadily increased. More than 15,000 service points for recyclables, 198 transfer stations, and 15 collection and distribution yards have been built, and a system of "points, stations and yards" for recyclables has been basically formed.

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By 2020, Shanghai has 16 garbage incineration projects (according to the number of approved



projects, some of which are divided into Phase I and Phase II construction) and 49 incineration lines, with a total scale of 28,895 tons per day. From the perspective of distribution, most incineration facilities in Shanghai are distributed in the outskirts of the city, due to China's restriction that the site selection of incineration projects should be no less than 300 meters away from residential areas. Among them, there are four super large projects, Old Port Phase I, Old Port Phase II, Liming, and Binhai, distributed along the seaside of Pudong New Area, with a total garbage disposal scale of 14,000 tons per day. By 2020, Shanghai has 16 garbage incineration projects (according to the number of approved projects, some of which are divided into phase I and Phase II construction) and 49 incineration lines, with a total scale of 28,895 tons per day.

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# Shanghai Waste Incin

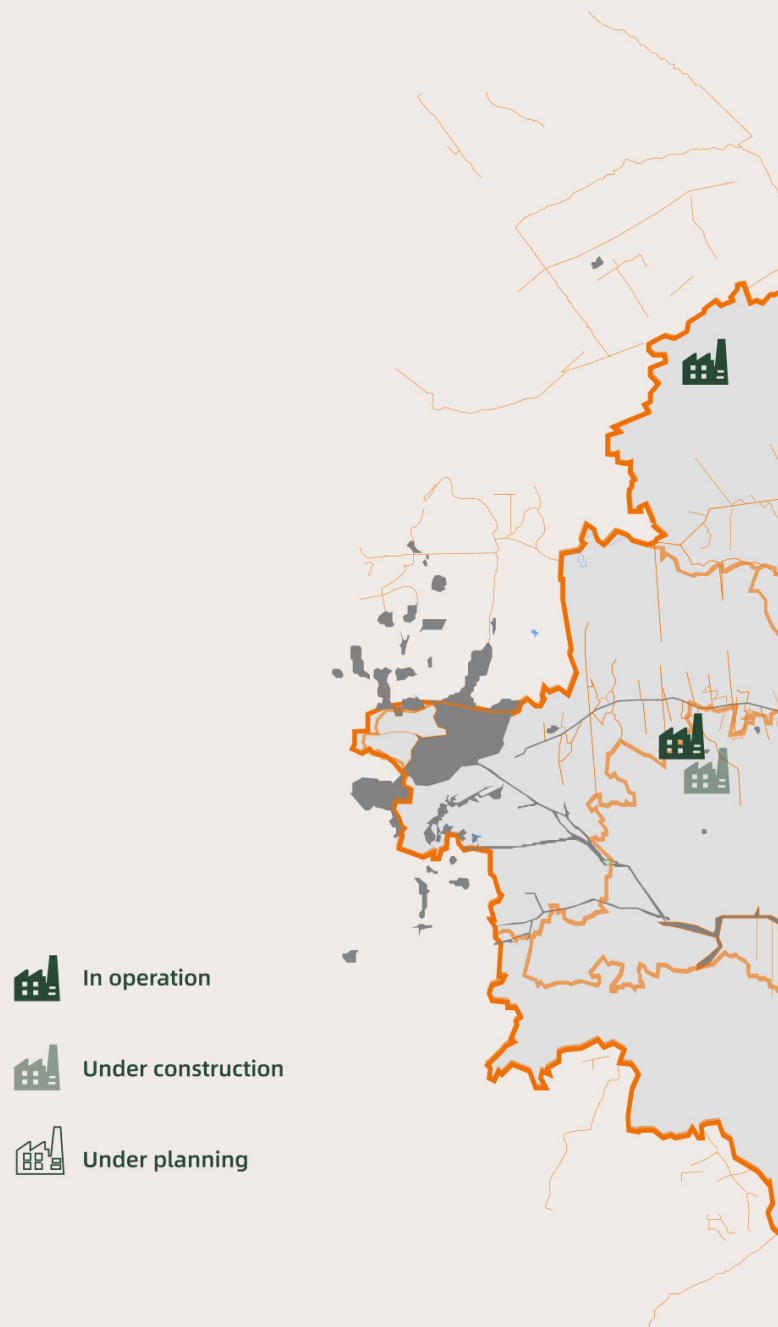
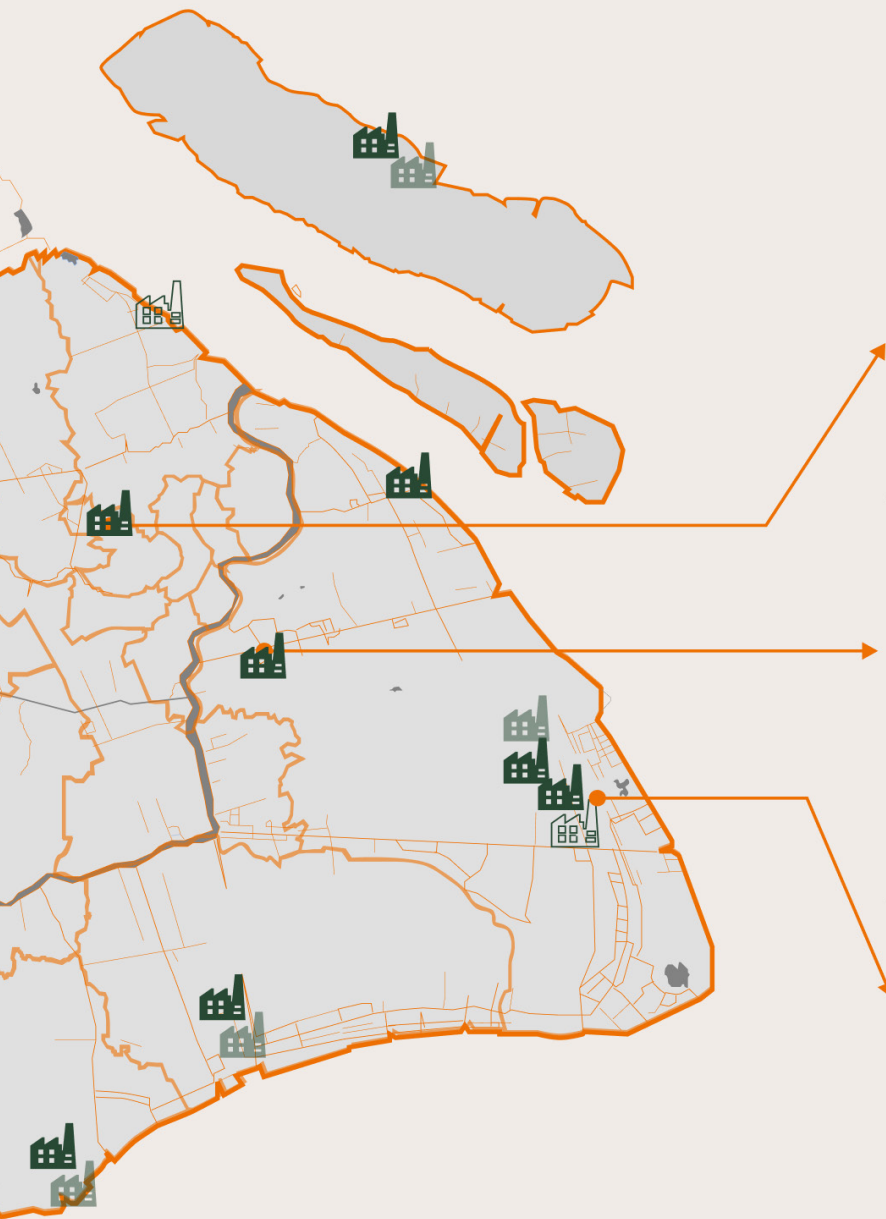


Figure 4-5. Distribution map of waste treatments in Shanghai. Drawn by the author



# eneration Plant

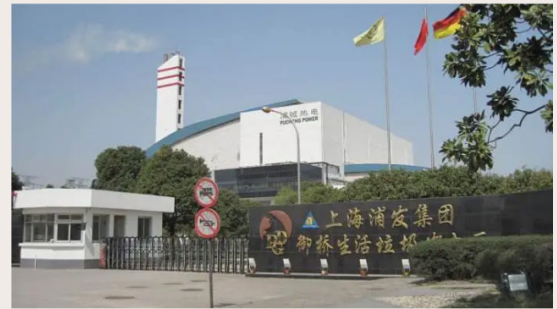


## 3 high capacity garbage plants

1. Jiangqiao Waste incineration Plant



2. Yuqiao Waste incineration Plant



3. Old port comprehensive treatment



## 4.3 Field Research of DajinGeng Community

### 4.3.1 Overview of DajinGeng community

#### 1) Definition of community

Community, also known as association, unity, or etiquette and custom society, was put forward by German sociologist Tonnies in the 19th century. It refers to the combination of people established through blood relationships, neighborhood, and friend relationships as opposed to "society". Later, it also refers to social units gathered together because people sharing common values or culture live in the same region and the resulting interactive influence. (Wikipedia 2022)

Why we choose the community as the research sample?

First of all, the community is the living space of every resident and is closely related to the use of express packaging. If the family is taken as the research sample unit, it can only include the steps of receiving express and generating express waste, which can not involve express dispatchers, garbage recyclers, and other stakeholders. After comprehensive consideration, it can be found that the community, as a living organism, completely covers express delivery, receiving express, and discarding express packaging, which is the smallest unit in the life cycle of express packaging, which is worthy of in-depth research and observation. Secondly, the community is a common environment in daily life, which is convenient for researchers to observe, interview and collect first-hand research materials. Therefore, this thesis selects the community as the research sample.

#### 2) DajinGeng community introduction

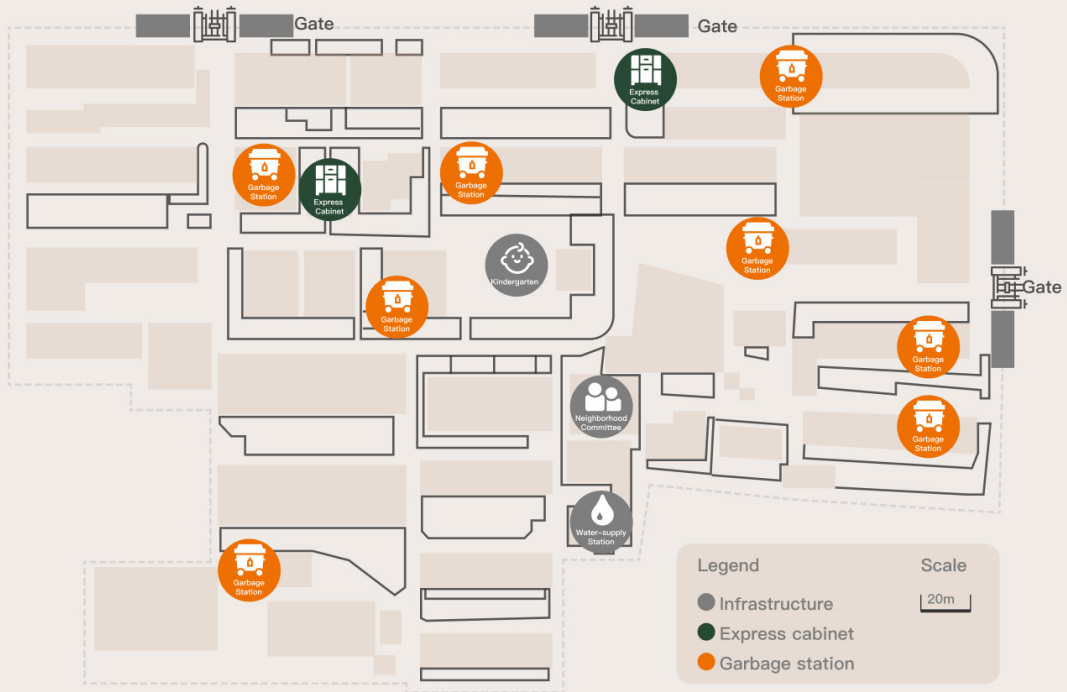
DajinGeng Residential area is located in the middle of Changning District, Shanghai, Xianxia Street, belongs to the ordinary residential, built in 1986, the internal facilities include kindergarten, fitness facilities, security facilities and so on. The total number of buildings is 66, and the total number of houses is 1602.

The nearby living facilities are comprehensive, There are supporting commercial centers around the community, kindergartens, primary schools and universities within 2KM, and community hospitals, general hospitals and other medical resources within 3KM. The living facilities in the community are complete, there are fitness equipment, there are supporting security. Good location, nearby subway station, bus station, etc., travel is very convenient, Therefore, the community is a mature community with both residents and renters. (Shanghai Changning District Government, 2021)

The houses in Shanghai's Dajingeng community were built in 1986 and are dilapidated without elevators. The average house price is 73,000 yuan/flat, and the average rent for an ordinary house with two bedrooms and one living room is about 5400 yuan a month, which is cheaper, so it attracts more work-rent groups. About 20 percent of the housing in the DajinGeng community is for rent. and the age group of renters is mainly post-90s. While half of the indigenous people here are elderly people in their 60s and 70s, so the residents in this community are diverse in age, and more comprehensive data can be obtained as observation samples.



Layout of DaJinGeng community



Pictures of DaJinGeng Community



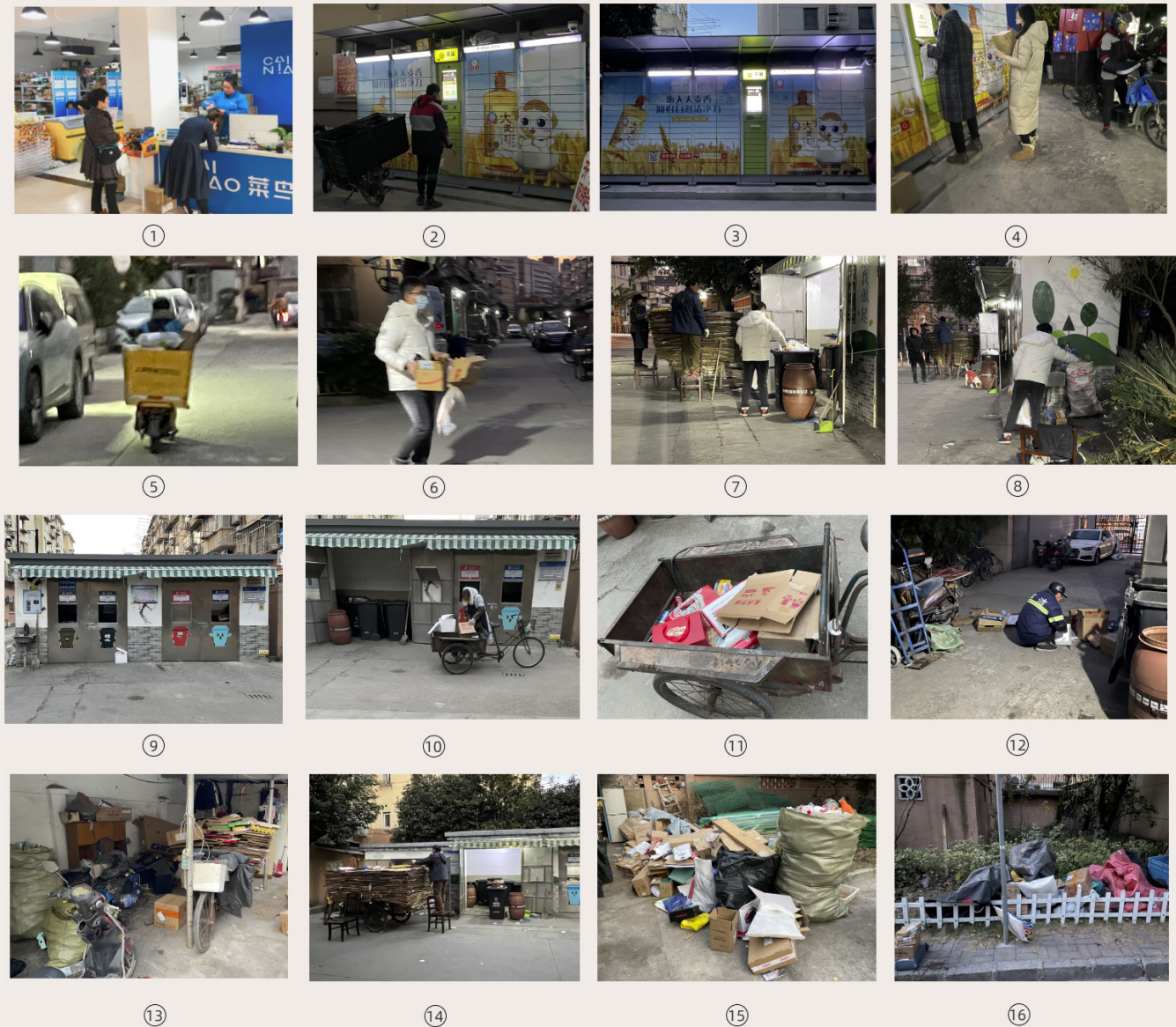
Figure 4-6. Shanghai DaJinGeng Community Field overview  
Drawn by the author



### 4.3.2 Investigation of express delivery and Packaging recycling process in DaJinGeng Community

In order to understand the current situation of express recycling in Dajingeng community, we conducted a field survey, mainly observing the way of express delivery and express packaging

#### Field Observation Of Da Jin Geng Community



1-3 :Community Express Station And Express Cabinet    4-5 : User Picks Up The Delivery & Courier  
6-8 :Users Throw Delivery Packages    9-10 :Community Garbage Stations  
11-16:Community Garbage Station Employees Sort Recyclable Garbage

Figure 4-7. Shanghai DaJinGeng Community Field observation photos  
Drawn by the author



treatment in the community. Based on the desktop research and field research, the following contents are sorted out.

**1. Express delivery**

There are many express sites around the large Jin community, more convenient to receive express.

**How To Deal With Express Garbage**

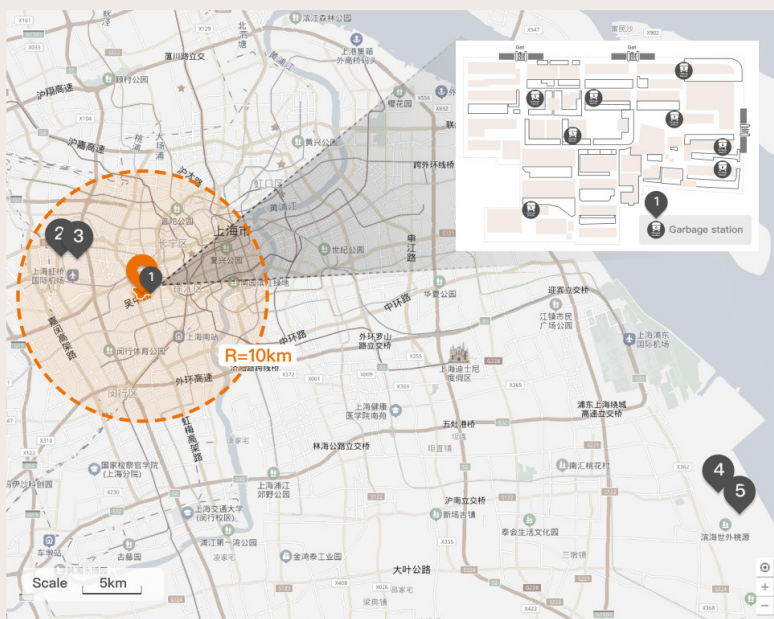


**Discard the express package**  
(Users)

**sort & collect cartons**  
(Garbage station employee)

**Waste treatment & cartons reuse**  
(Disposal center employee)

**Distribution Of Disposal Stations**



**Community Garbage Station**

- 1 Community Garbage Station

**Garbage Transfer & Treatment Station**

- 2 Changning District Comprehensive Waste Treatment Station
- 3 Changning District Recyclable Garbage Secondary Sorting Plant
- 4 LaoGang Solid Waste Treatment Center
- 5 LaoGang Renewable Energy Utilization Center

For users, the community garbage station is the most convenient and accessible way for express packaging disposal

Professional material classification and treatment plants are located in more remote suburbs because of avoiding pollution of urban environment and lower land cost

Figure 4-8. DaJinGeng community Express delivery methods and distribution of cabinets & stations  
Drawn by the author

At present, there are three main ways to receive express delivery. First, residents can go to the nearby express station to pick up the express after receiving the message. The advantage is safety, the disadvantage is it's more troublesome than home delivery.

The second is community delivery cabinets, such as Nest, Cainiao and other brands, users can take a delivery code to take delivery, the advantage is safe and convenient, but if the user does not take delivery in time will be charged a certain storage fee; Three is the Courier door-to-door delivery, is the most convenient way, but if the user does not take delivery in time will be charged a certain storage fee; Three is the Courier door-to-door delivery, is the most convenient way, but if the user is not at home will be placed at the door, on the security is not as good as the above two. And with the busy express business, express delivery tends to be the other two ways.

There are a lot of express points distributed near the Dajingeng community. Several big express brands such as Cainiao, Zhongtong, China Post, There are a lot of express points distributed near the Dajingeng community. Several big express brands such as Cainiao, Zhongtong, China Post, DHL and so on have express stations nearby, and there are express cabinets in the community. For the residents, it is very convenient to take the express, the amount of express is also large, and the express garbage is also much, so the treatment of express packaging is a problem worth paying attention to, especially since there is no special system for the disposal of express garbage.

## 2. Express packaging waste disposal

At present, there are many kinds of express packaging waste. The main types are shown in the figure below, including paper and plastic. Paper packaging accounted for about 48.77%, plastic

packaging accounted for 51.23%. Paper packaging includes delivery boxes and bags of different sizes. In addition to plastic bags, there are many different kinds of plastic fillers such as air column, bubble film, and foam. And the outer packaging will also use a lot of plastic bags. Dajingeng community is located in Changning District, Shanghai. Since 2017, 1013 domestic garbage can houses have been reconstructed in Changning District; Implement 161 classified transport vehicles; 957 integrated service points of the two networks

# Materials Of Express Pac



Figure 4-9. Different types of Express packaging  
 Drawn by the author



have been built; 1 collection and dispersion yard at the level of renewable resources area, with an area of 700 m; 1 Hazardous Waste Transfer and storage warehouse, covering an area of 306 MI; The coverage rate of "two determinations" in 737 residential areas in the region is 100%, and the standard rate of demonstration residential areas and demonstration streets and towns is 100%; Complete the establishment of domestic waste classification standards for 535 units in the region; All roads and shops along the street

are fully covered by the classified collection of domestic waste, covering 167 roads, involving 6875 merchants. The resource utilization rate of domestic waste will reach 63.62% in 2020. (Shanghai Changning District government 2021) To sum up, Near Dajingeng Community, there are garbage stations, garbage transfer stations, and garbage disposal points. Garbage stations are community garbage disposal points. Currently, there are four types of garbage bins:

## Packaging

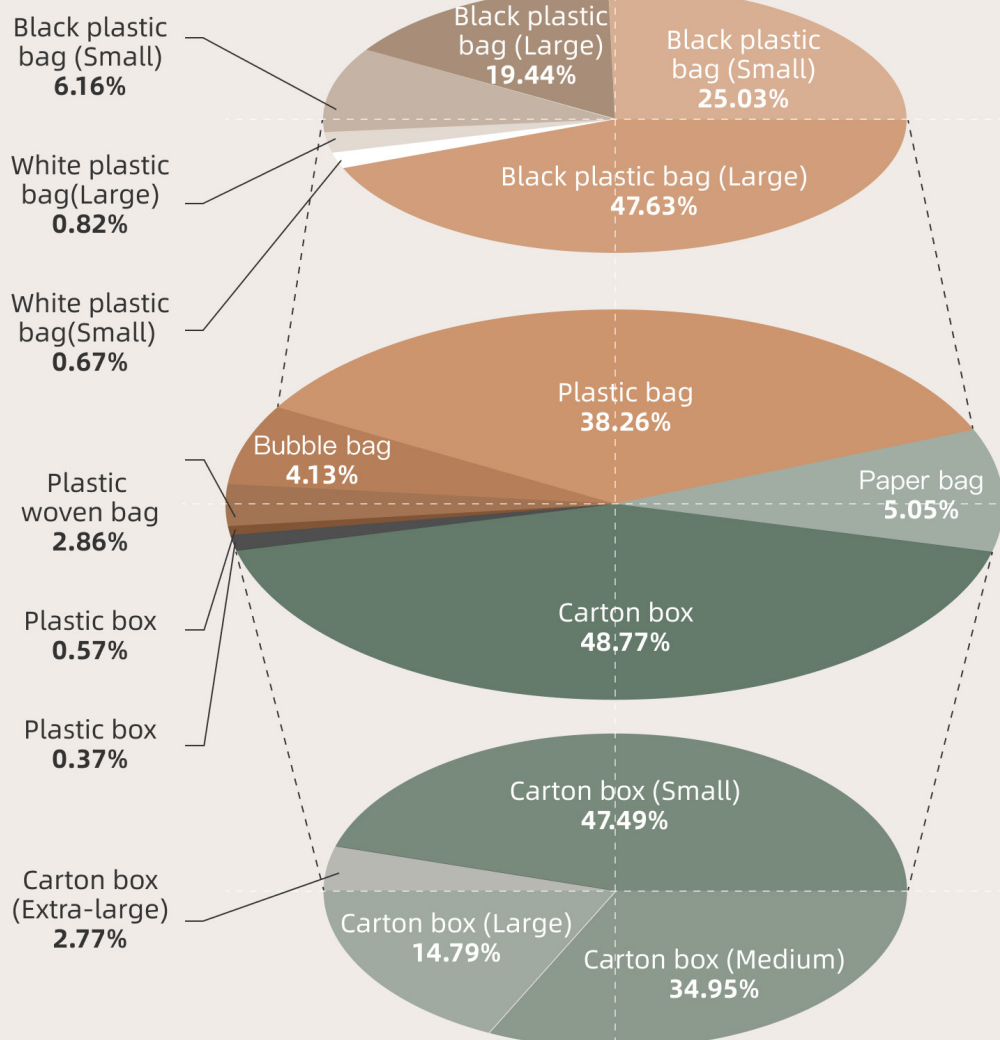
Plastic box



Plastic bag

Bubble bag

foam buffer



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[http://www.xinhuanet.com/multimediampro/2021-04/09/c\\_1211102902.htm](http://www.xinhuanet.com/multimediampro/2021-04/09/c_1211102902.htm)

## How To Deal With Express Garbage

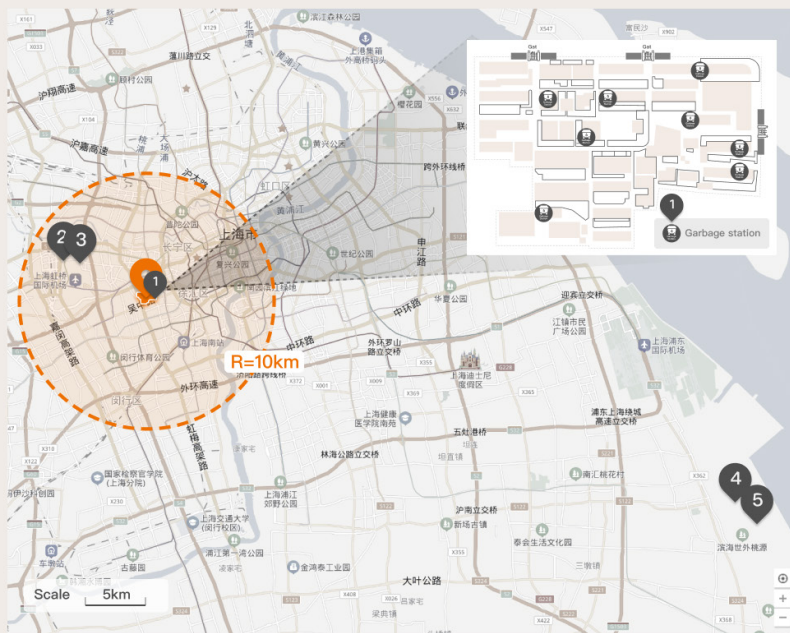


**Discard the express package**  
(Users)

**sort & collect cartons**  
(Garbage station employee)

**Waste treatment & cartons reuse**  
(Disposal center employee)

## Distribution Of Disposal Stations



### Community Garbage Station

- 1 Community Garbage Station

### Garbage Transfer & Treatment Station

- 2 Changning District Comprehensive Waste Treatment Station
- 3 Changning District Recyclable Garbage Secondary Sorting Plant
- 4 LaoGang Solid Waste Treatment Center
- 5 LaoGang Renewable Energy Utilization Center

For users, the community garbage station is the most convenient and accessible way for express packaging disposal

Professional material classification and treatment plants are located in more remote suburbs because of avoiding pollution of urban environment and lower land cost

Figure 4-10. DajinGeng community waste disposal methods and distribution of garbage stations  
Drawn by the author

wet garbage,recyclable garbage, dry garbage, and hazardous garbage. Generally, there will be a garbage disposal point in the community, with special staff for sorting and garbage

classification guidance, and garbage transport vehicles will clean up the garbage in the community every day. There is a refuse transfer station near Dajingeng Community.



The refuse transfer station has the equipment to deal with household garbage, which can collect, compress, treat, and transfer the daily garbage, and finally transport it to the refuse treatment terminal. The Shanghai Laogang Waste Treatment Base treats more than half of the city's household garbage. At the same time, Changning District, where Dajingeng Community is located, also has solid waste treatment centers and recyclables treatment centers, which can be processed nearby.

At present in Dajingeng community, express garbage disposal mainly through the following process. First can be put into the community garbage station, express cartons as recyclables. will be thrown into the recycling bin. The person in charge of the garbage station in the community will also disassemble and package the carton and sell it to the garbage recycling station for recycling. Generally speaking, the recycled cartons will be sent to the downstream carton recycling enterprises after sorting to realize the reuse of resources. However, due to low recycling value, plastic packaging is generally mixed with ordinary garbage and transported together with many garbage to the transfer station for compression and packaging, and then transported to Shanghai unified waste incineration base for incineration and power generation.

At present, the express business in Dajin community is developed with a large amount of express delivery, but there is no perfect way to deal with express packaging, especially plastic packaging. Paper express packaging waste has a high recycling rate because it has a certain recycling value, but it is recycled. Compared with direct recycling, it needs process treatment and resource consumption. However, plastic packaging waste is difficult to recycle due to its many categories, low recycling value, and currently it is mainly treated with dry garbage such as household garbage.

This has resulted in a huge waste of resources.

In order to conduct an in-depth study on the issue of express packaging, we choose stakeholders to conduct user interviews. This interview mainly focuses on the three main research questions of this paper, namely: how to improve the recycling rate/recovery rate of express package? How to solve the problem of imperfect recycling system, lack of intelligent and standardized management? How to increase people's interest in packaging recycling and recycling packaging? We designed our questionnaire around these questions.

### **4.3.3 Use interview of DajinGeng Community**

According to our field research, stakeholders in the use and recycling process of packaging are sorted out, including the following groups: e-commerce merchants, online consumers, express station owners, and persons in charge of garbage stations. These groups are closely related to the selection, use and recycling of express packaging.

#### **4.3.3.1 Couriers**

For couriers, 5 couriers in charge of express delivery in the community are selected for user interviews to understand the roles and attitudes of couriers in express delivery and recycling process,

1. Personal information, including age, education level, working years, working hours, etc.
2. How much express can be delivered per day? The number of people covered?
3. What is the main type of express package for delivery? Plastic bags or boxes or whatever?
4. Have you ever used recyclable boxes for delivery? Or packaging that needs to be recycled?
5. If there is any recycled express package, what is the recycling method and subsequent flow?
6. What is your opinion on door-to-door recycling of express boxes?

7. What is your opinion on how to provide a more cost-effective or intelligent recycling system?

Through interviews with Courier groups, we can get their persona, as well as their views on recycling Courier packaging or a smarter recycling system. Points concluded from the interview include:

### User Inverview Time Plan

Task Name	December, 2022		
	1-10	11-20	21-31
Identify Stakeholders	█		
Courier Interview	█		
Express Station Staff Interview	█		
Online Shopper Interview		█	
E-Commerce Merchant Interview		█	
Community Garbage Station Staff Interview			█

Table 4-1. Timeline of User inverview  
Arranged by the author

### STAKEHOLDERS OF PACKAGE RECYCLING





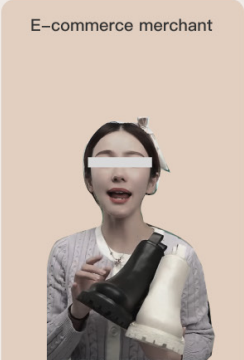
<p>Courier</p> 	<p>Express station owner</p> 	<p>Onliner shopper</p> 	<p>Garbage station worker</p> 	<p>E-commerce merchant</p> 
<p>Li is a Courier and mainly responsible for transporting, sorting and picking up packages</p>	<p>Fei runs a Courier station, is responsible for the sorting and distribution of express. Express packaging recycling boxes are available at express stations.</p>	<p>Cici buys a lot of things online. Most of the express boxes are thrown away and some are used for herself.</p>	<p>Wan is responsible for the sorting of garbage in the community and will sort out and recycle the paper packing boxes.</p>	<p>Liu operators an online shop, Usually responsible for the delivery of customer orders, Communication with customers online</p>

Figure 4-11. Stakeholders of packaging recycling  
Drawn by the author

**1. The work hours are long and the workload is heavy**

The daily working hours of couriers are more than 10 hours, and the labor intensity is relatively high. The average daily delivery quantity is more than 100 pieces, and in the period of e-commerce promotion, the delivery quantity will be more than 300 pieces.

**2. The express packages are mainly cartons and plastic packaging**

Express delivery mainly carton and plastic packaging, plastic packaging types are also different. E-commerce platforms, such as Jingdong, use HDPE with good tension and high bearing capacity as the main material. Ordinary express bags are made of LDPE, PVC, and other materials. The quality varies greatly.

**3. Recyclable box has high recycling cost and a low utilization rate**

For some logistics companies such as Jingdong or SF Express, the recycling box they provide is rarely seen in the actual distribution. We have learned

that "although the Courier repeatedly explained to return the box, many users are not used to, want to keep their use or sell waste products".There are difficulties in recycling them at the "Last mile of logistics distribution".In addition, in the recycling process, the recycling box will generate additional costs such as manual operation, scanning, and vehicle transportation, which increases the cost pressure of express outlets. So enterprises shift their focus to B-end customers, which have higher recovery efficiency, while there are relatively few C-end customers.

**4. The direct reuse rate of packaging recycled at the express point is the highest**

At present, express packaging is handled by users themselves after use. When the users pick up the items at the express point, some users will unpick the express on the spot, leaving the express box and placing it in the recycling box. According to the boss of Express Station, the ones that are in vehicle transportation, which increases the cost pressure of express outlets. So enterprises shift their focus to B-end customers, which have higher

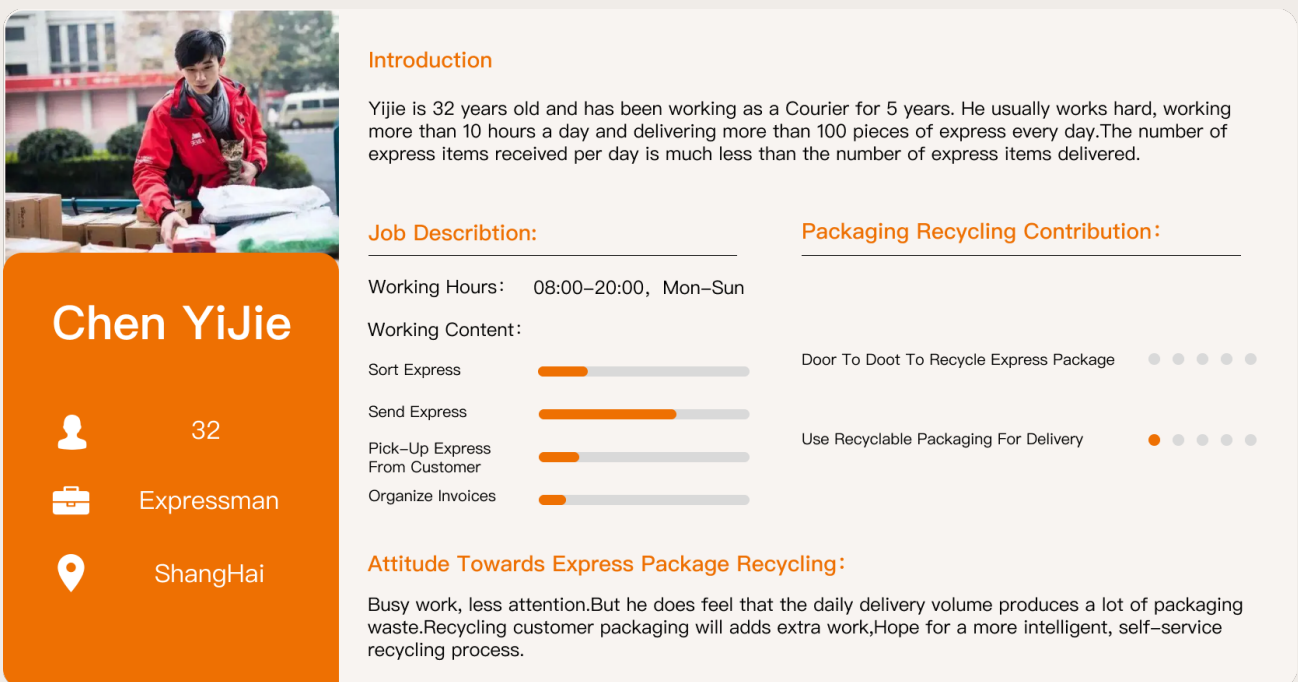


Figure 4-12. Persona of Courier  
 Drawn by the author

recovery efficiency, while there are relatively few C-end customers.

### **5. The direct reuse rate of packaging recycled at the express point is the highest**

At present, express packaging is handled by users themselves after use. When the users pick up the items at the express point, some users will unpick the express on the spot, leaving the express box and placing it in the recycling box. According to the boss of Express Station, the ones that are in good condition will be kept for mailing, while the ones that are badly damaged will be collected and sold to recycling sites, or piled up at the door.

### **6. The packaging of the returned Courier is mainly secondary**

According to the Courier, usually, there are a lot of return orders need their door-to-door pick-up, about 50 or 60 a day. Double 11 is a big e-commerce promotion period of return and exchange business volume is larger, many users purchased online are not satisfied with the things and will choose to return or exchange. As for express packaging, those that can be used directly will be used directly and will not be repackaged.

### **7. Couriers' Thoughts on packaging recycling**

Most couriers believe that providing a packaging recycling service will increase the workload to a large extent and affect the progress of couriers' work. For them, in addition to door-to-door delivery, the current delivery service is mostly stored in the community's express cabinets for temporary storage, more convenient and efficient, saving energy. So hopefully the recycling service will also be more convenient and faster.

#### **4.3.3.2 Express station stuff**

Express station is the community express parcel collection/ mailing site, that mainly provides community express delivery, and collection business. There are three Courier stations

near Dajingeng Community. We selected three staff members of the three Courier stations in the community to conduct user interviews, to understand the roles and attitudes of Courier stations and their staff in express delivery and recovery links, Our questions include:

- 1.How many packages do users pick up each day at the delivery point?
- 2.How much package can be recycled at the delivery point?
- 3.What is the recycling method? What happens after recycling?
- 4.Are there incentives or relevant tools to promote express packaging recycling?
- 5.Have you ever used a recyclable box for delivery?
6. What is the standard for the recycled packaging to be used directly for a second time? How to handle packaging that can't be reused?
7. Ideas for a more cost-effective or intelligent recycling system?

Through interviews with this group, it can be concluded that express delivery sites have played a greater role in packaging recycling, or more opportunities and potential will be explored. The main conclusions are summarized as follows:

#### **1. The number of express deliveries is increasing at present**

After the epidemic lockdown in the first half of 2022, residents in Shanghai saw double consumption and the number of express parcels also surged, recovering or even exceeding the pre-epidemic average level. According to the staff of the express delivery station near DajinGeng community, the express station is also busy with delivery service, with an average daily delivery volume of about 1,000 pieces. Adding the express delivery from other communities, the daily throughput can reach 3,000 pieces.

#### **2. High sorting pressure, easy to cause violent sorting damage**

Due to the explosive growth of the express



delivery business in recent years, the sorting pressure has also been amplified, and violent sorting is common. This is not only a problem for enterprises and their practitioners, but also a problem for the entire industrial chain, which requires comprehensive treatment. Therefore, both e-commerce sellers and express delivery companies hope to reduce the possibility of damage caused by violent sorting through good packaging.

### 3.The number of packages picked up at delivery points has increased

According to the staff at the express delivery point, one-third of the express items are picked up by residents, and the rest are delivered to their homes or stored in the community express cabinets. Express Point does not provide door-to-door delivery service, on the one hand, is the pressure of operation, the lack of staff leads to lower delivery service standards or late delivery, on the other hand is the enterprise to save things and other reasons. Especially since the epidemic, couriers have chosen "no contact" delivery to reduce risks and avoid too much contact with residents.

### 4. Express stations can recover part of the package but the recovery rate is not more than 50%

Disease control experts warned that express delivery may be infected with the coronavirus during the delivery process, so they advised not to bring the packaging indoors. In addition, the station has set up packaging recycling boxes and provides scissors and other tools to help users

### 5. Express stations can recover part of the package but the recovery rate is not more than 50%

Disease control experts warned that express delivery may be infected with the coronavirus during the delivery process, so they advised not to bring the packaging indoors. In addition, the station has set up packaging recycling boxes and provides scissors and other tools to help users unpack express packages. Residents are also willing to help with environmental protection. According to the staff, there are more than 300 door-to-door deliveries every day, and more than 80 cartons can be recycled. Some residents take home better packaging so they don't need to reuse it. The recycling rate will increase when the station holds the activity of carton egg delivery.

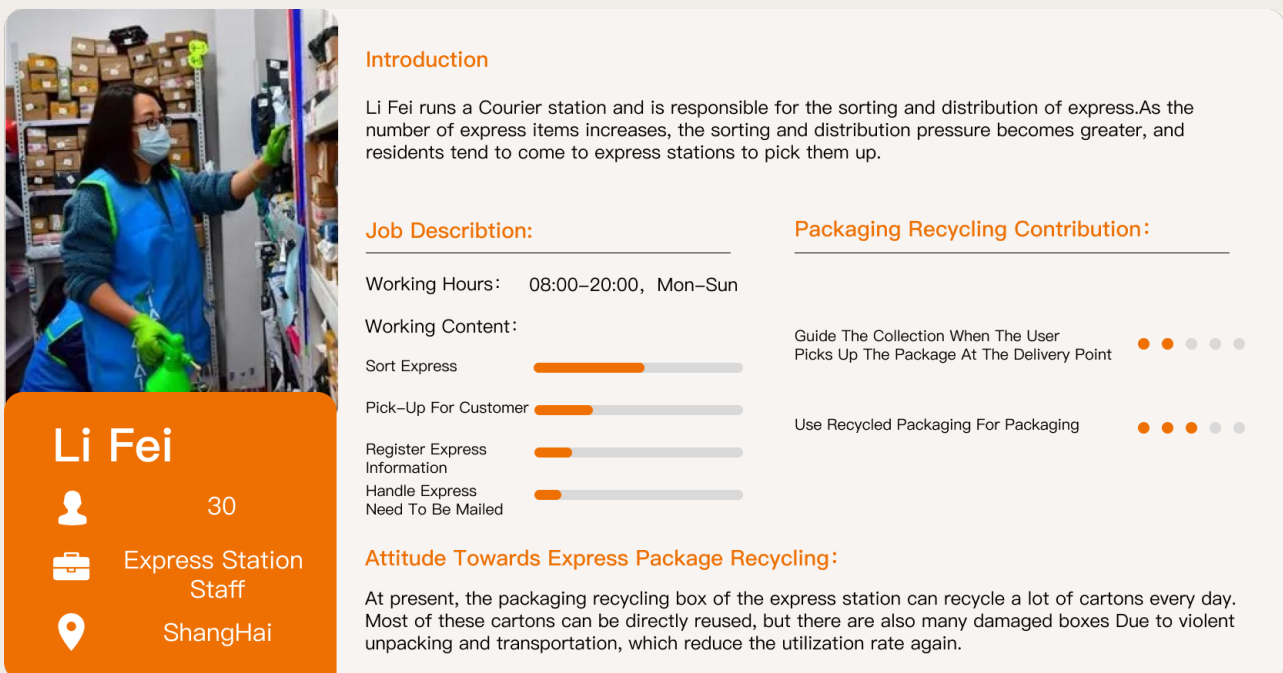


Figure 4-13. Persona of Express station staff  
 Drawn by the author

#### **6. Recycled packaging has a higher reuse rate**

Neighborhood Courier station director told us that they will be classified depending on the degree of intact delivery box processing, the packing box for secondary use of less damage degree. Many citizens buy things online, if they are not satisfied they will choose to return or exchange. The recycled cartons can be used free of charge when customers return goods. The packaging boxes that have been damaged are sorted into the garbage, and some can be used as filler.

#### **7. The recovery rate of packing filler is low**

Packages such as express woven bags, plastic packaging and bubble column are difficult to recycle compared with express cartons. 99% of plastic packaging is not effectively used because of the low recycling value. The express station is also mainly focused on the recycling of express packaging cartons. There is no special recycling channel for the foam boxes and plastic fillers.

#### **8. Recyclable boxes cost money to store and transport**

After some of the recycling boxes come to the receiving place, they have fewer opportunities to go back, which leads to the backlog of recycling boxes, and they have to be shipped back empty, resulting in additional costs. In addition, after recycling boxes are recovered, they will also occupy limited storage space in the express station. Although only from the perspective of manufacturing cost, with the increase of the number of cycles, the cost of circular packaging will be lower than one-time packaging, but if the reverse logistics cost is added, the overall cost of circular packaging is still high.

#### **4.3.3.3 Online shopper**

We surveyed the users who often shop online in DajinGeng Community to confirm the types of express goods they buy, their views on the packaging, and the way of handling express

packaging. At the same time, the user's cognition and acceptance of recyclable packaging are investigated. Users include people of different ages. Through the analysis of consumer behavior on Nov 11, it can be seen that the young group is the main consumer. The main interviewees are the post-90s, post-80s, post-00s, and other major online shoppers. Our questions include:

1. What items do you mainly buy online? How many deliveries do you receive each month?
2. What is your preference for express packaging? Do you accept simple packing?
3. What problems do you think exist in the current express packaging?
4. How to deal with the packaging after receiving the express?
5. Are you aware of the pollution caused by express packaging?
6. Are you aware of the pollution caused by express packaging?
7. Are you willing to leave the package at the pick-up place? Such as express cabinets, express points, etc
8. Ideas for a more cost-effective or intelligent recycling system? Through interviews with this group, the main conclusions are as follows:

Through interviews with this group, the main conclusions are as follows:

#### **1. Consumers' preference for online shopping is mainly daily necessities/washing and care products/clothing**

About 30 people were interviewed, ranging in age from 18 to 60. Fifty percent said they received more than 10 deliveries per month. The post-1995 generation is the main force of online shopping, and the top three purchases are clothing, cosmetics and skin care, shoes, and other fast-moving consumer goods. People under 35 years old are more diversified in their shopping, focusing on not only dressing up but also health care. They mainly buy clothes, shoes and hats, daily necessities,

washing care and skin care, packaged food, digital products.

**2. Environmental considerations are rarely taken into account when shopping online**

For most users, when shopping, they don't think much about the place of shipment, the main factor is the length of time to receive the item. For example, users in Shanghai are more inclined to deliver goods from Jiangsu and Zhejiang regions, and the receiving time is short. A few users consider that shipping too far will produce more carbon emissions, but most users do not consider environmental protection as a factor.

**3. Consumers' preference for package delivery is first safety and second beauty**

For merchants, the lower the packaging material cost, the better. But for users, the safety of packaging is always a mandatory requirement. Users do not exclude the use of simple packaging, but the premise is to ensure the safety of the express. Therefore, the first element of express packaging is to ensure that the package can be

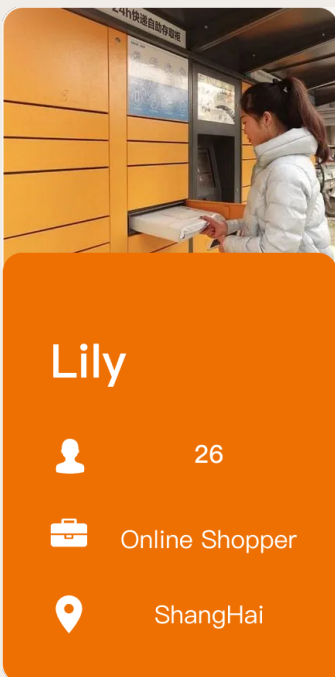
packaging is to ensure that the package can be safely and intact to the recipient.

**4. Consumers have some awareness of environmental protection but less action**

Due to the imperfect recycling system and weak consumer awareness of environmental protection, many users still choose to throw away express packaging, which is also the reason why the waste of express packaging remains high. Online shoppers with a sense of environmental protection are aware of the waste of resources and environmental damage caused by packaging, but there seems to be little that can be done to change the status quo.

**5. The recovery mechanism is not perfect**

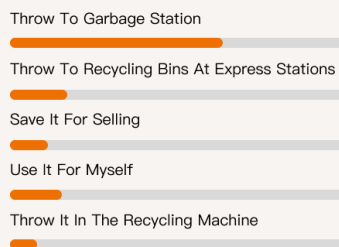
Respondents said they were less motivated to recycle packaging because it was cumbersome and less profitable. For the users of DajinGeng Community, the main ways to deal with express packaging are to throw it into the recycling box at the express point, to throw it into the recyclable box at the community garbage station, to save



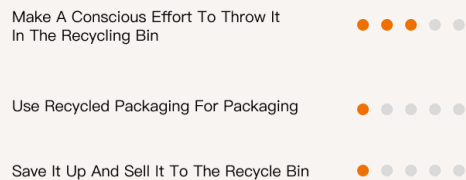
**Introduction**

Lily is an online shopper, She likes to shop online and says that there are few opportunities to reuse the boxes after delivery, most of which go to recycling bins at garbage stations. For express packaging, she believes that the package should be as simple as possible while the items are safe.

**Package Treatment Methods:**



**Packaging Recycling Contribution:**



**Attitude Towards Express Package Recycling:**

I am aware of the waste of resources and environmental damage caused by packaging in the express industry, but it does not seem to change much. The biggest effort is to throw the packaging into the recycling bin.

Figure 4-14. Persona of Online Shopper  
 Drawn by the author

and sell the waste products or to keep the express packaging for the next use.

According to the survey, teenagers are more willing to unpack express boxes (bags) and throw them at express delivery points or keep them for a second use, while middle-aged and elderly people are more willing to collect express packages and then send them to express packaging recycling points in exchange for cash. The interviewees hope that recycling express packaging can be exchanged for more kinds of rewards.

#### 4.3.3.4 E-commerce merchant

At present, with the development of e-commerce, there are more and more people engaged in e-commerce business. Mainstream e-commerce platforms in China include Taobao, Tmall, Jingdong and other platforms. According to our interviews with online shoppers, we found that the e-commerce platform Taobao is the most frequently used platform. Taobao is a major online retailer in the Asia-Pacific region. Founded by Alibaba Group in May 2003, it has nearly 500 million registered users and more than 60 million regular visitors every day. The total turnover of 2021 Taobao "Double 11 Promotion Festival" reached 540.3 billion yuan, attracting a large number of users to participate. Therefore, we interviewed several Taobao shop owners online, covering different fields such as clothing, electronic products and household goods. The interview questions included:

1. What are the sales trends in recent years?
2. Do you use the packaging provided by the Courier company, or do you purchase the packaging yourself?
3. What kind of packaging material do you mainly choose when sending the express? What are the considerations?
4. Will environmental considerations be taken into account in the selection of packaging? Will there be excessive packaging?

5. Will you choose used packaging and recycle it again?
6. Do you want the packaging to have a customized element that conveys the brand image?
7. What is the recovery rate and subsequent treatment of plastic express packaging or plastic fillings?
8. Ideas for a more cost-effective or intelligent recycling system?

The main conclusions we get from interview are:

#### 1. Safety is the most important factor in the selection of express packaging, sometimes there can lead to excessive packaging

For e-commerce merchants, the main purpose of express packages is to enable goods to reach users in good condition, so safety is the priority. If the goods are damaged, it will lead to a certain return rate, which will bring certain economic losses. Therefore, to ensure the safe delivery of express goods, sometimes there is excessive packaging, and a lot of tape and plastic foam filler is used. Especially at present, violent transportation phenomenon exists in the express industry. This phenomenon is more severe in the logistics company with low charges, so most businesses will use more packing and filling materials to ensure the safe delivery of express items.

#### 2. Packaging materials are generally not environmentally friendly, and the price is the main constraint

For the choice of express packaging, the most common types on the market at present are cartons, plastic bags, and plastic stuffing, among which plastic bags use the most. Plastic bags used for express delivery are often composed of complex ingredients, mainly reprocessed from chemical materials and household waste. Such materials have a low recycling rate and are not easy to degrade, which brings a heavy burden to the environment. The price of environmentally friendly plastic bags such as degradable plastics



is more than three times that of ordinary plastics. Due to the high price, many businesses tend to choose ordinary packaging materials with traditional technology when choosing.

**3.E-commerce platforms with self-built warehouses will take more actions related to green express delivery**

At present, the express delivery system of e-commerce can be divided into self-run logistics and third-party logistics. For example, Tmall supermarket (self-run store of Taobao) and Jingdong supermarket (self-run e-commerce of Jingdong) all have their own warehousing, packaging, and logistics systems. Take Vipshop as an example. Its warehouse monitors the whole process of commodity warehousing, packaging, Small and medium-sized businesses are more likely to choose cheap packaging materials

E-commerce merchants' choice of express package is related to many factors, such as commodity price, business size, commodity type and so on. To save costs, most small and medium-sized goods merchants do not use custom packaging, and

they choose a variety of packaging materials. In general, the cheaper the goods are, the cheaper the packaging materials are, and the easier it is to use recycled packaging. Big brands use more customized packaging, from packaging design to material selection, careful consideration, to convey the brand image. They also use less directly recycled packaging.

**4.E-commerce platforms have limited exploration of circular packaging and green packaging**

The promotion and application of circular express packaging is considered to be one of the most worthy directions of e-commerce express packaging greening. However, recycling of terminal recycling boxes has always been a difficulty. Jingdong and Suning cooperate with circular packaging suppliers, explore C-end recycling mode, and realize the recycling of circular express boxes through face-to-face signing, delivery area management, or cooperation with intelligent express cabinets and other enterprises. However, now the number of terminal circulation boxes serving consumers is very limited.

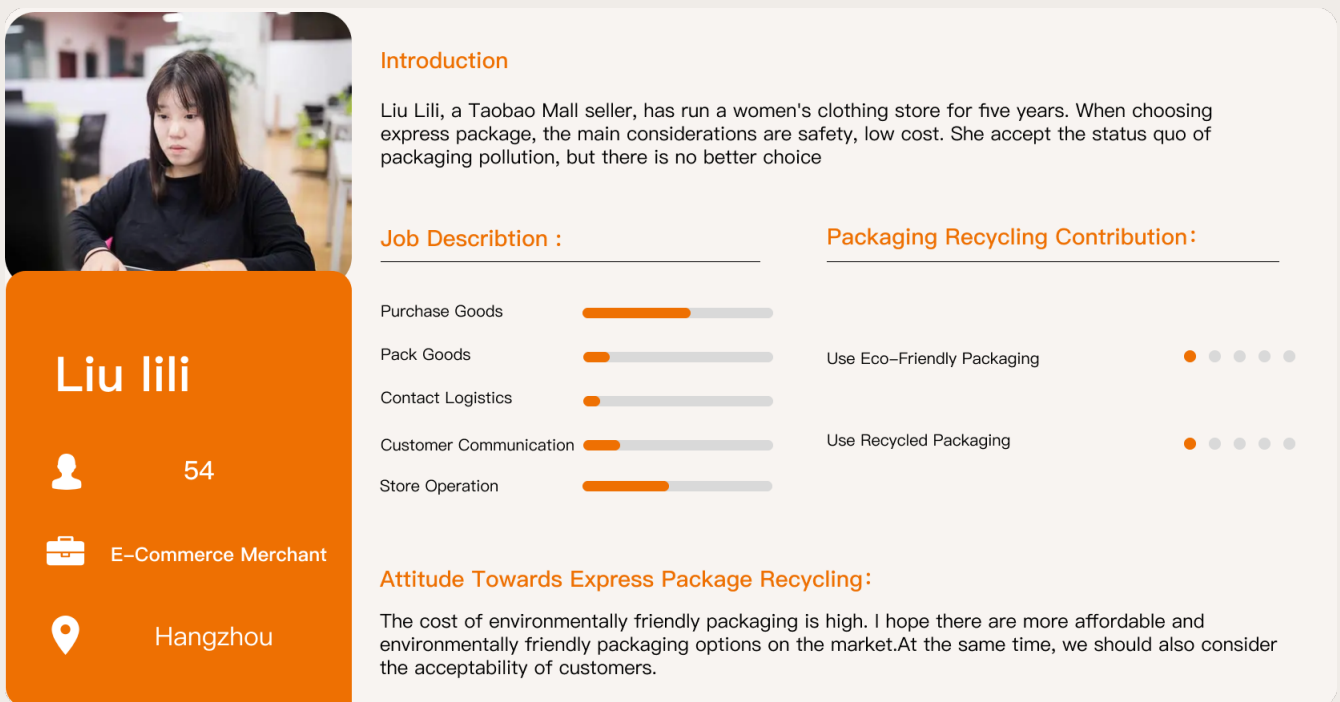


Figure 4-15. Persona of E-Commerce Merchant  
 Drawn by the author

#### 4.3.3.5 Community garbage station staff

Dajingeng Community has a total of 68-floor groups, home to more than 1,500 households, which produce a large amount of household waste every day. At present, there are 8 garbage recycling points in the community. The garbage station mainly divides the garbage into wet garbage, recyclable garbage, and non-recyclable garbage. We spoke to a couple of staff members who are currently in charge of the site: Huang Jinguo, 62, a Shanghai native who works in the Dajin community as a garbage collector and classifier. After the waste is handled in the wing room, it will be taken away by a third-party sanitation company. If the classification is not up to standard, it cannot be taken away. Qiu Xia 48, comes from Anhui province, and now is in charge of the district dump, she said: "my job is to plot of spam received tips, and then to the secondary sorting rubbish again, this is troublesome. if citizens can classify very accurately, we can greatly reduce the workload". Our questions include:

1. Is there any special recycling channel for express cartons?
2. The number or weight of express cartons that can be recycled every day?
3. Is there any difference between the handling of the intact express box and the damaged one?
4. Where do the cartons go after they are recycled?
5. What is the recovery rate and subsequent treatment of plastic express packaging or plastic fillings?
6. Ideas for a more cost-effective or intelligent recycling system?

Through interviews with this group, the main conclusions are as follows:

##### 1. Most cartons are sorted and recycled at garbage stations

We learned that most of the packaging boxes thrown away by the DajinGeng community are

picked up by scrap collectors and sold as scrap. Cartons are a few cents a catty, and foam cases are more expensive. The staff at the garbage will pick out the cardboard boxes that can be recycled as they sort through the garbage. "In many cases, we can sell hundreds of scrap pieces a month." The boxes are neatly stacked and sold to the scrap yard. The recycling of cartons is mainly charged by weight, and the whole cartons will also be disassembled for packing and shipping. Therefore, complete cartons are recycled into the reproduction process after only one use.

##### 2. The recycling price of the carton is much lower than the purchase price

According to the owner of a waste collection station near the community, a considerable number of recycled cartons are of good quality. They are still good after being used once and no problem after being used once or twice. It's a bit of a waste to sell it to the scrap yard, so it can only be pulped and reproduced like scrap cardboard. Take 25cm cube carton as an example, the market price is 1.4 yuan -2 yuan/piece, if it is customized, the price is often more expensive. This size is also often used in online shopping. If they are recycled directly, the price of this type of carton at the waste collection station is only about one tenth of the selling price.

##### 3. The recycling rate of express plastic packaging materials is very low

Plastic recycling is often "de-recycling". Plastic recycling faces both economic and technical challenges. Different types of plastic require different processing technology, In practice, what is recycled is usually a low-quality mixture of various plastics that can only be used to produce low-value items, which are of worse quality and often cannot be recycled. At present, there is no recycling classification for express packaging plastic or filling plastic in the community garbage recycling station, which is mostly mixed with household garbage and eventually incinerated.

**4. Intact cartons and damaged cartons are recycled without distinction**

The waste paper is thrown into the garbage station, where staff will sort it out, including taking apart, folding and packaging the cartons before selling them to the recycling station. Sales are

mainly on a weight basis, so complete cartons are recycled after only one use. In the process of carton dismantling, each time the tape and sheet paper is split, it will bring a certain amount of work to the recycling process and produce more non-recyclable garbage.

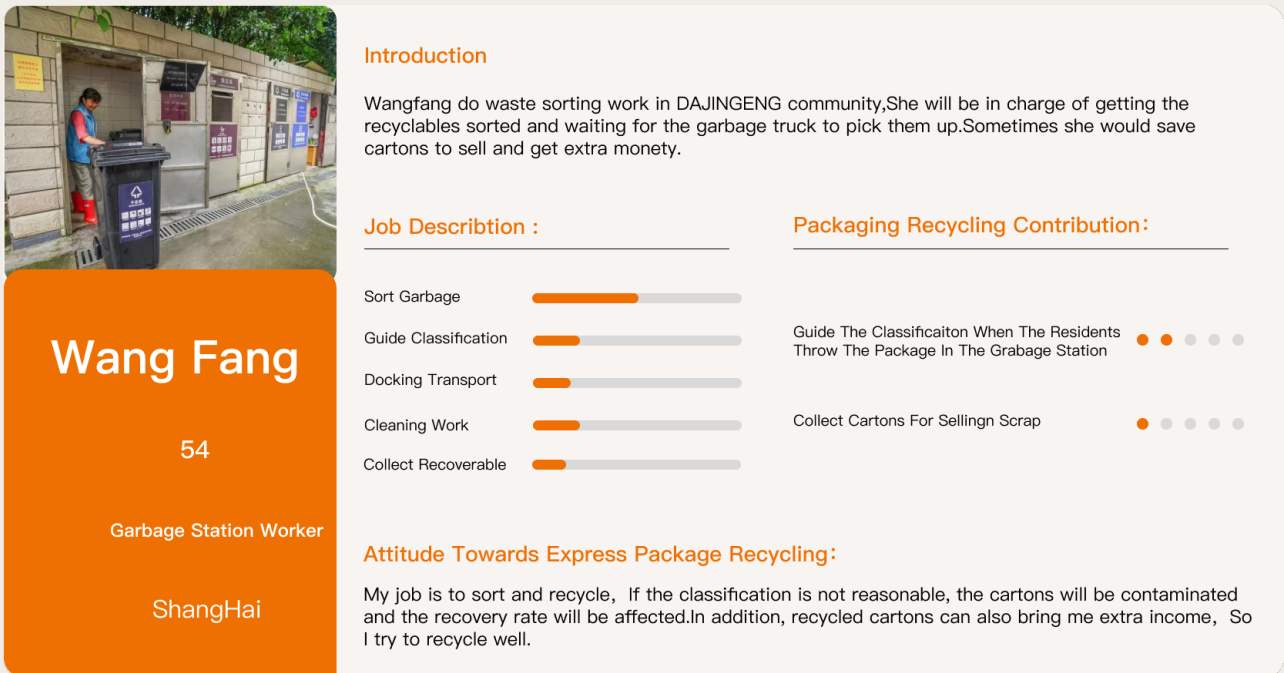


Figure 4-16. Persona of Garbage station worker  
Drawn by the author

**4.3.3.6 User interview summary**

After summarizing the persona of each type of stakeholders,we find that:

**1.Users support more environmentally friendly packaging, but do not want to add additional costs**

The current packaging use and disposal method produces a lot of pollution but is convenient enough to use.The additional cost includes price cost and labor cost, and users hope that the new packaging is environmentally friendly and convenient, so that everyone is willing to use the new packaging.

**2.Different users have different consideration points, and the interests of all parties need to be taken into account**

For express businesses, the new packaging needs to be low-cost but strong to protect the goods, for couriers do not want to recycle express packaging to increase the number of additional users, for users receiving express delivery, express packaging needs a convenient recycling method. The relevant demands of different stakeholders need to be considered.

05

# Problem analysis

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# 5.1 Life Cycle of Express Packaging

Based on the field research data and literature reading and sorting, this paper studies and analyzes the whole life cycle of express packaging, and finally draws the current situation analysis and life cycle diagram of express packaging.

flow, which shows the life cycle of express packaging, from the processing, production, transportation and distribution of raw materials, use, recycling and final disposal, through the analysis of the process, Find out the factors that affect the unsustainability of express package in each link, and make a more detailed analysis.

It can be found that the whole life cycle of express packaging mainly involves: the production, transportation, packaging into express, transporting to customers with express, being disassembled, discarded, classified collection, final treatment and other key steps.

We will investigate each step in detail, understand the operation details of express packaging in each different stage, and draw a system diagram of express packaging material

## EXPRESS PACKAGE LIFE CYCLE

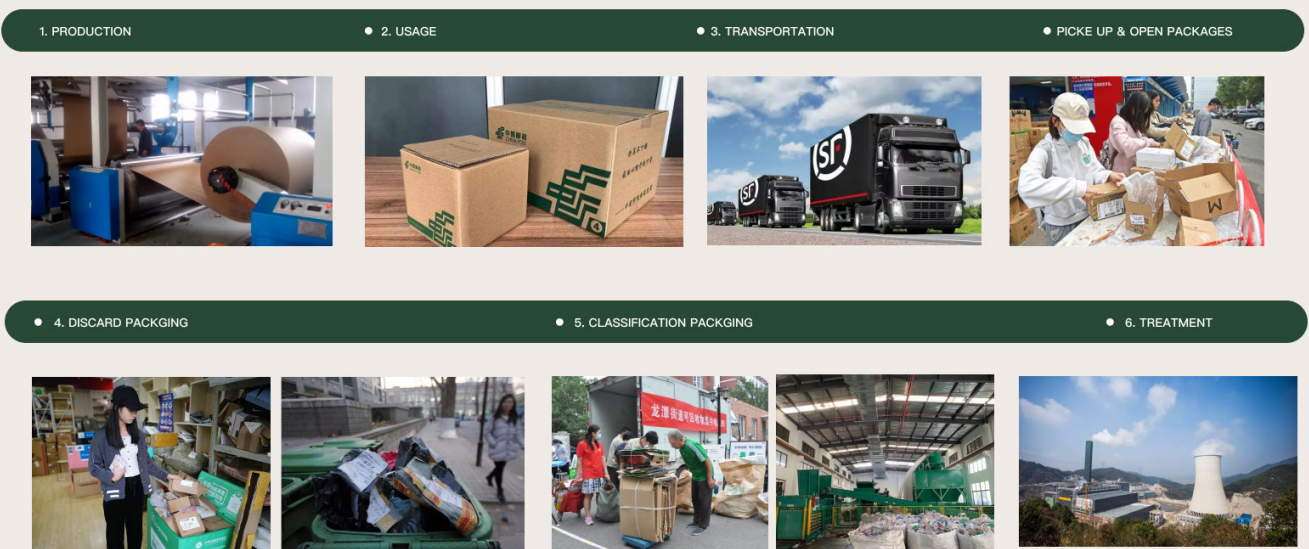


Figure 5-1. Life cycle of express packaging  
 Drawn by the author

# Life cycle diagram of express packaging

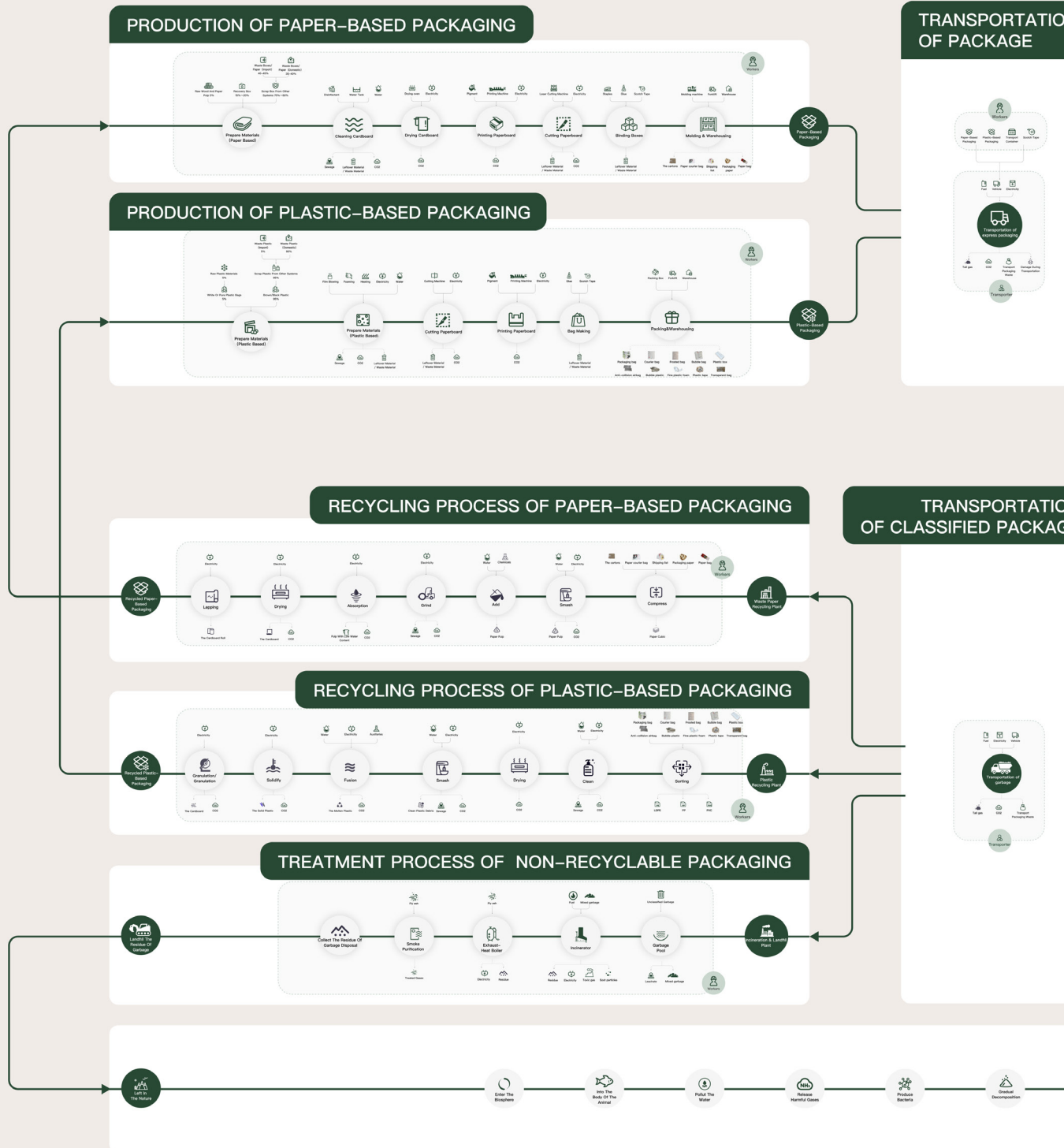


Figure 5-2. Current situation analysis and life cycle diagram of express packaging  
 Drawn by the author



## 5.2 Material Flow Of Express Packaging

### 5.2.1 Material flow of paper-based packaging

Paper-based packaging include corrugated paper, envelopes, and order paper. In view of the dominant position of corrugated boxes and plastic bags in China's express packaging materials, their logistics should be further studied. Figure 3 shows that recycled materials together account for about 95% of the corrugated boxes used by Chinese express. Although the utilization rate of recycled materials is high, the recovery rate of corrugated boxes used for express delivery is not high.

According to our survey, about 5-15% of China's express waste corrugated boxes are mixed into the domestic waste stream for incineration (16%), landfill (32%) or direct dumping (3%) (National Bureau of statistics, China (National Bureau of statistics, 2018) . most of the rest are mainly recycled by informal recyclers. Please note that 40-45% of the materials used in the production of express corrugated boxes are waste paper

imported from other countries, mainly developed countries (sun, 2015). The Chinese government's recent ban on specific foreign waste is aimed at unclassified waste paper (Walker, 2018) Therefore, on the one hand, the supply of waste paper for the production of corrugated boxes in China will be seriously disturbed in the short term. However, in the long run, improving the recycling rate of domestic waste boxes of express delivery can make up for the blank left by the foreign garbage ban. On the other hand, it is necessary to further evaluate whether all packaging wastes are recycled enough to meet the demand? More importantly, China Collection and sorting capabilities are already available, and efficient recovery can be achieved in this way? If not, additional investment should be considered.

### 5.2.2 Material flow of plastic-based packaging

Plastic waste can accumulate in landfill or

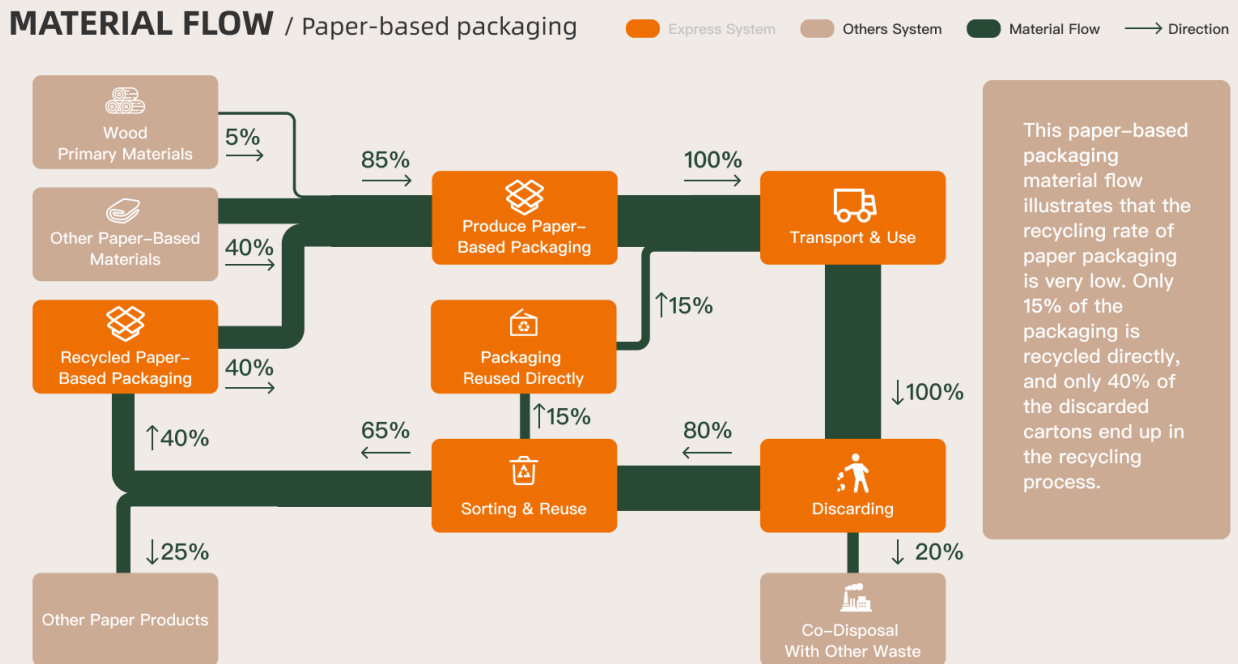


Figure 5-3. Material flow analysis diagram of paper-based materials  
 Drawn by the author



natural environment without decomposition, and improper treatment will cause serious environmental impact (Geyer et al., 2017; Xu et al., 2020). Plastic flow includes plastic bags, woven bags, foam plastic boxes, adhesive tape, adhesives, void filling materials (such as polystyrene foam) and bubble cap filler.

For example, express wrapping paper and paperboard waste does contain polyvinyl chloride (PVC), mainly from tape. Unlike corrugated boxes, almost all plastic wastes in China's express industry are mixed with other urban domestic wastes for landfill (63%) and incineration (30%) (China National Bureau of Statistics (NBS, 2018) , about 7% of which are directly dumped. The lack of recycling activities of packaging plastics is mainly due to the high separation and transportation costs and the relatively low value of recycled plastics.

Similar to corrugated boxes, plastic bags for express delivery are mainly made of recycled plastics (95%), of which 95% are from China. Although China recently banned foreign garbage, including waste plastics, the supply of recycled waste plastics used in the production of express

plastic bags will not be significantly affected. Duan et al. Estimated the packaging waste of China's express industry for the first time. The paper-based and plastic based packaging materials used in express delivery mainly come from recycled materials. However, the recycling of EOL packaging materials can be improved. At present, less than 40% of paper-based packaging materials are recycled, and plastic based materials are hardly recycled. In addition, plastic packaging materials are mainly produced from recycled agricultural films and contain chemical residues from pesticide application, which may have a significant impact on the health of employees and consumers in the life cycle of express delivery. (Duan et al. 2019)

Based on the statistical data obtained from literature research, the material flow of two types of express packaging materials: paper-based and plastic based Express materials is drawn on the basis of life cycle diagram. By quantifying the processing methods of packaging materials in each process on the basis of life cycle, it is convenient to analyze the problems existing in the current express packaging system more intuitively.

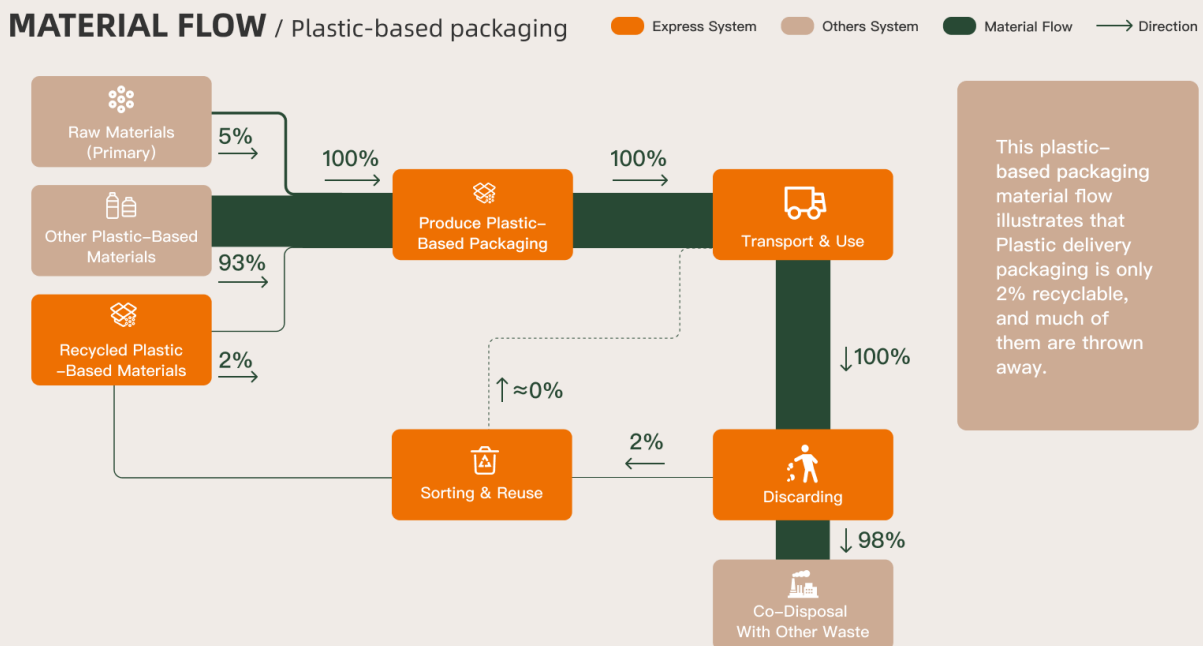


Figure 5-4. Material flow analysis diagram of plastic-based materials  
 Drawn by the author

## 5.3 Problems Identification

After the above process analysis of the life cycle of express packaging, many problems can be found. We will sort out the problems in each stage, and summarize the problems that can be improved from the different stages of express packaging production, use, transportation, classification, discarding, and recycling, which will serve as the subsequent design opportunity points.

### 5.3.1 Problems in the production process of express package

According to the material flow analysis diagram of the joint surface, it can be found that there are two major problems in the production process of express packaging:

- The recycling rate of plastic and other materials in the current landfill system is very low, especially the recycling rate of plastic and paper-based materials is almost 40%.
- Even if we choose recycled materials to produce express packaging, these production processes themselves also need to consume a lot of water and electricity resources and produce pollutants such as carbon dioxide and sewage. Because the production and recycling plants of express packaging are built in the suburbs of the city and are the suburbs of some second and third-tier cities, most people who use packaging live in the city, resulting in multiple transportation for both production and recycling of express packaging. In this process, there will be a lot of resource consumption and air pollution.

### 5.3.2 Problems in the usage process of express package

Merchants of different sizes have different use scenarios for express packaging, and the corresponding needs will be different, which are

mainly divided into the following three categories:

#### 1. large E-commerce platform

Such platforms are characterized by large daily shipments and need to consume a lot of express packaging materials. Many goods are self-delivered. To improve efficiency, the platform often adopts an automatic packaging assembly line. Such a packaging form is bound to be unable to finely distinguish the packaging size required by different orders, which is easy to cause excessive packaging. Moreover, enterprises pay more attention to brand building and often do not care about the overused packaging cost and the subsequent recycling process, resulting in a huge waste of packaging materials.

#### 2. Medium-size online store

The scale of such platforms is much smaller than that of e-commerce platforms, but there is also a need to emphasize the tone and uniqueness of their independent brands, and they often have special warehouses and employees to complete the packaging and distribution of express delivery. For such businesses, the cost of packaging materials also needs to be considered. The advantage is that it can give consideration to express delivery with different volumes, give appropriate packaging size, and improve packaging utilization efficiency. The disadvantage is, if environmental restrictions are not strict, platforms are likely to choose non-environmental packaging materials to reduce costs.

#### 3. Individual e-commerce shops

Most of these businesses are self-employed and sell some goods on a small scale. Most of them do not have the demand for customized express packaging and hope to reduce the packaging cost. Don't want to spend too much to buy special packaging. Most of them try to use their recycled packaging.

## PROBLEM-FINDING

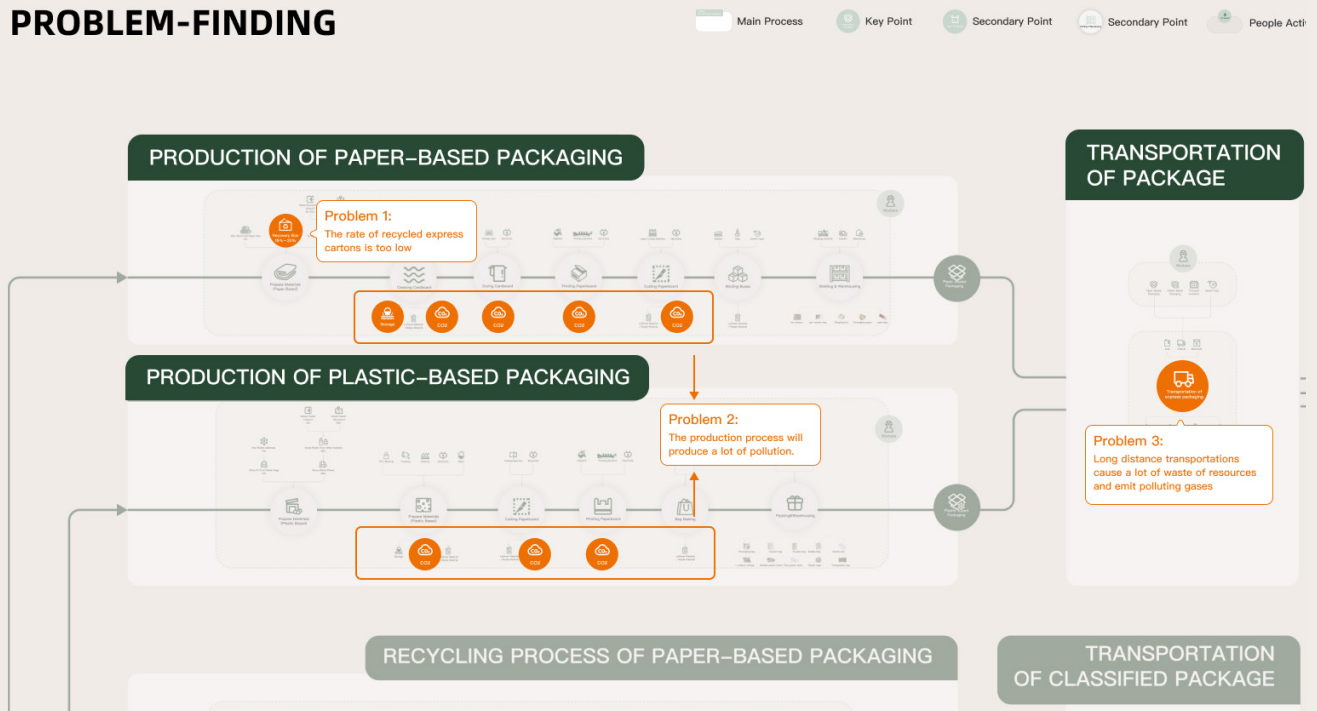


Figure 5-5. Problem diagram of the production process of express package  
 Drawn by the author

### 5.3.3 Problems in the transportation process of express package

The transportation process can also be divided into long-distance transportation, intercity transportation, and the last kilometer transportation. Different types have different properties.

In long-distance transportation and intercity transportation, we can find these problems:

- Packages to the same address are not packed in one batch, but scattered in multiple batches of transportation, resulting in a waste of transportation resources
- Many less urgent packages are also transported at high speed, resulting in a waste of transport capacity

- The violent transportation process caused serious damage to the express packaging and reduced the recovery rate of the express packaging

As for the last kilometer transportation there are many ways to deliver express, For example, put it at the express station, storage cabinet, deposit station, then wait for the consumers to take it away by themselves. Of course, if they want, can also let the courier deliver it directly to the home.

Through field research, it is found that there is a lack of guidance on packaging recycling and promotion mechanisms, whether it is express stations, express cabinets, or door-to-door delivery.

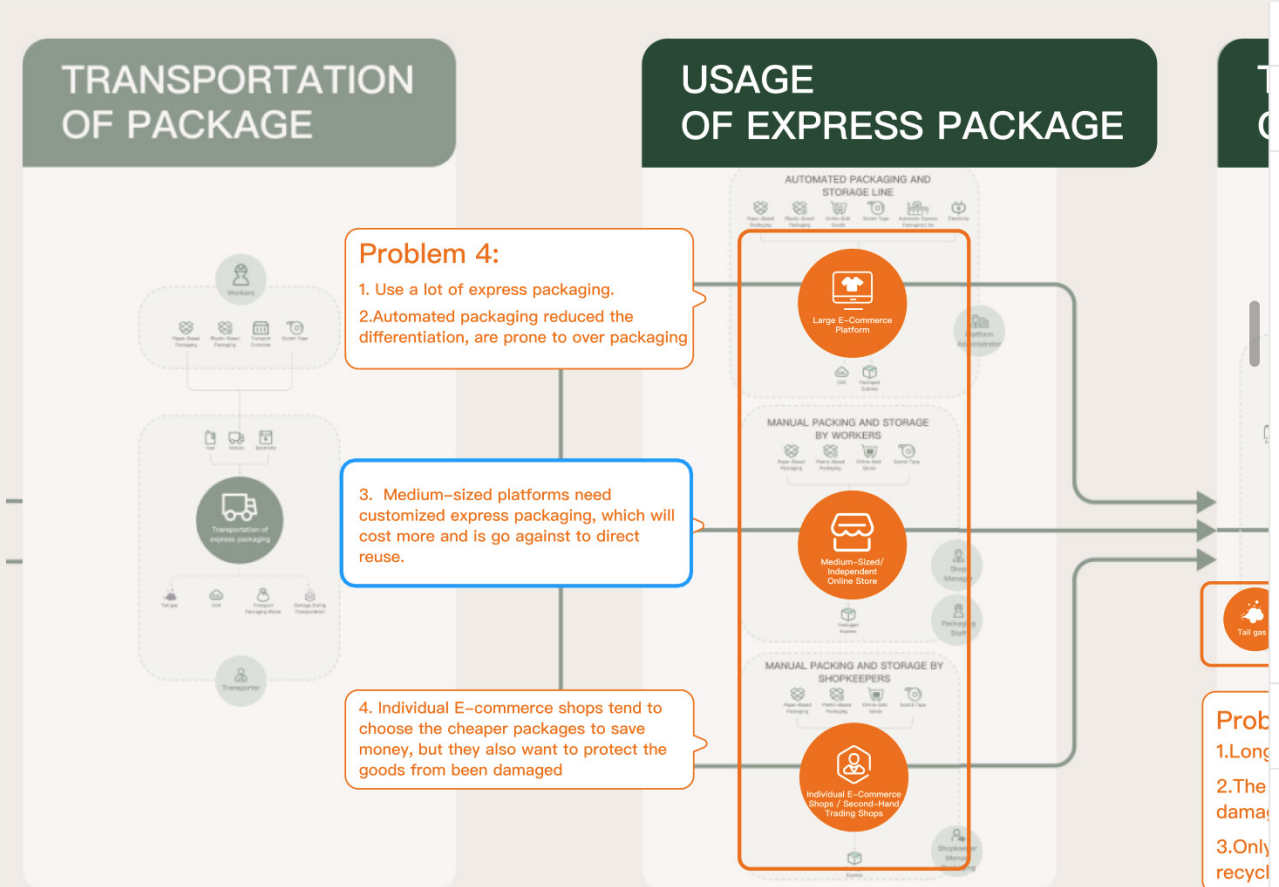


Figure 5-6. Problem diagram of the usage process of express package  
 Drawn by the author

### 5.3.4 Problems in the picking up and opening process of the express package

At the consumer level, there are many problems, such as poor consumption habits, violent demolition of express delivery, weak awareness of express packaging recycling, lack of recycling ways and so on, The specific performance is as follows:

- The rapid development of e-commerce has greatly improved the convenience of shopping and , also customers are coerced by the concept of consumerism ,often buy some non necessities goods, resulting in a large waste of resources.
- It is urgent for consumers to dismantle the express, resulting in the damage of the package, which can not be reused and needs to be recycled.
- Customers are used to the worry free return and exchange policy of e-commerce platform, resulting in too many meaningless commodity returns and exchanges, resulting in a waste of express packaging and transportation capacity.
- Consumers lack recycling awareness and convenient recycling channels.



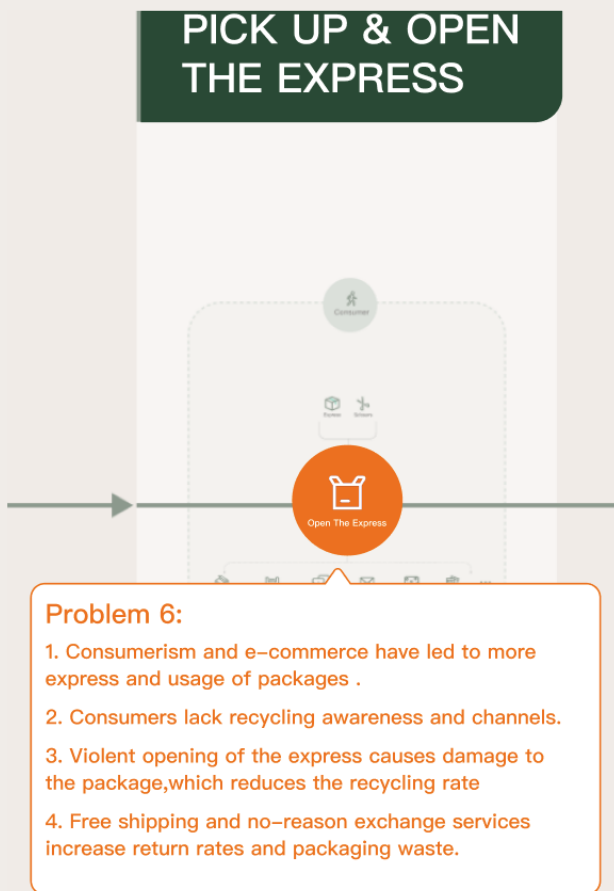


Figure 5-7. Problem diagram of the picking up & opening process of express package  
 Drawn by the author

### 5.3.5 Problems in the discarding process of the express package waste

After investigation and analysis, express packaging can be discarded in the following ways, and there are corresponding problems in each mode:

#### 5.3.5.1 Selling to garbage collector

Online shopping has increasingly become a consumption habit. After receiving express delivery, many consumers choose to hoard packaging, which can be reused on the one hand and recycled as waste on the other. However, on the one hand, the hoarded express packaging

waste occupies family space and is in urgent need of recyclable treatment. On the other hand, the recycling channel is not smooth. It can be summarized as:

#### 1. Traditional waste collection methods are declining and the new way has not yet fully risen.

For example, From 2020-2021 in the ShanDong province of renewable resources recovery industry development report, one of the problems existing in the waste paper recycling industry is: the recycling of life waste, industrial waste, and commercial paper depends mainly on the alleys of self-employed , disorderly competition of family-style small collection points cause operators thin margins, not form chaining, intensification, and industrialization.

#### 2. There is no convenient mainstream platform to provide recycling services in most areas.

At present, many companies are relying on Internet technology to create "Internet + waste paper recycling". The Internet mode solves the disadvantages of "small scale and unstable" recycling. Enterprises can directly establish contact with users, plan recycling paths and reduce logistics costs. However, under the Internet model, the platform that can provide door-to-door waste recycling covers a limited area, and the recycling amount for a single customer is small and not all customers have the demand, so the marginal cost of recycling will be high, which will make it difficult for enterprises to make profits.

"Internet +" waste recycling has made great progress in service quality, convenience, fairness, professionalism and other aspects, but it is still in its infancy and has not yet extensively touched all communities and users. Therefore, there is no convenient sales channel for users to sell waste products directly. The traditional way is declining while the new way has not yet fully risen.

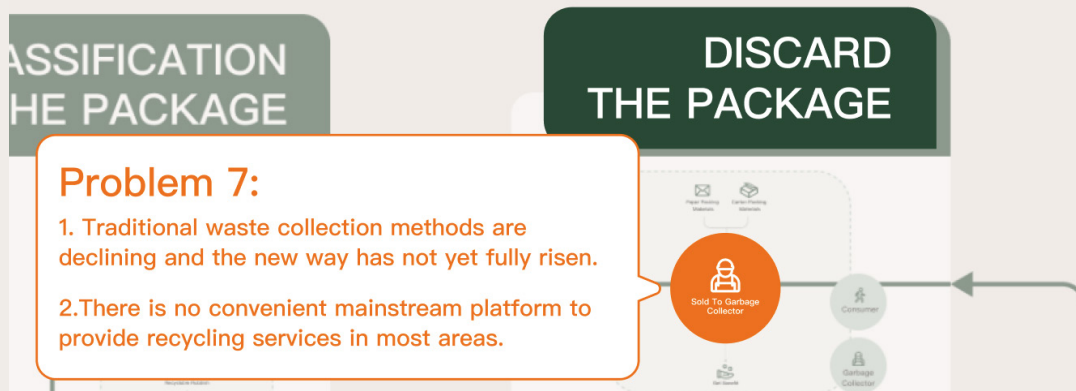


Figure 5-8. Problem diagram of selling the express package waste to garbage collectors process  
 Drawn by the author

### 5.3.5.2 Sorting and recycling of express packaging waste

At present, there are three main ways to classify and recycle express packaging: garbage classification and recycling in residential areas, classification and recycling of Community self-help garbage collection stations, and recycling in Express delivery stations.

#### 1. Sorting & recycling by Community sorting bin

The classification of recyclable garbage is rough. At present, garbage classification has been realized in most areas of Shanghai, and the most common one is to set up garbage bins in communities. However, there is no unified standard for the fine management of recyclable waste because of the different classification precision of different communities. Yu Haifeng, a staff member of the street office, said, "Shanghai has made a lot of achievements in household garbage classification, but the quality of garbage



Figure 5-9. Community sorting bins  
 Taken by the author

classification needs to be further improved and refined management needs to be strengthened. We do not have uniform rules on how to do the detailed classification, but local administrative departments will set it according to local conditions. For express packaging waste, it involves paper packaging boxes, plastic bags, plastic fillers, foam boxes and other recyclable waste. However, there is no more detailed division of recyclable garbage in express recycling boxes in residential areas, or the division is different in different areas, so there is no unified standard for processing. For express packaging, only enters the recyclable trash can, and the subsequent processing requires more labor costs, reduces the recovery rate, and increases the processing cost.

## 2. Sorting and recycling by Community self-help sorting recycling stations.

Community self-help waste recycling station has simple operation steps and can recycle the garbage in exchange for certain rewards, attracting the attention of residents. "The steps are very simple, you can log in by using mobile phone Numbers, scanning QR code, or facial

recognition. Weigh your trash before throwing it away and then choose categories on the screen, such as paper, plastic, metal, glass, and so on. then garbage automatically opens the door, simple, convenient, and quick." Wang Shujuan, deputy secretary of Nanhua Road Community, said, "The system will give points based on the nature and weight of the garbage. In the redemption machine, residents can exchange points for household items such as detergent, toothbrushes, toothpaste, and so on.

Self-service garbage collection stations can classify and recycle recyclable garbage, providing residents with an effective way to recycle garbage. But the current dilemmas are:

1. Insufficient coverage density;
  - At present, such garbage recycling stations do not cover all communities, many areas just implement pilot policies, according to the effect of subsequent use and then put, and if there is poor management or an unstable situation, the promotion and operation of the company also has a large unstable factor.



Figure 5-10. Community self-help sorting stations taken by the author



2. Low garbage carrying capacity and insufficient operation;

- For self-help recycling stations, regular cleaning is also required. If the processing frequency is insufficient, it is not enough to carry a large amount of garbage. The household garbage in the community is generally cleaned daily and treated in time. If the self-service recycling box cannot be recycled and cleaned regularly, the lack of operation and maintenance will reduce the enthusiasm of users. Over time, residents lose interest and end up paying little attention.

3. Poor incentive experience;

- In addition, the user's incentive experience is not friendly. For example, the user's participation enthusiasm is degraded due to the complicated process of using, the return of points, the exchange of specified items in vending machines, complicated exchange procedures and few categories.

### 3. Sorting and recycling by express stations

At present, the express delivery station is a very important contact point for express delivery, especially in the case of a large amount of express delivery and insufficient delivery manpower, the majority of people generally go to the express delivery station to get the express packages by the package code. In the current situation of the Novel Coronavirus pandemic, to prevent the spread of the virus through Courier delivery, residents generally remove the package delivery outside their homes to avoid taking it home. Delivery stations also provide residents with unpacking tools and recycling bins. In addition, to improve consumer participation enthusiasm, also develop express packaging recycling habits, during the 2021 Double 11 Festival Tmall and Cainiao express station adopts "recycling the express package, Reward eggs" activities, reward recycling activities



Figure 5-11. "recycling the express package, Reward eggs" activities poster.

with fresh eggs, has obtained the good effect. Despite the above measures, the overall recycling of express packaging is still low. Reasons include:

1. Many residents don't cultivate recycling awareness, recycling utilization rate is low.
  - Incentives for recycling at delivery sites are not always sustainable. Many residents have not developed enough environmental awareness and behavior habits. At Cainiao, the largest Courier station on the campus of Shanghai University, the recycling rate of express boxes is about 10%. Less than 20% of recycled cartons can be directly reused after simple treatment. There are a large number of express cartons, which can not enter the recycling channel because of violent unpacking and wet garbage



Meanwhile, more packaging materials for express delivery, such as anti-collision foam, bubble wrap and other plastic products, are not recycled.

2. The recycling mechanism is not perfect;
  - Incentives for recycling at delivery sites are not National ecological environment protection department certification center (CEC) vice minister Xue Jinghua, climate, points out that the express industry, more than 9 million tons of paper waste produced each year about 1.8 million tons of plastic waste, but the express overall recovery rate of less than 20%, packaging boxes recovery rate is much lower than 50%, FedEx packing filler, sealing tape, packing tape, and other plastic basic no recycling. At present, the recycling rate of express packaging is still at a relatively low level. China has not yet formed an effective "reverse logistics" recycling link, failed to get through the packaging recycling circulation link from "consumers" to "businesses", and lacks effective mobilization of the end consumers to participate in the express packaging recycling initiative.

### 5.3.5.3 Unclassified treatment of Express packaging waste

At present, express waste accounts for a small proportion of total household garbage, but the growth rate is alarming. In megacities in China, the increment of express packaging waste has accounted for 93% of the increment of domestic waste, and 85% to 90% in some large cities. In addition to the recyclable treatment of packaging, there is a considerable amount of express packaging waste in the recyclable treatment channel. For example, in areas where garbage classification has not been implemented (Shanghai is the only city in China that has implemented a strict garbage classification policy at present), such as randomly discarding garbage in roadside garbage cans, Problems brought by this behavior include:

#### 1. Nnclassified garbage is polluted and cannot be recycled again.

Express packaging mixed with other garbage can be contaminated by oil and water stains, and heavily contaminated cartons are usually not recycled. In these cases, packaging cannot enter



Figure 5-12. Problem diagram of the unclassified treatment process of express packaging waste  
 Drawn by the author



**2. Packaging integrity affects the direct reuse rates.**

For the packaging materials recovered by express delivery sites, consumers should be encouraged to throw the packaging materials into the recyclable boxes of express delivery sites. Secondly, the integrity of packaging materials largely determines whether they can be directly reused. Packaging is difficult to separate or unpack due to packaging design problems, violent unpacking and express delivery by consumers, and violent sorting in the process of transportation, all of which will damage the packaging to a certain extent and reduce the direct reuse rate.

**5.3.6 Problems in the classification process of express packaging waste**

After the package is discarded, it will enter the subsequent processing stage. It is mainly for garbage classification and non-classification processing.

**5.3.6.1 Express packaging garbage is sorted and treated**

According to the user's recyclable treatment of garbage, express packaging garbage into the

classification the classification process. At present, express packaging classification is facing several problems:

**1. The classification fineness of recyclable express packaging is insufficient.**

For recyclables, especially paper and plastics, there is insufficient classification. The community classification bins only define recyclable bins at present, and there is no further subdivision of the categories within recyclable bins.

**2. Back-end classifiers have heavy classification tasks and poor working environment .**

Recyclable garbage that is not more detailed, will be recycled by the garbage station manager or community garbage pickers and sold to waste collectors. These people have to sort the waste in the trash bin and break down the cardboard boxes into cardboard while recycling the plastic is very inefficient. Poor working environment, the recovery rate is affected by the environment and fluctuates.

**5.3.6.2 Express packaging garbage is unsorted**

Express packaging waste has not been sorted and treated, on the one hand, it is randomly discarded

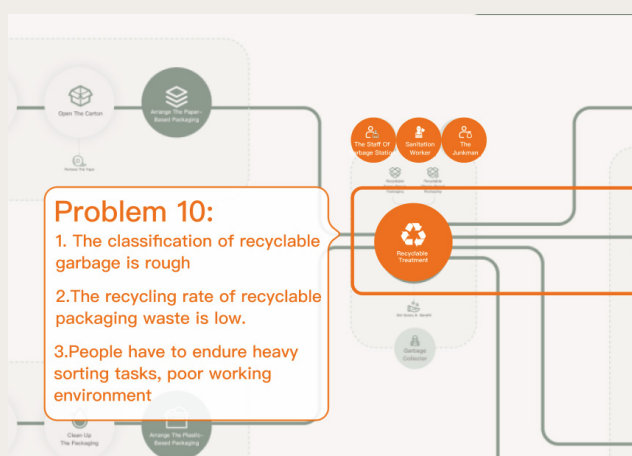


Figure 5-14. Problem diagram of discarding process of express packaging waste  
Drawn by the author

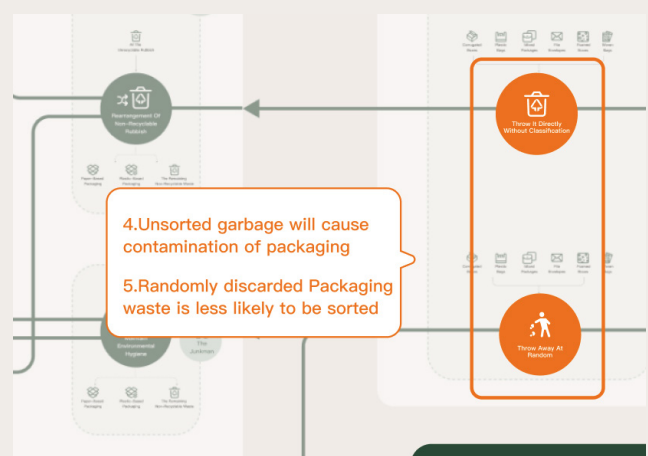


Figure 5-15. Problem diagram of sorting process of express packaging waste  
Drawn by the author

on the roadside, not included in the garbage disposal system, and into nature; For one thing, it is discarded in unsorted trash cans. Problems with unsorted garbage include:

**1. The subsequent garbage classification needs more manpower and resources.**

The garbage that is not classified from the source will increase the difficulty of treatment and the cost of treatment in the subsequent classification. The mix of wastes contaminates each other, reducing the recycling rate of recyclable waste.

**2. Waste that does not enter the waste disposal system will cause environmental pollution.**

The plastic, foam products, and adhesive tape in express packaging are difficult to degrade and seriously corrode the land. To reduce costs, many small manufacturers use a large number of recycled materials from chemical waste, medical waste, and household waste to produce express packaging, which has the problem of harmful substances exceeding the standard, causing pollution to soil, air, and water resources.

**5.3.7 Problems in the transportation process of the express packaging waste**

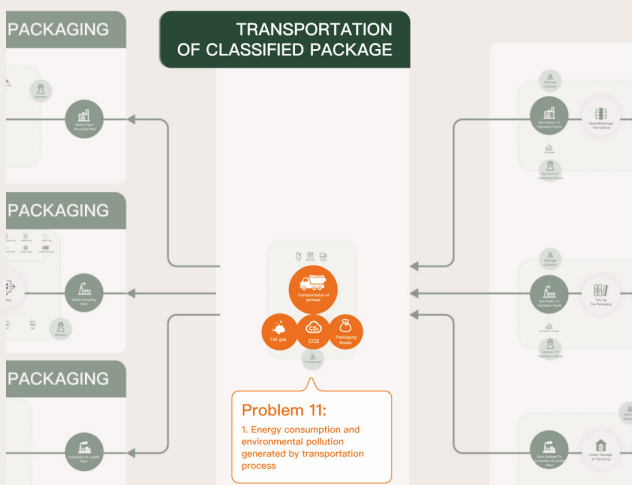


Figure 5-16. Problem diagram of transportation process of express packaging waste  
 Drawn by the author

The plastic, foam products, and adhesive tape in express packaging are difficult to degrade and seriously corrode the land. To reduce costs, many small manufacturers use a large number of recycled materials from chemical waste, medical waste, and household waste to produce express packaging, which has the problem of harmful substances exceeding the standard, causing pollution to soil, air, and water resources.

**5.3.8 Problems in the disposal process of the express packaging waste**

The plastic, foam products, and adhesive tape in express packaging are difficult to degrade and seriously corrode the land. To reduce costs, many small manufacturers use a large number of recycled materials from chemical waste, medical waste, and household waste to produce express packaging, which has the problem of harmful substances exceeding the standard, causing pollution to soil, air, and water resources.

**1. Recycling process of express package**

By analyzing the reprocessing process, it can be found that there are two major problems in the reprocessing process of express packages:

- In the current recovery and treatment system, the carton needs to be separated with adhesive tape and surface sheet paper, Plastics need to be more finely sorted before they are processed. Packaging designs and recycling processes that are not easily separated can reduce recycling rates.
- In the process of recycling, will consume a lot of energy such as water and electricity, and also discharge a lot of wastewater and waste gas to pollute the environment.

**2. Non-Recycling process of express package**



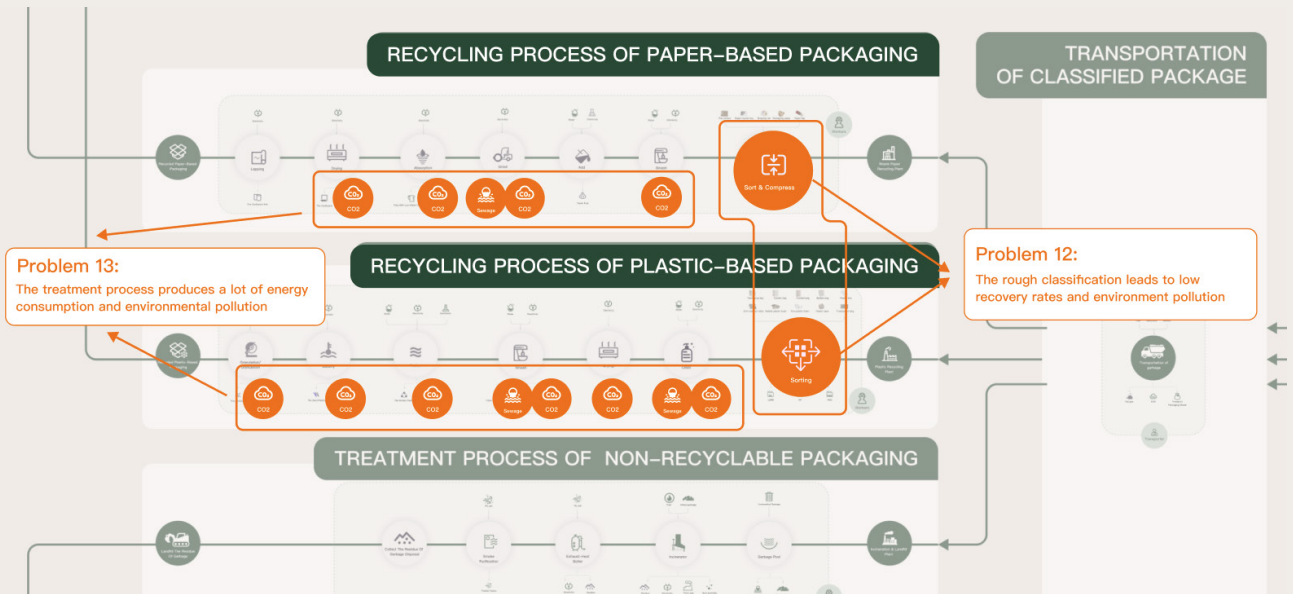


Figure 5-17. Problem diagram of recycling process of express packaging waste  
 Drawn by the author

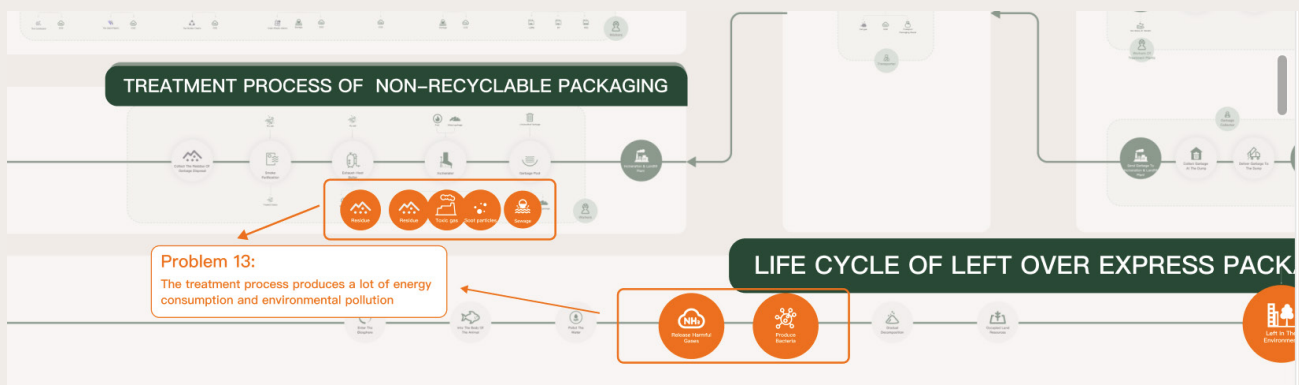


Figure 5-18. Problem diagram of Incineration & Natural degradation process of express packaging waste  
 Drawn by the author

Without classified treatment, the main waste is incineration and landfill treatment, and some waste into the natural environment degradation. The main problems in these processes are:

- Landfill will occupy a large amount of land, resulting in a waste of land resources. The landfill leachate contains a lot of organic pollutants, which pollute the soil and groundwater. The anaerobic decomposition of garbage will produce a large amount of landfill gas, resulting in pollution and safety risks. Natural degradation will also pollute the environment, especially plastics and other materials that are not easy to degrade.
- A large amount of carbon dioxide produced in the process of garbage incineration will have a significant impact on our environment. Currently, garbage incineration is also an important cause of global warming. Dioxins in the flue gas of MSWS incineration are highly toxic substances, causing great harm to the environment.

After sorting out the problems in each stage, we can sum up all the existing problems, and summarize the table to facilitate the analysis and sorting of the following solutions.

# PROBLEM-FINDING

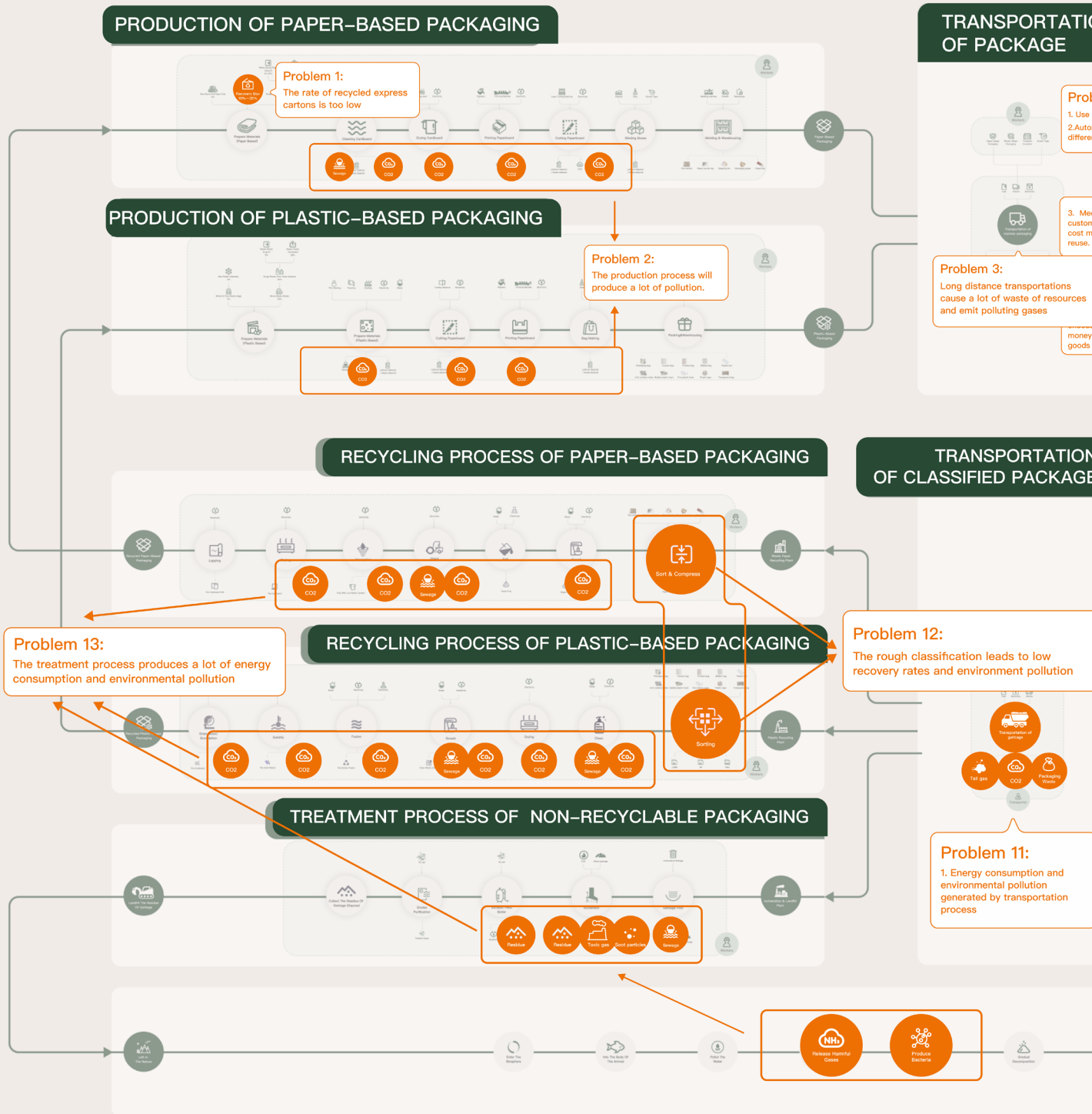


Figure 5-19. Summary of the problems in the life cycle of express package  
 Drawn by the author



# PROBLEMS

• PRODUCTION • USAGE • TRANS



### THE FACTORY

- Consuming a lot of energy
- Polluting water & releasing greenhouse gases.
- The proportion of recycled materials used is low.



### LARGE E-COMMERCE PLATFORM

- Using too much packaging every day.
- The automatic packing line reduced the differentiation, are prone to over packaging.



### MEDIUM-SIZED/INDEPENDENT ONLINE STORE

- Need for customized packaging, which will cost more and is go against to direct reuse.



### INDIVIDUAL E-COMMERCE / SECOND-HAND TRADING SHOPS

- Tend to choose the cheaper packages, which are environmentally unfriendly.



- Long d greenh
- The vio damage recycla



- Only r recyc

• DISCARD PACKGING • CLASSIFICATION PACKGING



### SORT & SOLD TO GARBAGE COLLECTOR

- Traditional waste collection methods are declining and the new way has not yet fully risen.
- There is no convenient mainstream platform to provide recycling services in most areas.



### SORT&THROW INTO TRASN CANS/SELF-HELP RECYCLING STATIONS/EXPRESS STATIONS.

- The recycling mechanism for express packaging is not perfect.
- The classification of recyclable garbage is rough.
- Uneven placement density of self-service recycling bins.



### THROW DIRECTLY WITHOUT CLASSIFICATION

- Unsorted garbage will cause contamination of packaging.
- Randomly discarded Packaging waste is less likely to be sorted.



### REUSE THE PACKAGE IN DAILY LIFE & EXPRESS STATION

- Violent unpack packages results in package damage and reduce utilization.
- .There is no systematic recycling mechanism in the express industry.



### COLLECT & CLASSIFY

- The classification of recyclable garbage i
- The recycling rate of recyclable packaging



### UNCLASSIFIED & LEFT IN THE

- Harmful substances produced by garbage environment.

Figure 5-20. Summary of the problems in the life cycle of express package  
 Drawn by the author



TRANSPORTATION

PICK UP & OPEN PACKAGES

LONG DISTANCE & INTERCITY TRANSPORTATION

Long distance transportations consumes energy & releases greenhouse gases. Intensive transportation & sorting process caused serious damage to the express package and reduced the reliability.



THE CUSTOMER

- Consumerism and e-commerce have led to more express packages waste.
- Customers lack recycling awareness and recycling channels.

THE LAST KILOMETER OF EXPRESS DELIVERY

Delivery workers are responsible for express delivery, lack of packaging recycling mechanism.

TREATMENT

BY SANITATION WORKER

Classification is rough. Recycling rate is low.



RECYCLING PROCESS & INCINERATION & LANDFILL TREATMENT

- The rough classification leads to low recovery rates and environment pollution.
- The treatment process produces a lot of energy consumption and environmental pollution

ENVIRONMENT

Improper decomposition will pollute the environment.

## 5.4 From Problems To Opportunities

According to the summarized problem points, we brainstorm and summarize the corresponding solutions.

### 5.4.1 Production process

The points that can be optimized in the express package production process include

- Refined packaging classification, increase the proportion of recyclable packaging, and reduce heavy production energy consumption.
- Choose more bio-based, biodegradable, recycled materials for packaging that are environmentally friendly.
- Establish a sound recycling, disinfection, and reuse mechanism (cooperate with delivery points/recycle stations)

### 5.4.2 Usage process

In the usage process, we have summarized different problems according to merchants of different scales. Also for these merchants, we have given the following improvement points for the common problems encountered in the use of express package:

- Offer more options, including recyclable or recycled packaging
- Develop packaging recycling channels, convenient and has a wide coverage.
- Create incentives for users to recycle and make recycling profitable.

For merchants of different scales

#### 1. For Large e-commerce platform

- Use more compact packaging to reduce material consumption at the source.
- Optimize the algorithm to support order consolidation and common packaging.

#### 2. For Medium-sized/Independent online store

- Offer recyclable packaging which can meet the customized brand unpacking experience to convey a brand image.

#### 3. For Individual e-commerce / Second-hand trading shops

- Offer a low price of recyclable packaging, which can meet the needs of individual shops.

### 5.4.3 Transportation process

#### For Long distance & Intercity transportation

- Provide obvious close-place merchant Filter option, and reduce long-distance transportation across regions.
- Reduce packaging weight to reduce transportation costs under the premise of satisfying usage.
- Qualification training for couriers to reduce violent transportation and packaging damage.

#### For The last kilometer of express delivery

- Provide convenient recycling methods, couriers can centrally retrieve recyclable packaging.

### 5.4.4 Pick up & Open packages process

- Strengthen publicity, and enhance consumer awareness of environmental protection.
- Provide convenient recycling channels to promote consumers to carry out packaging recycling.
- Material rewards promote recycling behavior

### 5.4.5 Discard packages process

#### Sort & Sold to garbage collector

- Provide convenient recycling methods, such as courier participation in recycling, recycling at the express point, recycling in the self-service recycling machine, etc.
- Diversified recycling rewards: including money, redeemable rewards points, shipping reduced postage, etc.
- A cleaner recycling environment improves the experience of recyclers.

#### **Sort & throw into trash cans/self-help recycling stations/express stations.**

- Increase the density of self-service recycling machines to ensure that most residents can be covered.
- Strengthen the operation and maintenance of self-service recycling equipment, and dispose of garbage regularly.
- Set up recycling boxes for packaging in the community to improve the recycling rate of express packaging.
- Help users form the habit of classification, and improve the accuracy of classification.

#### **Reuse the package in Daily life & express station**

- Express package design: package design is easy for users to disassemble, reducing the damage rate in the process of disassembly.
- Express package dismantling guide: Provide express dismantling guide and tools at the express point.

### **5.4.6 Classification process**

#### **Collect & classify by sanitation worker**

- Increase the proportion of rubbish bins, including sorted bins to improve the recycling rate.
- Improve users' awareness of environmental protection and help users develop the habit of recycling.
- The packaging design uses less tape and sheet paper to improve the efficiency and ratio of carton recycling.

#### **Unclassified & Left in the environment**

- Increase the proportion of rubbish bins, including sorted bins to improve the recycling rate.
- Improve users' awareness of environmental protection and help users develop the habit of recycling.
- Improve the recycling efficiency at the source and reduce the flow of express packaging into the natural environment.

- Encouraged people to take part in voluntary activities to collect packages scattered in nature and redeem green points.

### **5.4.7 Final treatment process**

- Improve packaging integrity, and improve the proportion of direct reuse.
- Provides an online platform to view the nearest recycling disposal site, which facilitates quick recycling and reduces the consumption of transportation resources.
- Increase the recycling rate and direct reuse rate of packaging, reduce the amount of waste incineration or landfill, and reduce environmental pollution.
- Improve the waste disposal process to reduce environmental pollution.

# SOLUTIONS

## • PRODUCTION • USAGE • TRANSPORTATION



### THE FACTORY

- Refined packaging classification, increase the proportion of recyclable packaging, reduce heavy production energy consumption.
- Choose more bio-based, biodegradable, recycled materials for packaging that are environmentally friendly.
- Establish a sound recycling, disinfection and reuse mechanism (cooperate with delivery points/recycle stations)



### LARGE E-COMMERCE PLATFORM

- Offer options for recycling packaging.
- Develop packaging recycling channels, convenient and has wide coverage.
- Create incentives for users to recycle and make recycling profitable.



### MEDIUM-SIZED/ INDEPENDENT ONLINE STORE



### LARGE E-COMMERCE PLATFORM

- Use more compact packaging to reduce material consumption at source.
- Optimized algorithm to support order consolidation and common packaging.



### MEDIUM-SIZED/INDEPENDENT ONLINE STORE

- Recyclable packaging which can meet the customized brand unpacking experience to convey brand image.



### INDIVIDUAL E-COMMERCE / SECOND-HAND TRADING SHOPS

- The use price of recyclable packaging should be low, can meet the needs of individual shops.



### LONG DISTANCE

- Provide obvious close-distance transportation
- Reduce packaging weight on the premise of satisfying user needs
- Qualification training for staff and packaging damage prevention



### THE LAST K

- Provide convenient means to retrieve recyclable packaging

## • DISCARD PACKAGING • CLASSIFICATION PACKAGING



### SORT & SOLD TO GARBAGE COLLECTOR

- Provide convenient recycling methods, such as courier participates in recycling, recycling at the express point, recycling in the self-service recycling machine, etc.
- Diversified recycling rewards: including money, redeemable rewards points, shipping reduced postage, etc.
- A cleaner recycling environment improves the experience of recyclers.



### SELF-HELP RECYCLING STATIONS/EXPRESS STATIONS

- Increase the density of self-service recycling machines to ensure that most residents can be covered.
- Strengthen the operation and maintenance of self-service recycling equipment, and dispose of garbage regularly.
- Set up recycling boxes for packaging in the community to improve the recycling rate of express packaging.
- Help users form the habit of classification, improve the accuracy of classification.



### THROW DIRECTLY WITHOUT CLASSIFICATION



### COLLECT & CLASSIFY BY SANITATION WORKERS

- Increase the proportion of rubbish bins, including sorted bins to improve recycling rate.
- Improve users' awareness of environmental protection and help users form the habit of recycling.
- The packaging design uses less tape and sheet paper to improve the recycling rate and ratio of carton recycling.



### UNCLASSIFIED & LEFT IN THE ENVIRONMENT

- Increase the proportion of rubbish bins, including sorted bins to improve recycling rate.
- Improve users' awareness of environmental protection and help users form the habit of recycling.
- Improve the recycling efficiency at the source and reduce the flow of packaging into the natural environment.
- Encourage people to take part in voluntary activities to collect and scatter in nature and redeem green points.



### REUSE THE PACKAGE IN DAILY LIFE & EXPRESS STATION

- Express package design: package design is easy for users to disassemble, reduce the damage rate in the process of disassembly.
- Express package dismantling guide: Provide express dismantling guide and tools at the express point.

Figure 5-21. Summary of Solutions  
 Drawn by the author



DN

• PICK UP & OPEN PACKAGES

E & INTERCITY TRANSPORTATION

-place merchant Filter option, reduce long-  
n across regions.  
ght to reduce transportation cost under the  
usage.  
or couriers to reduce violent transportation  
e.



THE CUSTOMER

- Strengthen publicity, enhance consumer awareness of environmental protection.
- Provide convenient recycling channels to promote consumers to carry out packaging recycling.
- Material rewards promote recycling behavior

LOMETER OF EXPRESS DELIVERY

recycling methods, couriers can centrally  
ackaging

• TREATMENT

ER

mpriove the  
sers develop  
the efficiency



RECYCLING PROCESS & INCINERATION & LANDFILL TREATMENT

- Improve packaging integrity, improve the proportion of direct reuse.
- Provides online platform to view the nearest recycling disposal site, which facilitates quick recycling and reduces the consumption of transportation resources.
- Increase the recycling rate and direct reuse rate of packaging, reduce the amount of waste incineration or landfill, reduce environmental pollution.
- Improve waste disposal process to reduce environmental pollution.

mpriove the  
sers develop  
w of express  
ackages

## 5.5 Opportunities Summary

After summarizing the problems and solutions in each stage of the express packaging life cycle, we hope to find the corresponding solutions. Our solution can be divided into four parts:

1) For people, we improve users' awareness of recycling and promote their motivation to use recyclable packaging. This also requires more

participation in packaging recycling.

2) For express packaging, we hope that it is easy to disassemble and reuse, supports customized brand communication, and uses more environmentally friendly and recyclable materials.

3) In terms of recycling, it is necessary to refine

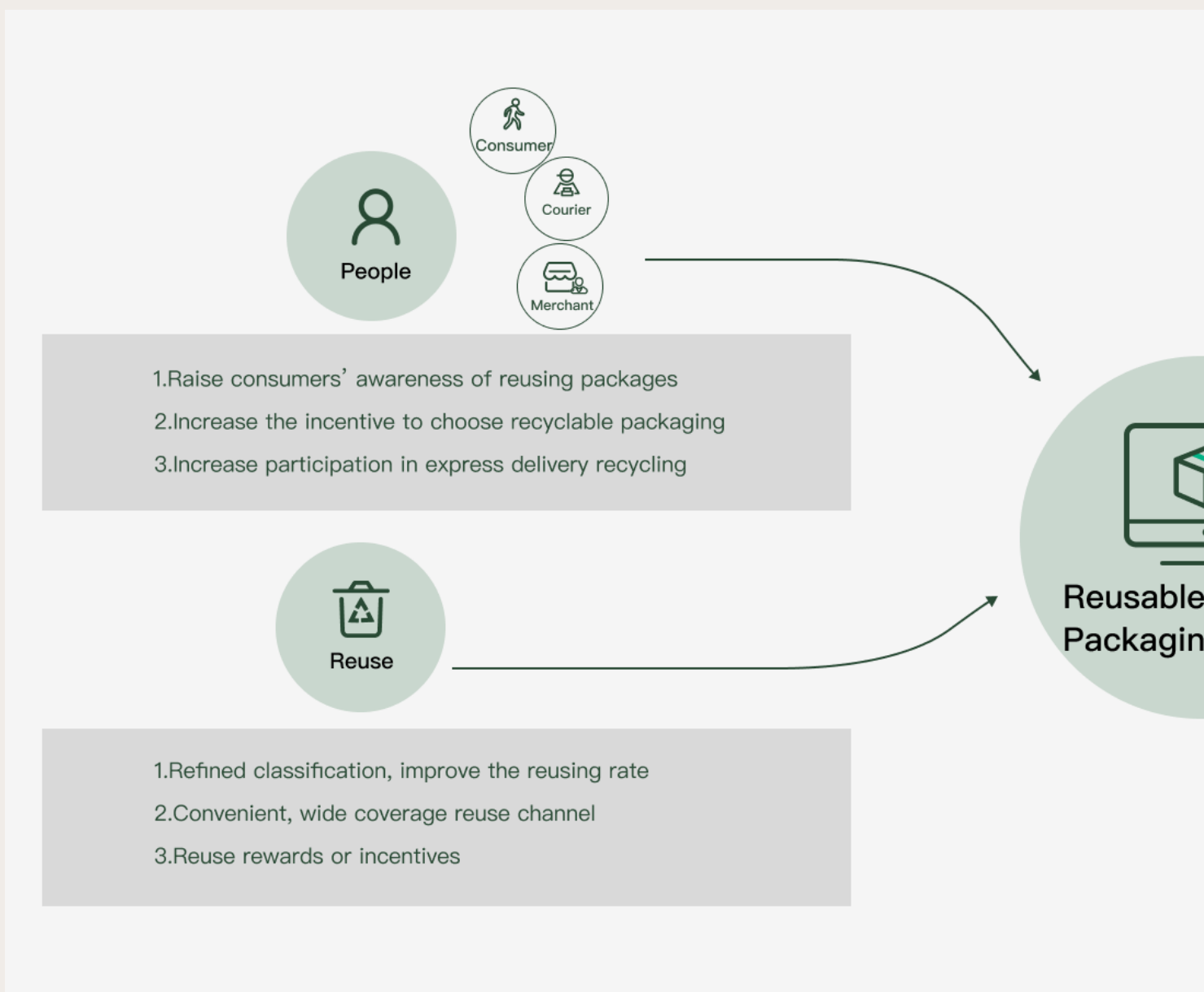
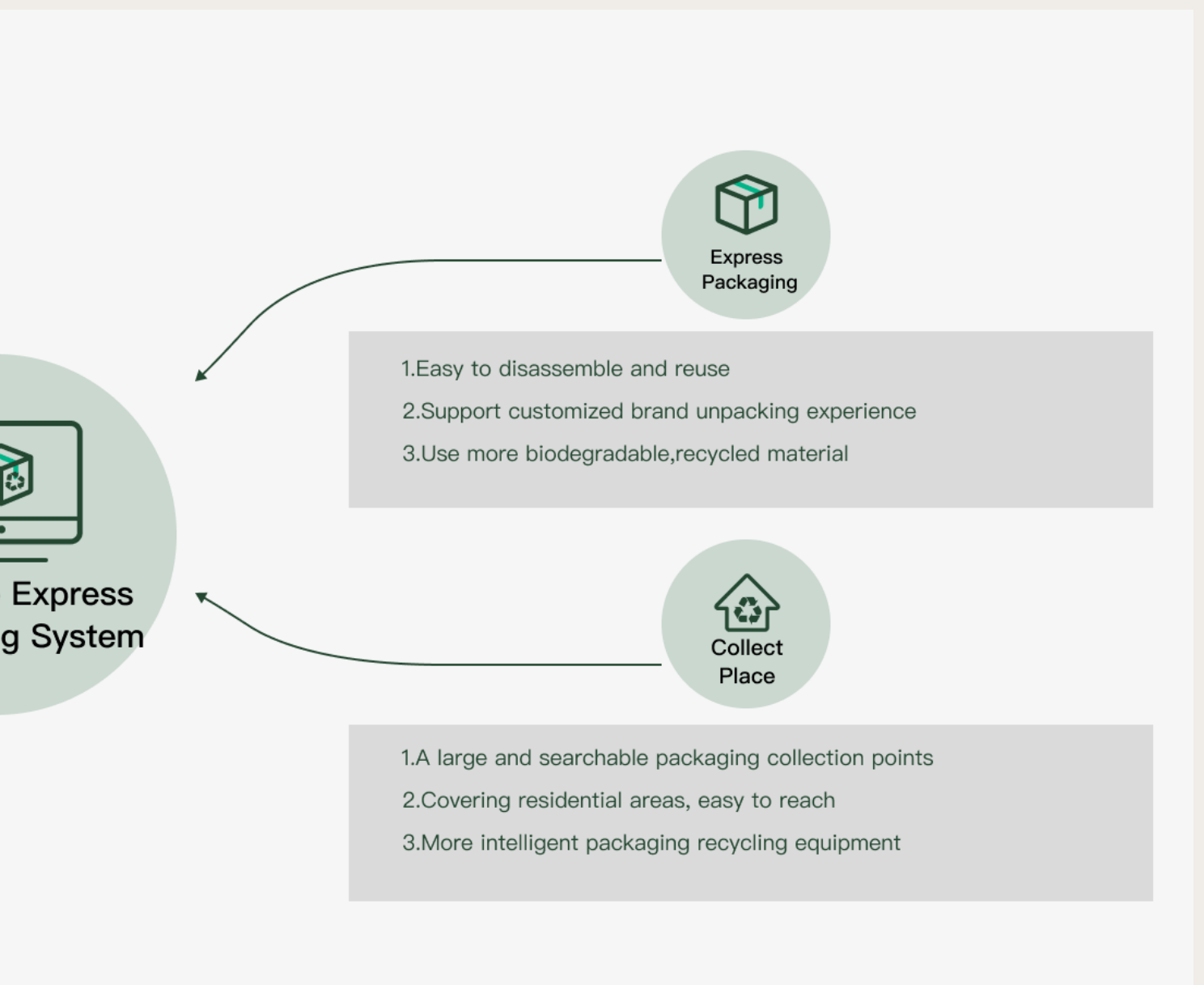


Figure 5-22. Four parts of Resuable express packaging system  
Drawn by the author

garbage classification, provide more convenient recycling channels with wider coverage, and provide incentives to enhance people's participation in packaging recycling and improve the reuse rate of packaging.

4) The fourth is the setting of recycling points. In addition to the traditional garbage stations for recycling, we hope to regard packaging recycling as a way of life and daily behavior. We

can provide more efficient and intelligent recycling equipment at the contact points around residential areas that are easy to reach people, such as 24-hour convenience stores, express delivery points, and near express cabinets. Promoting packaging recycling as a part of everyday life.



06

Design  
Project

---



## 6.1 New Express System Overview

The solution we offer has three parts: reusable packaging, online reuse platform and Smart recycling bins..

We provide a recycling platform to realize various services such as mailing, unpacking, and recycling, At the same time, we can create a green community atmosphere through the APP and attract more users to use the reusable express boxes combined with rewards. We provide recycling bins, people can choose door-to-door pickup services, or to put reusable boxes to the recycling bin, Our recycling bins are widely distributed and you can locate the nearest one by mobile phone.

Through the systematic design scheme, to solve the main problems of this paper, that is, to improve the recycling rate of express packaging, to solve the problem of incomplete recycling exercises, and the lack of intelligent and standardized management. At the same time, through various means to provide incentives to different stakeholders, improve people's willingness to use the recycling box.



Figure 6-1. Fina design scheme  
 Drawn by the author

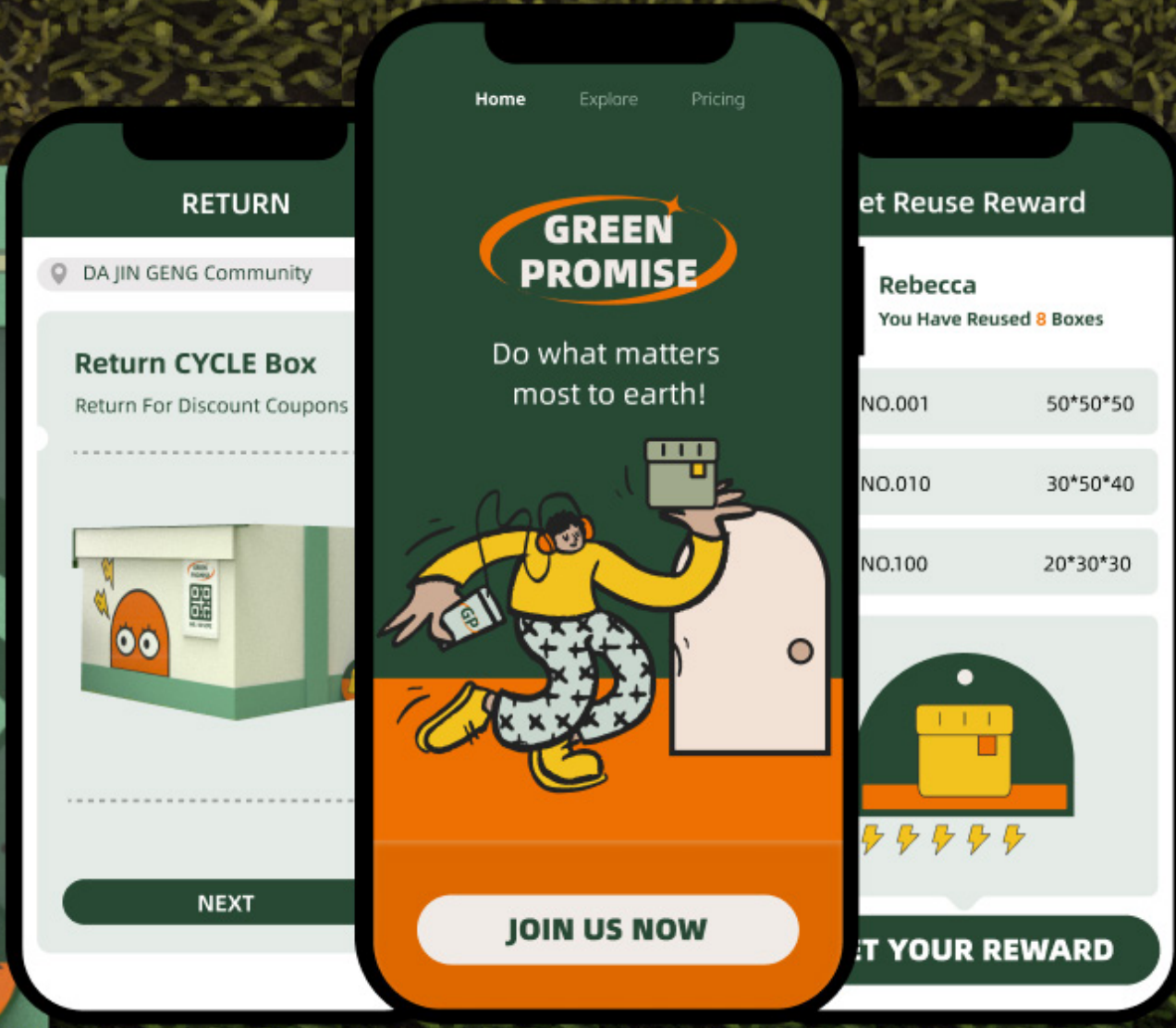
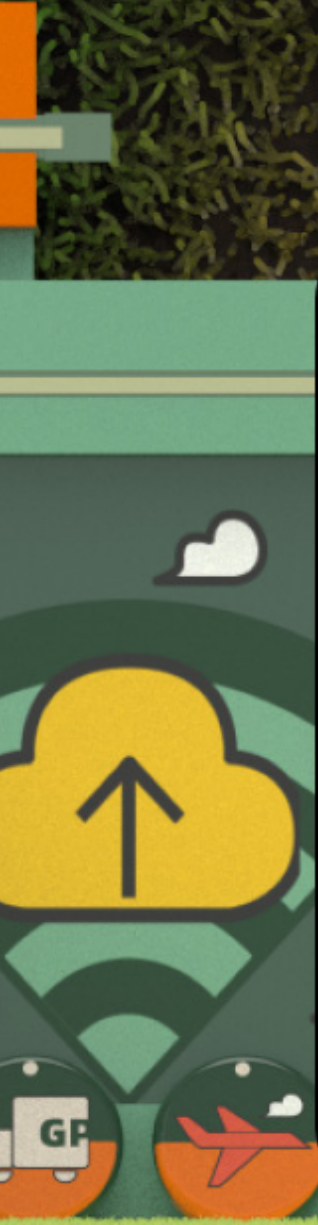
# Reusable Express Packaging System Overview



Figure 6-2. Reusable express packaging system overview  
Drawn by the author



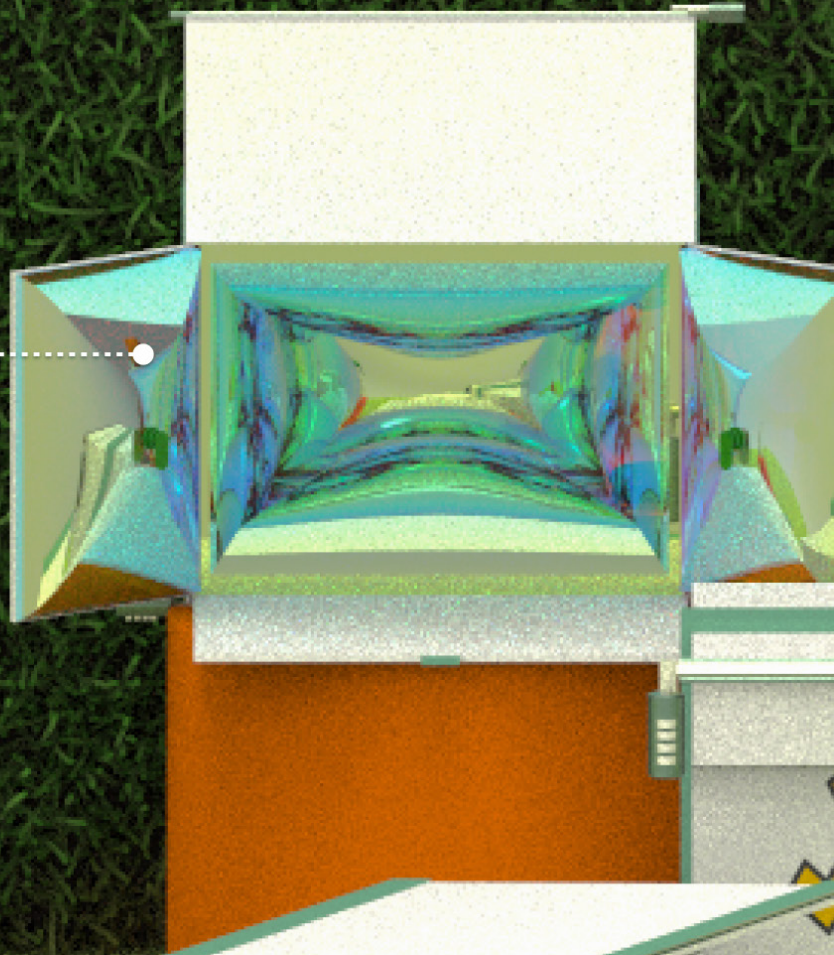
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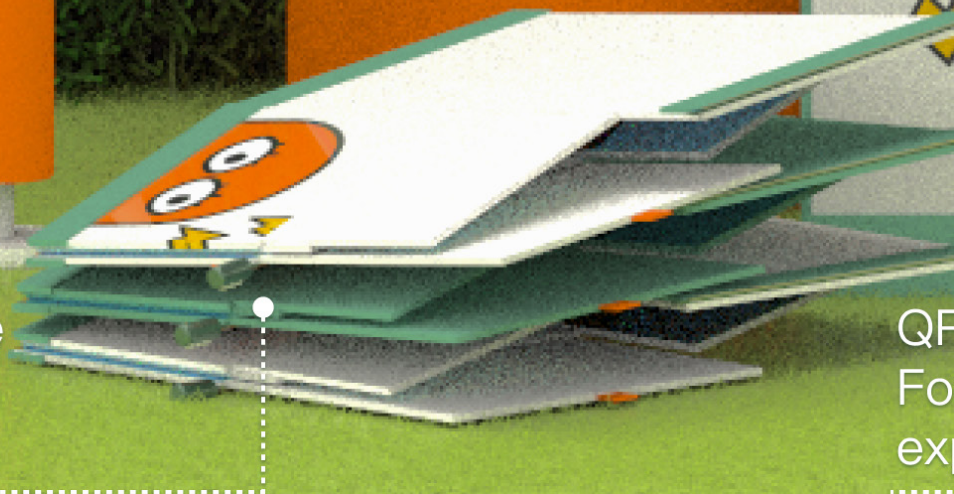


# Reusable Express Box Overview

Inflatable air bag  
to avoid collision



Integrated & foldable  
express box  
For easier recycling



QP  
Fo  
ex

Figure 6-3. Reusable express packaging boxes overview  
Drawn by the author



Zipper with password lock  
To protect the security of goods

Recyclable express bag  
To replace unsustainable plastic bags



QR code & Box ID  
for more intelligent  
press service

Limited edition badge  
To reward loyal users who  
use recyclable packaging

## 6.2 Reusable Express packaging

Reusable express boxes can be recycled many times, reducing the consumption of resources and the burden on the environment, compared with the current disposable packaging bags and cartons.

The appearance of the Reusable express boxes is shown in the figure above. We adopt a relatively young and lively appearance design and create an exclusive brand identity through unique design elements. There is a zipper on the outer surface of the box, and a smart lock in a fixed position can lock the zipper. There is an obvious two-dimensional code area on the surface of the box, so users can easily scan the code to unlock the box. At the same time, each box has its ID, and users can track the transportation path of the box on the mobile APP. The box interior has its shock-proof bubble film, which can be filled and deflated to reduce the use of buffer plastic. The boxes can be easily folded for subsequent recycling.

Its structural features also include:

1) The structure is strong and durable, the surface material is all PP, and the material of the whole box is more than 97% recyclable. The edge of the whole box does not hurt hands, is waterproof, moisture-proof, and damage-proof, strong corrosion resistance. Can be reused more than 70 times, is easy to clean, with puncture resistance, and greatly protect the express interior.

2) By folding in 2 steps and sealing in 4 steps, a box can be put into use in less than 10 seconds. Use a zipper, with Velcro, can quickly seal and open the box. It eliminates the use of consumables such as tape.

3) The circulation box has an inflatable inner membrane, which can provide a shockproof function, saving the use of inflatable film, air column, foam, and other shockproof plastic materials. The inflatable inner membrane is made of rubber material, which is attached to the inside of the six surfaces of the circulation box. The air mouth is empty. When used, the air can be injected through the inflatable mouth to make it expand, to achieve the function of shockproof and fixed items in the box. After use, open the aeration port to fold the reusable express boxes.

4) Under normal circumstances, the service life of the Reusable box can reach 3 years, and after reaching the service life, the polypropylene material can achieve more than a 90% recovery rate. Reusable boxes made from PP plastic produce lower carbon emissions than the heavily used single-use boxes made from corrugated paper. Paper production will produce a lot of greenhouse gases and sewage, and paper products are mostly disposable, a great waste. Biodegradable, reusable plastics have relatively low carbon emissions.



## Structural Features

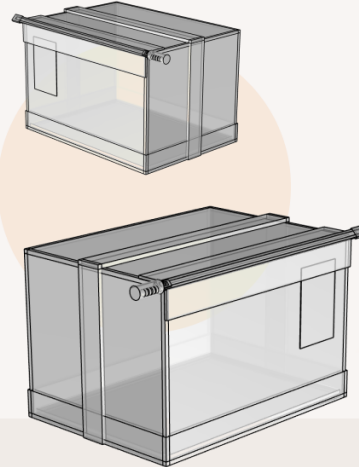
### Traditional Package

- Energy consumption in re-production
- Various materials are difficult to separate and recovery



### • Integrative Shape

No more non-recyclable plastic tape or Express mailing list,  
No need to classify the material



### • Inflatable Air Bag

Protect the goods from being damaged, no more Bubble plastic foam or Anti-collision airbag



### • Foldable

Save more space, which can Easier to reuse & transport

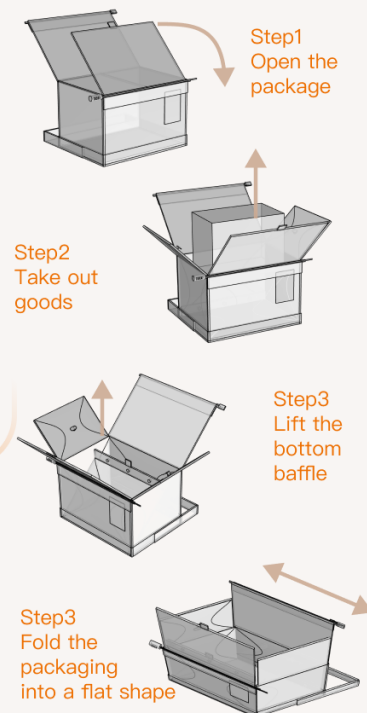
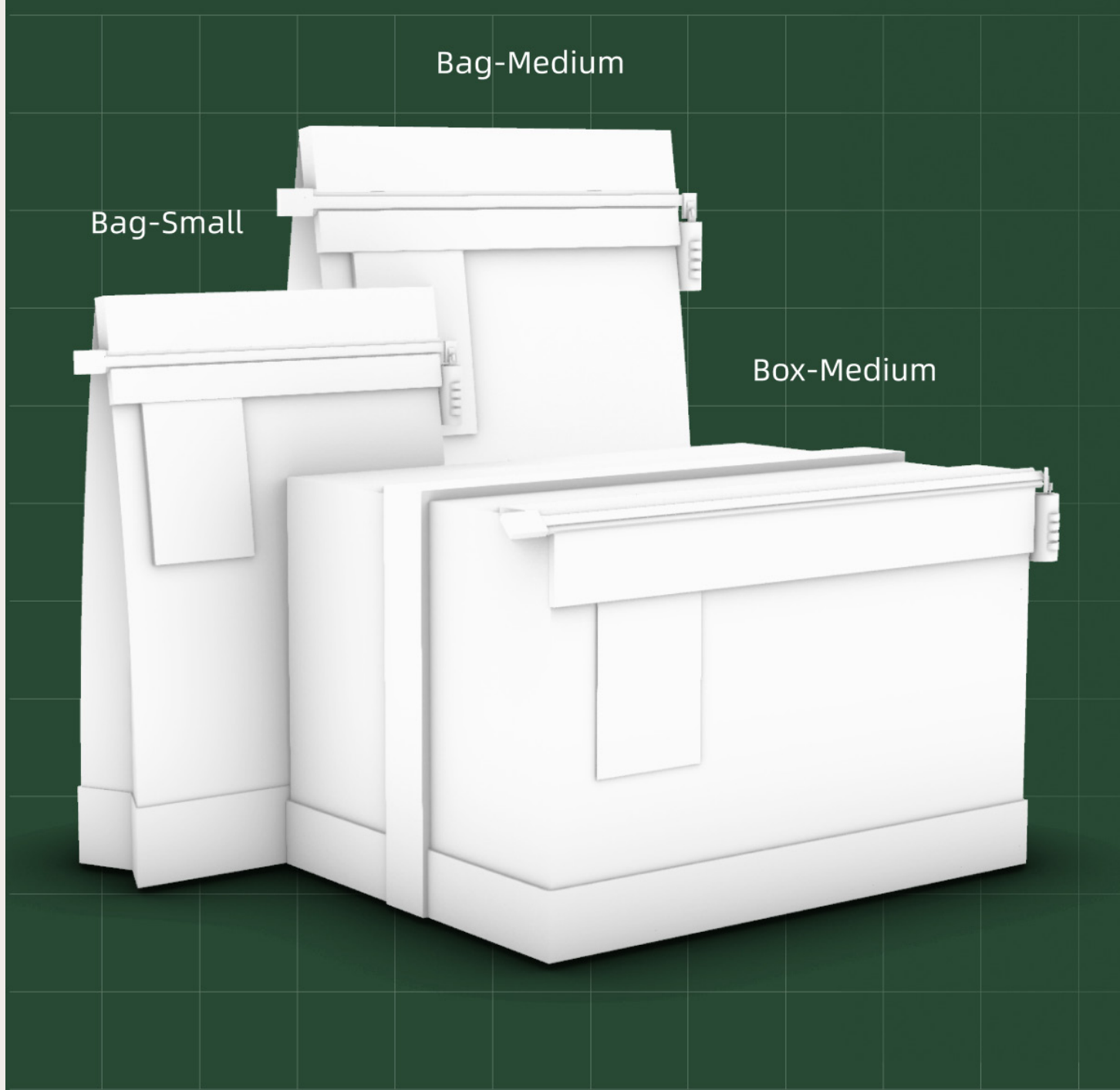


Figure 6-4. Reusable express packaging box structure drawing  
Drawn by the author

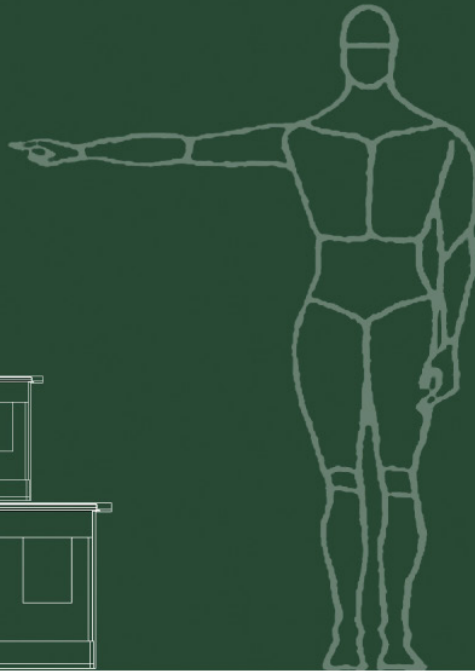
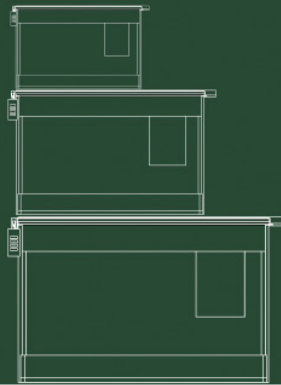
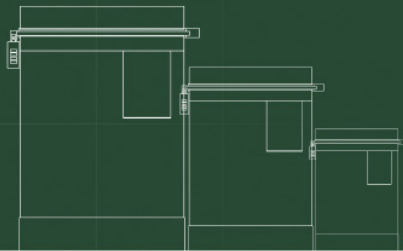
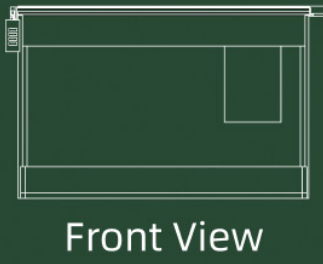
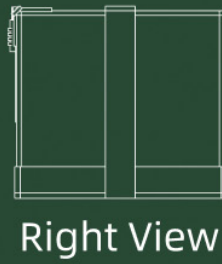
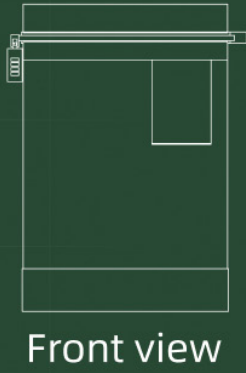
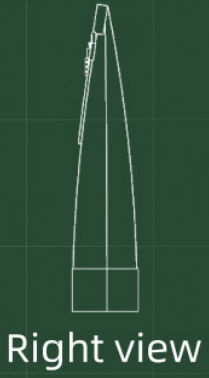
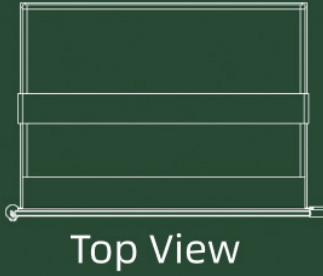
# Reusable Packaging Of Different Shape & Size



| Figure 6-5. Sizes and three views of Reusable express packaging box  
| Drawn by the author



# izes



Bags of different size

Boxes of different size

Human

# Online Reuse Platform

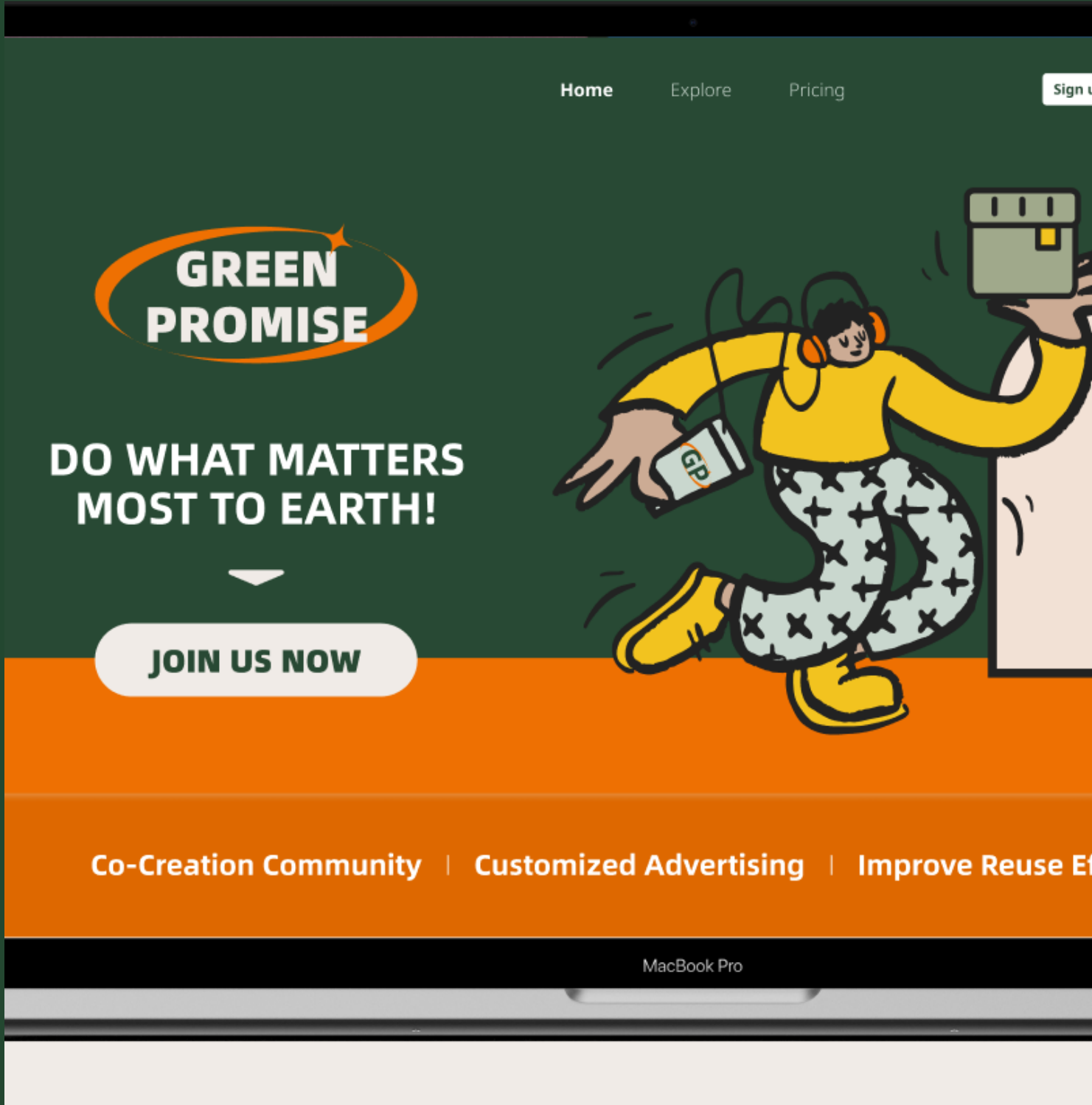
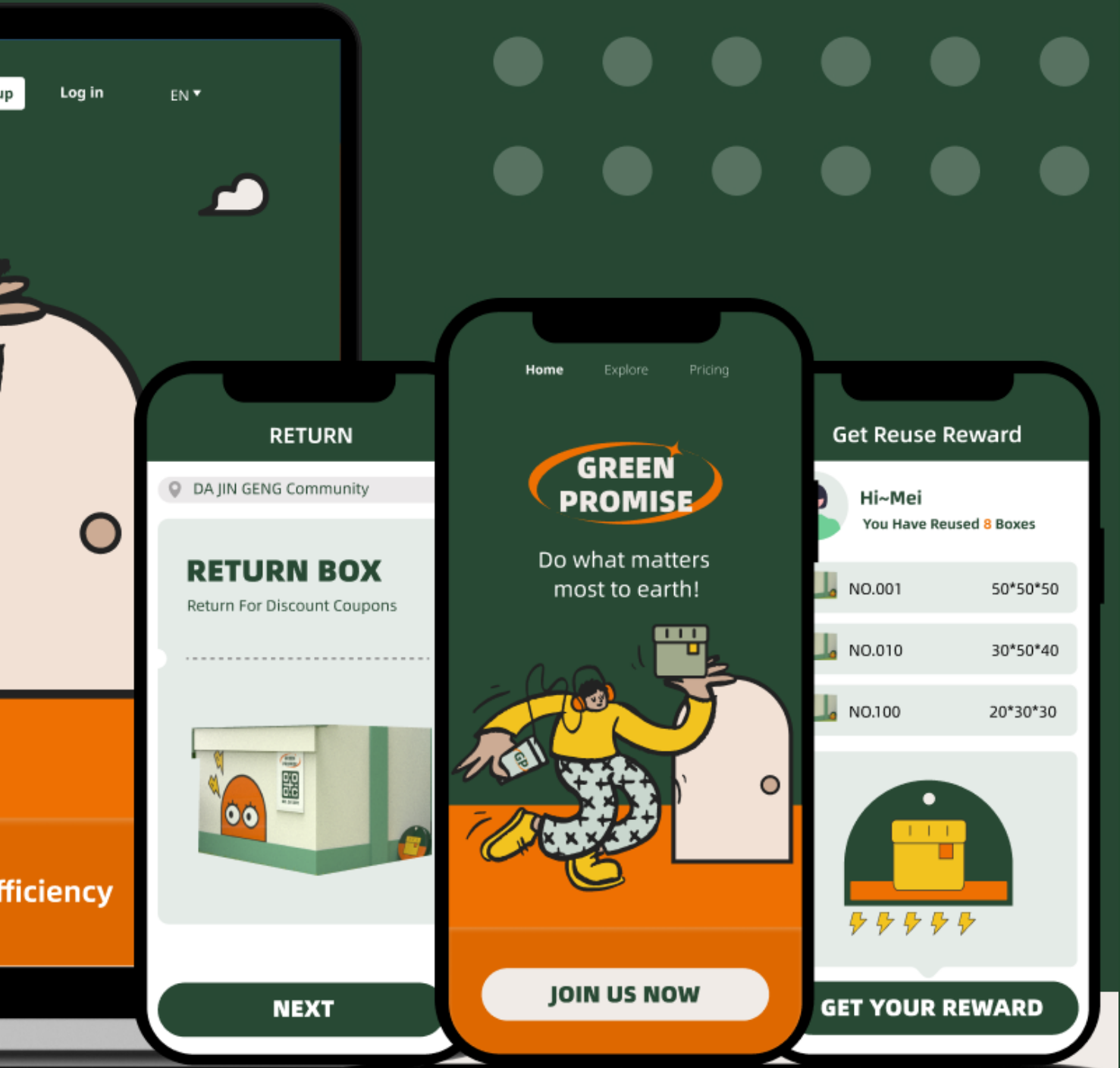


Figure 6-6. Online reuse platform overview  
Drawn by the author



## 6.3 Online Reusable Platform

The online reuse platform is a multi-functional APP, used in conjunction with a reusable box. Designed to solve the problem of the "last mile". The process of express parcels from terminal express stations to consumers is known as the "last kilometer" of logistics, while reusable packaging faces the problem of reverse logistics in this "last kilometer": How to recover the Reusable express boxes from the hands of consumers?

to solve the problem of the "last mile". The process of express parcels from terminal express stations to consumers is known as the "last kilometer" of logistics, while reusable packaging faces the problem of reverse logistics in this **last kilometer** : How to recover the Reusable express boxes from the hands of consumers?

### 6.3.1 Design points for different users

#### 1. General user groups receiving and sending express

The online reuse platform is a multi-functional APP, used in conjunction with a reusable box. Designed

We want to create a community atmosphere that will attract young people who are concerned about environmental protection and green living, and create a sense of belonging to the brand. So we increase engagement in two ways.

1) One is Co-create sustainable digital atr works with users. Users with creative talent can choose to express the concept of environmental protection through the creation of graphic design works.

For Users: Use Green Attitude & Youthful Visual To Attract Gen-Z Users



Logo	Color
Slogan	
<p><b>DO WHAT MATTERS MOST TO EARTH!</b></p> <p>Digital reuse rewards for users</p>	

Talented users and artists are invited to create green digital works to express their own unique environmental protection attitude

Figure 6-7. Co-create sustainable digital atr works with users on **Green Promise** reuse platform  
 Drawn by the author





## For Users: Combine The Digital Art Works With Reuse Courier Services

### 1 Print on the packaging

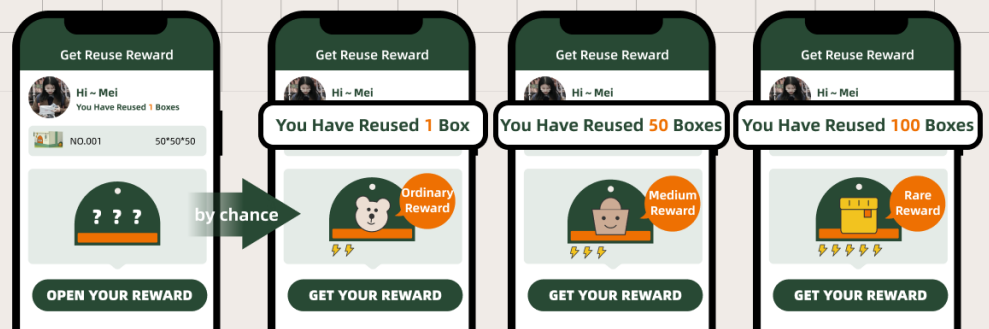
Print the digital works on the packaging box, then users will have a surprise when receiving the package



### 2 Use as reuse rewards

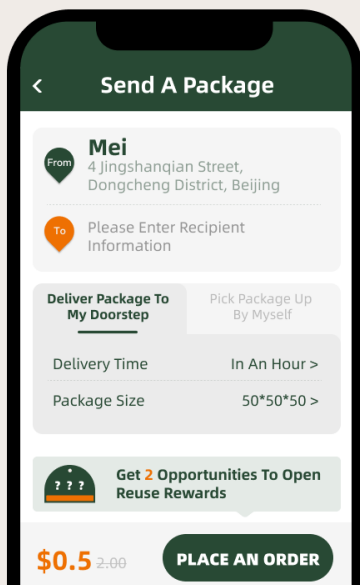
Every time the user completes a packaging reuse, he can get a digital reward by chance

The more the user reuses the packaging, the more rare digital rewards he has the chance to get

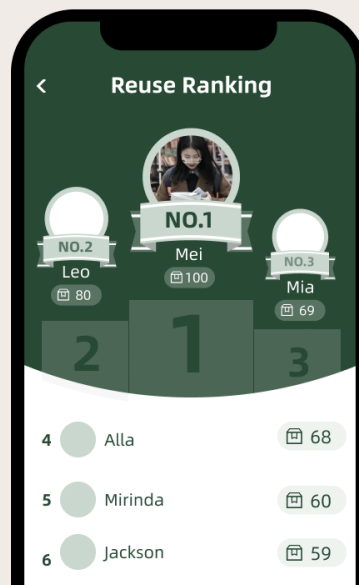


## For Users: Combine The Digital Art Works With Reuse Courier Services

### 3 Use reuse packaging can get rewards



### 4 Ranking of reuse packaging usage



### 3 Rare Reward Collection album

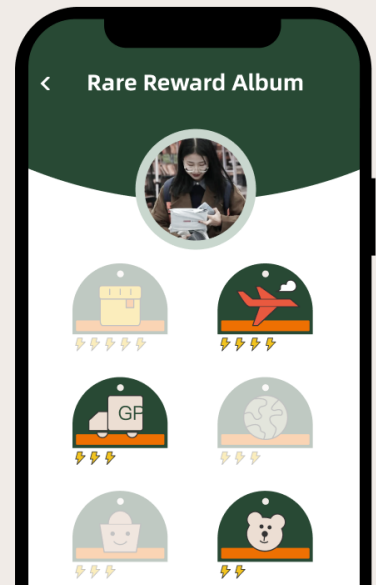


Figure 6-8. Incentive design of Online reuse platform for users  
 Drawn by the author

After the screening, they will be printed on the reusable box. At the same time, it also serves as an incentive for users to use reusable boxes. The more times users use it, the more electronic logo they can get. When sending, the electronic logo can be exchanged for reusable boxes printed with the logo.

2) Another way is to display low carbon credits on the personal page of the APP, which can accumulate a certain low carbon value once used. The more you use it, the more accumulated, and the low carbon value can be used to exchange for mail coupons. At the same time, our low-carbon community can show everyone's ranking, jointly create a low-carbon environment and attract more people to participate.

**2. Attract online merchant with Customized promote service**

When using the reusable express box, businesses can put customized brand marketing content, including video, text, and text. After receiving the express, the recipient can use the APP to scan the code and open the box to display the marketing content. This way meets the needs of big brands or self-operated platforms to convey the brand image in the express box. At the same time, the online platform, compared with the traditional way of printing advertisements in the box, saves the communication cost, reduces the use of consumables, and is more green and environmental protection.

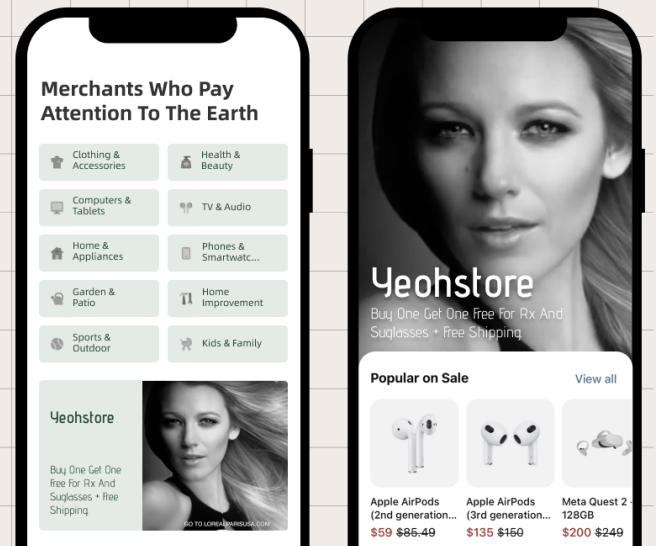
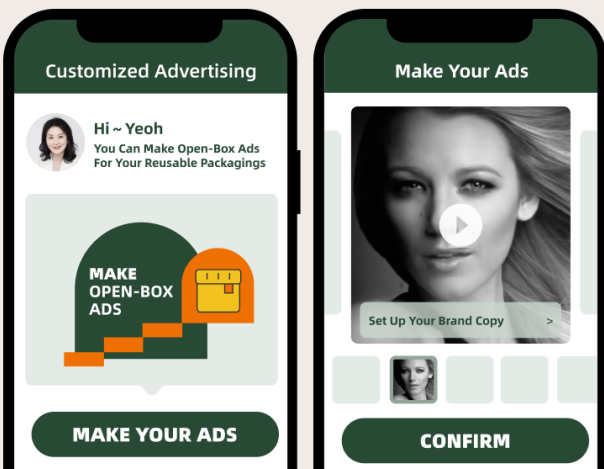
At the same time, users can find merchants using reusable boxes for delivery on our APP page. We provide a product/merchant display page, and users can reach these merchants on the APP platform. Provide more user-oriented media for merchants to increase their exposure and sales.

**For Merchants : Attract Online Merchant With Customized Promote Service**



**1 Merchants: Making Customized open-box ads for free**

Merchants who use reusable packaging can get customized open-box advertising services for free, which can help them promote their stores to users



**2 Merchants can promote their stores in reuse platform**

Figure 6-9. Attract online merchant with Customized promote service  
 Drawn by the author

## **6.3.2 Main use process of Reuse platform**

### **1. Easy delivery**

When using reusable boxes for delivery, you only need to place an order on the APP, select the number and size of reusable boxes, and the Courier can take the reusable boxes to the door to pick up the items. Then fill in the shipping information online and complete the payment. The real-time location of the express will be displayed in the APP, and users can track it. After receiving the package, the recipient can scan the QR code on the top of the package to unlock the box.

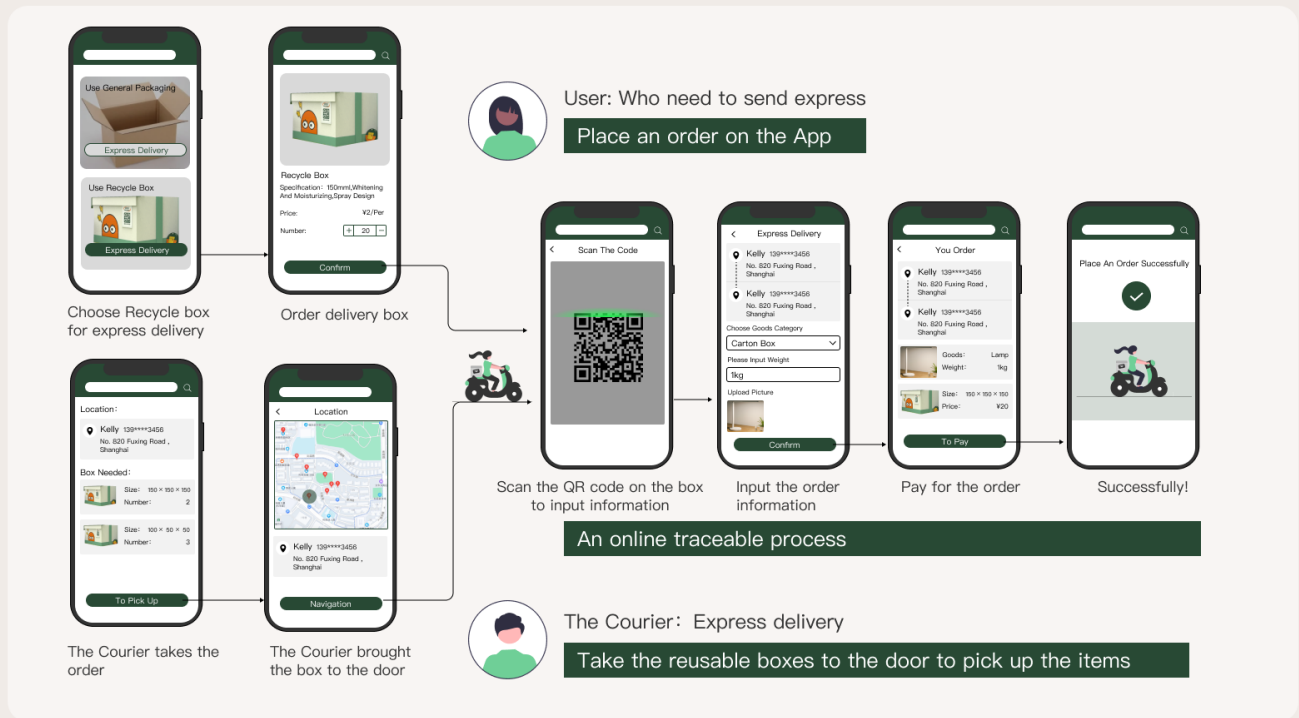
### **2. Scan the code and unpack the box**

After receiving the delivery, the recipient can scan the QR code on the reusable express box through WeChat or our APP to open the box. After scanning, the marketing advertisements placed by the merchants can be displayed. After skipping the advertisements or the advertisements are over, the users can see their order details, namely the electronic sheet. After confirming, they can choose to open the box immediately.

### **3. Convenient recycling**

After opening the box, the recycling method is displayed. If the Courier is at the scene, it can be directly recycled by the Courier. If the Courier is not at the scene, you can choose two recycling methods: self-help recycling and door-to-door recycling. Self-service recycling means that users can search for the nearest return place and bring it to the on-site recycling equipment for recycling. Door-to-door recycling is to make an appointment with a Courier on the APP to door-to-door recycle boxes at a specified time. After the recovery behavior is completed, the corresponding reward points can be obtained, and the points can be exchanged for the mailing coupons.

### Easy Delivery



### Convenient Recycling

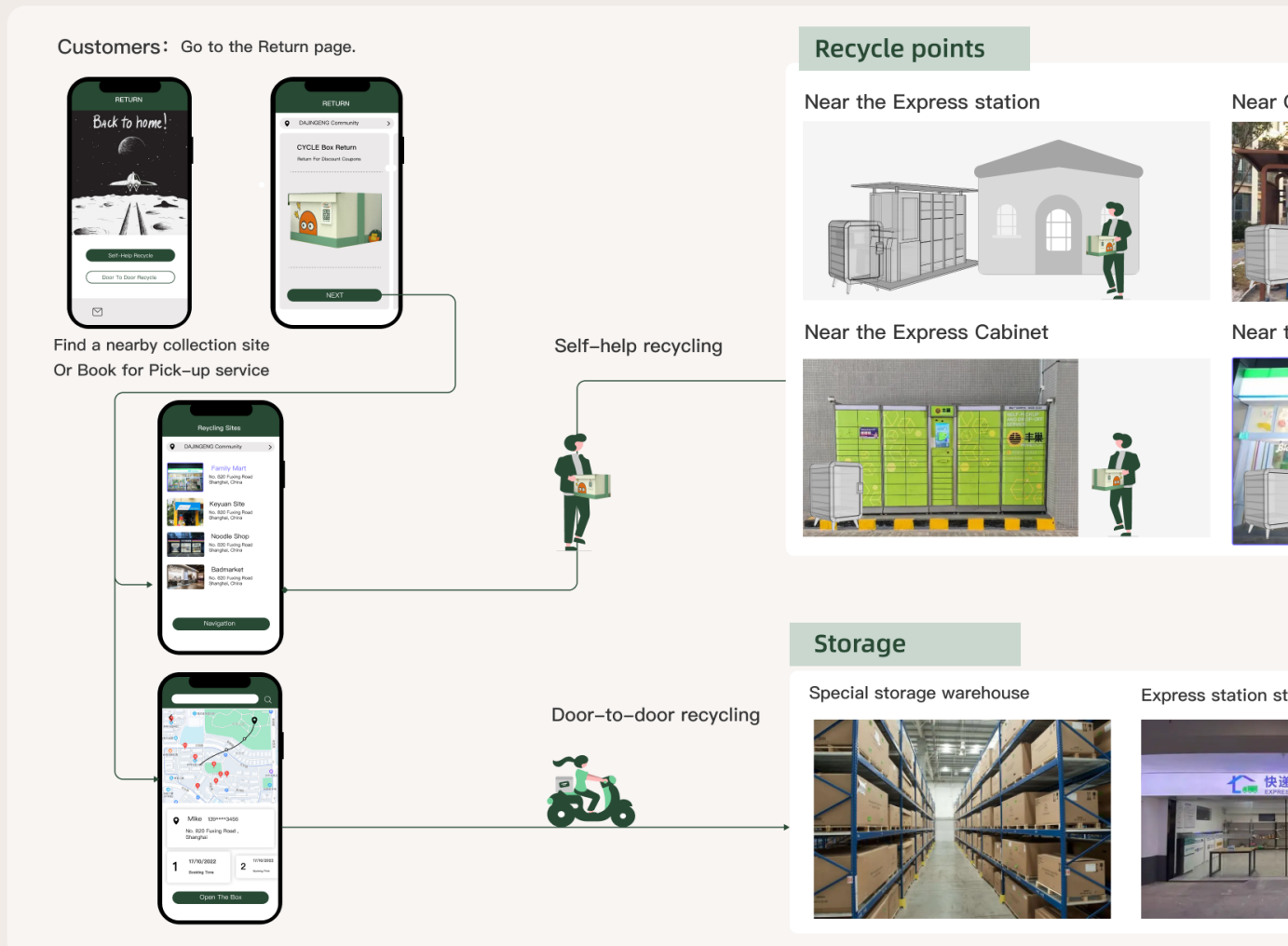
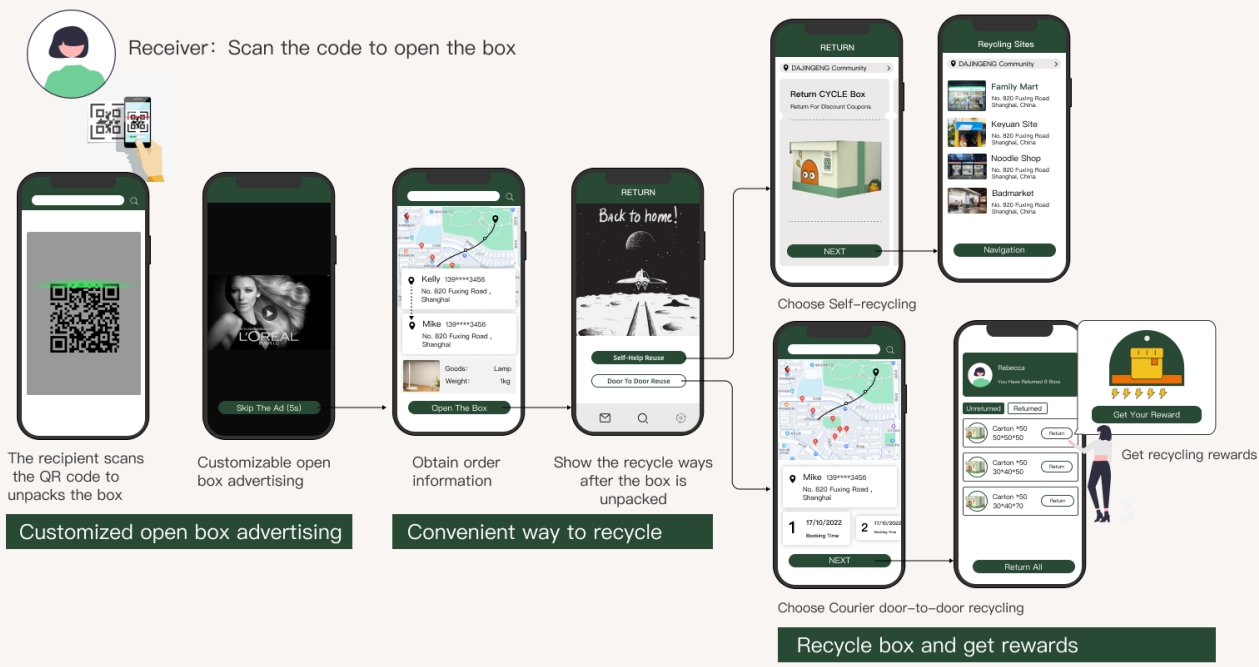


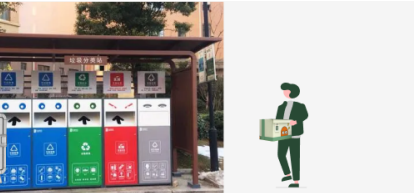
Figure 6-10. User process of Online reuse platform  
Drawn by the author



Can The Code And Unpack The Box



Garbage station



the convenience stores



Shopping mall: Reovery the cycle box



Cafe bar: Reovery the cycle box



Storage sites



Recycled box



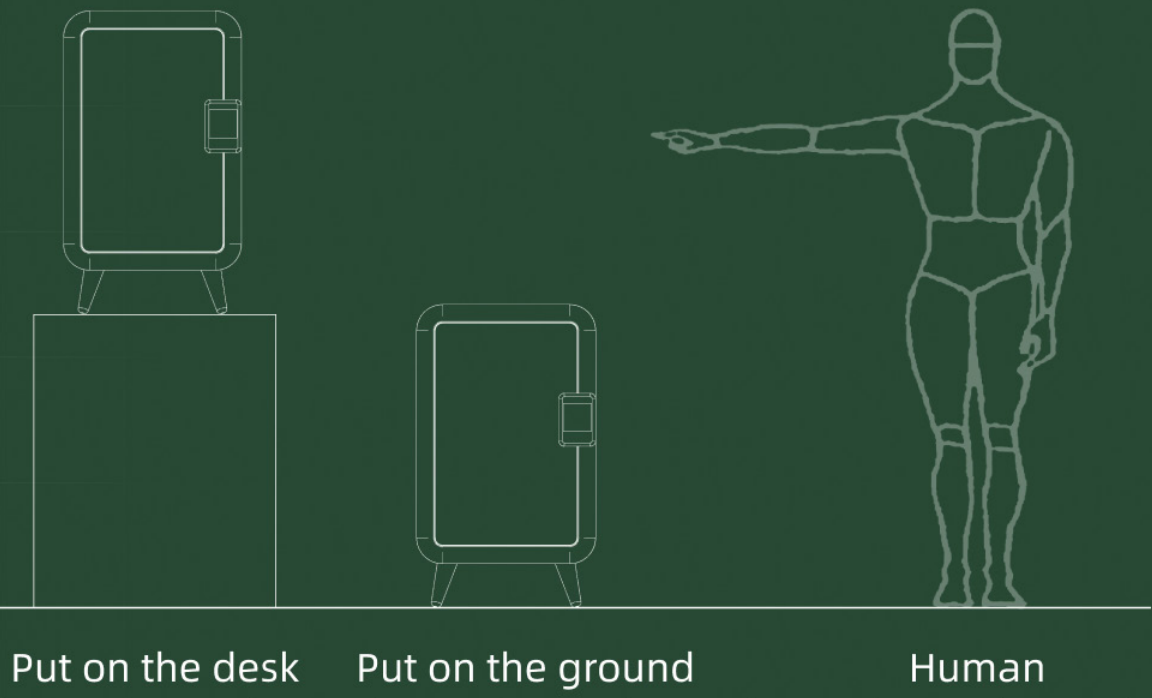
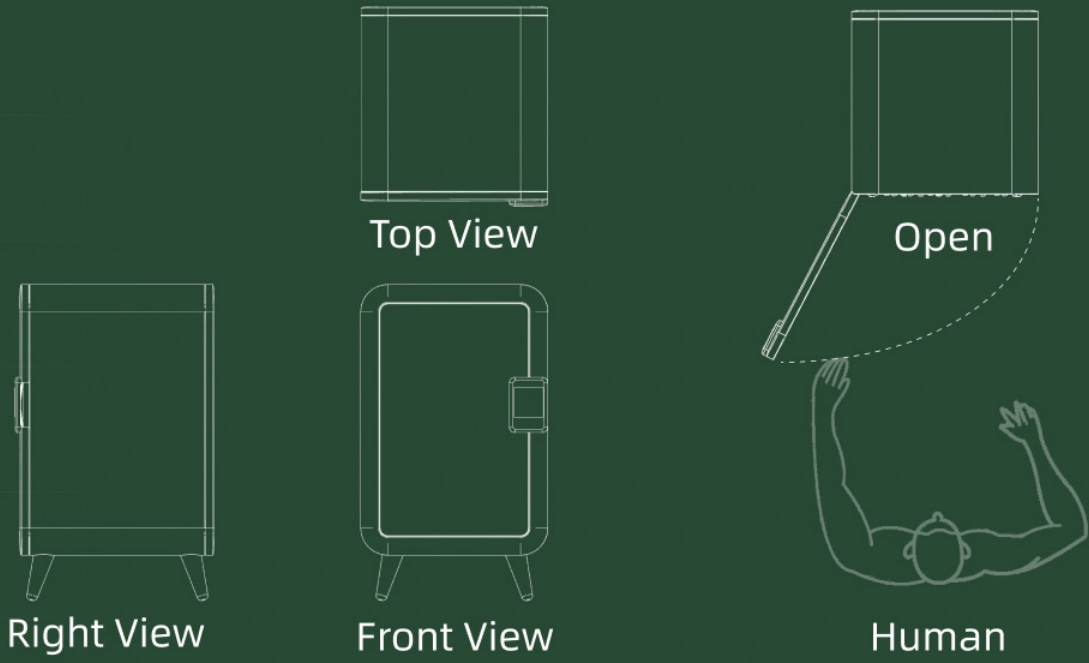
Users' orders



## 6.4 Smart Recycling Bins



Figure 6-11. Sizes and three views of Recycling bins  
Drawn by the author



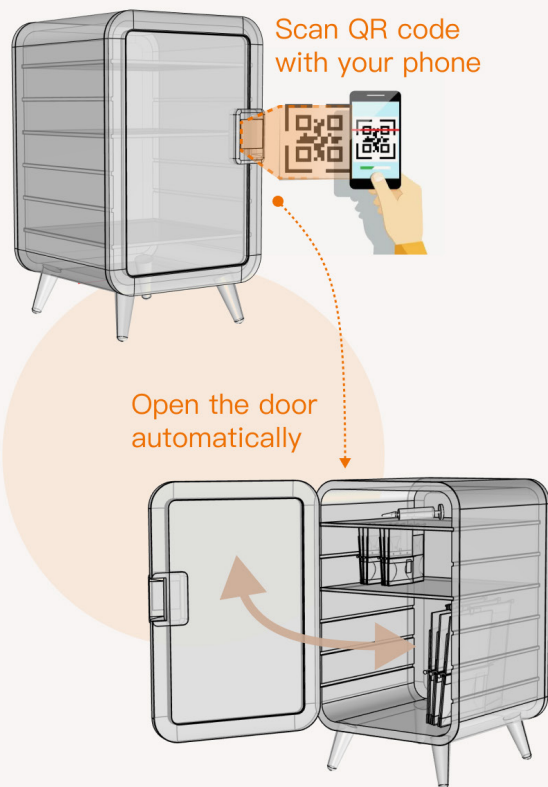
## Design Instructions For The Intelligent Recycling Bin

### Traditional Recycling Way



- **Scan QR Code To Open**

Users complete the recycling process independently, which is more efficient



- **Rad**

Use Rad  
Ensure  
prevent

Close the  
of the re  
cabinet

Figure 6-12. Smart recycling bins structure drawing  
Drawn by the author



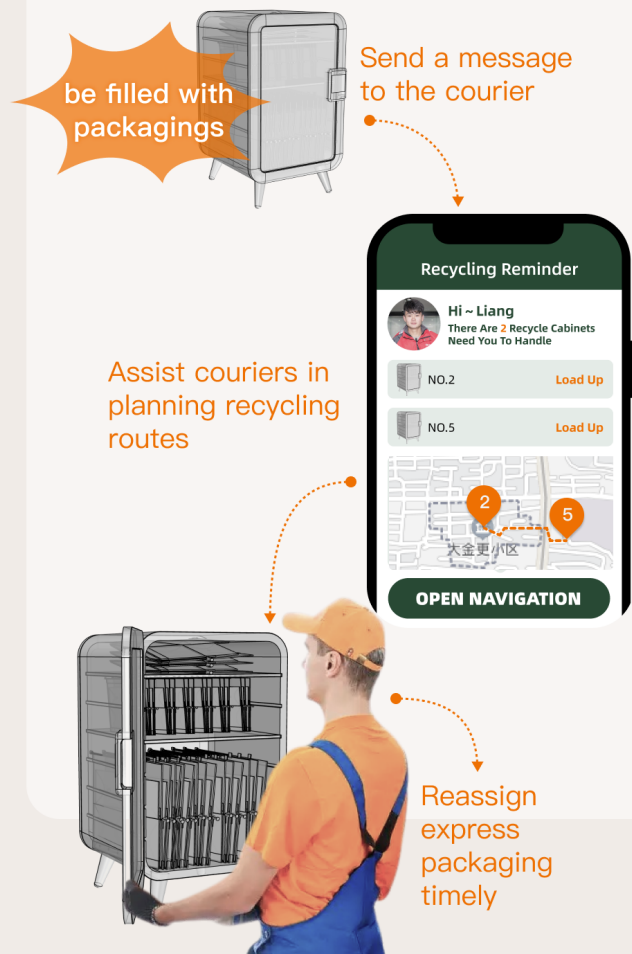
## Radio Frequency Identification

Use Radio Frequency Identification technique to improve the accuracy of packaging quantity statistics & reduce packaging loss



### • Wireless Network

## • Contact With Courier For Bulk Recycling Automatically



### 6.4.1 Smart recycling bin function

The traditional community recycling method is to recycle cartons, and at the same time, it needs to rely on the staff of the community garbage station to collect and organize. The recycling process is not efficient and intelligent, and the recycling environment needs to be improved.

The new intelligent recycling bins can be scanned and unpacked. Users can easily fold the reusable packaging and then put it into the recycling bins. After the user closes the recycling bins' door, according to Radio Frequency Identification technology, the recycling results can be directly recorded, and the user's green account can receive corresponding recycling rewards.

Users can check the location of nearby recycling bins and whether there is room for recycling through the Green Promise mobile APP. When the recycling bins reach the maximum amount of recycling, they will automatically send a notification to the operation personnel, who will take out the reusable packaging in batches and transport them to the nearby warehouse for recycling.

### 6.4.2 Convenient recycling point

How to recycle the reusable box is our key concern. In the self-service recycling mode, users can find nearby recycling points through a mobile app for recycling.

Recycling sites are usually located near residential areas, such as next to delivery cabinets, garbage stations, convenience stores, community delivery points, etc. so that users can easily find them. Set up intelligent recycling equipment in these places. In addition, we can also cooperate with more businesses to put our recycling bins. For example, in the crowded streets, in the store with a large flow of customers, put our recycling bins. For businesses, placing recycling bins can bring more people to them, and support for low-carbon causes can also help convey a more positive brand image. For users, the more recycling boxes, the more convenient recycling, will be more willing to use the recycling box.

Figure 6-13. Convenient recycling bins distribution |  
Drawn by the author |

## Place Recycling Bins Near Residential Areas

Convenient For Residents To Recycle The Reusable Box

Near the Express station



Near Garbage station



Near the Express Cabinet



Near the convenience stores



## Cooperate With Commercial Entity With High Traffic To Place Recycling Bins

**For Reuse System:** More Recycle Points Will Provide More Convenient Recycle Service

**For Store:** Attract More Customers & Use Reuse Value To Shape Their Own Brand Image

Business street



Chain restaurants



Coffee shop



Shopping mall



Chain supermarket

07

# Conclusion

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## 7.1 Summary Of Reuse System

The rapid development of e-commerce in China has led to a surge in the number of express deliveries. However, there are many problems with the recycling and utilization of existing express packaging, such as:

- 1) a lack of effective packaging recycling mechanism, resulting in a low recycling rate;
- 2) Mixed express packaging of various materials makes it difficult to classify and recycle;
- 3) The mechanization and automation ratio in the recycling industry is too low, resulting in high labor costs.
- 4) The public also lacks corresponding recycling awareness and low participation in recycling.
- 5) The government lacks support and rewards for the recycling of express packaging, relying solely on some express delivery or e-commerce enterprises to operate independently, making it difficult to handle it on a large scale. But in response to the United Nations concept of sustainable development and the challenge of reducing carbon dioxide emissions. China urgently needs to explore an environmentally friendly and effective way to recycle express packaging.

Recently, globalization and sustainability have led to an increase in design complexity, which has brought challenges to design and made traditional design methods inadequate. The systemic design integrates System thinking and people-oriented design, aiming to help designers cope with complex design projects. It is very suitable for solving the packaging problem of express delivery in China. Therefore, the main research question of this article is "How to adapt systemic design thinking to reduce the quantity of the express packaging margin, specifically in the background

of the rapid development of e-commerce?" The research goal is to build an co reactive express packaging system to improve the reuse rate of China's express packaging and reduce the express garbage.

First, compare the Case study of sustainable express packaging in China and other countries; Next, conduct field research on Shanghai, China. It can be found that the independent environmental protection consumption values of sustainable recycling packaging, Sharing economy and Generation Z young user groups are very helpful to establish a new type of express packaging reuse system. Therefore, we have designed the **Green Promise** reuse express packaging platform:

- 1) Newly designed sustainable express packaging. Unlike existing express packaging, the integrated durable structural design allows the express box to be produced once and used multiple times, completely changing the human and resource consumption in the existing recycling, splitting, sorting, reproduction, and reuse processes; The replacement of QR code delivery notes allows the delivery box to reduce the waste of traditional paper labels; The built-in inflatable airbag can reduce the waste of filling materials such as plastic airbag and plastic foam; Zipper and Combination lock sealing structure can not only ensure the safety of internal express delivery, but also reduce the waste of plastic tape. Reduce resource waste from the source.

- 2) Intelligent recycling bins can achieve automated recycling and distribution of express packaging. If users want to rent express packaging, they can also search for the recycling bins near them,

scanning the QR code to open the bins' door, and select the appropriate size of the reuseable packaging. Each Intelligent recycling bin is equipped with a Radio Frequency Identification chip, which can automatically identify whether the packaging was taken away or placed in, making the packaging management more convenient. After users using the reuse express packaging, users also can scan the QR code directly to open the recycling bins, then recycle the express packaging for by themselves, and then receive a recycling reward instantly.

Many aspiring buyers and convenience stores can also collaborate with "Green Promise" to attract young customers who are also environmentally conscious by placing smart recycling cabinets in their stores, increasing their exposure opportunities, and achieving a win-win situation.

For traditional recyclers, if they find a reuseable express packaging around them, they just need to collect it and put it in recycling bins nearby, then receive rewards, without the need to sort and dispose of the packaging as before, which is more clean and efficient.

When the recycling packaging is full or there are no packaging, the intelligent recycling bin can automatically send messages to the courier, timely adjust the distribution of reusable express packaging, and improve the utilization rate of delivery boxes.

By doing so, the reusable express packagings can also reduce long-distance transportation, improve local recycling efficiency through the principle of mutual renting and nearby recycling within the city, and reduce energy consumption for meaningless long-distance transportation.

3) In addition, there is also a need for a convenient online platform, the Green Promise App, which organically combines online shopping with the reuseable express delivery system.

Young and creative consumers can collaborate with the Green Promise platform to create environmentally friendly digital collectibles, to express their unique environmental attitudes. Green Promise will select the best digital works as rewards and distribute them to users who use eco-friendly recycled express packaging by chance. Users who complete one use and reuseable express packaging, will receive green points and digital collectibles rewards. The more times they use it, the higher the chance of getting rare and precious rewards. Enhance users' enthusiasm for using sustainable packaging from the perspective of spiritual and cultural attraction.

For online merchants, they can collaborate with Green Promise to rent reusable packaging and receive free opening-box advertisement opportunity. When their customers receive and scan the QR code to open the packaging, they can see the store-exclusive advertisements, which can help online merchants shaping brand value. In addition, Green Promise App will also give a dedicated column to promote those cooperating merchants, so that more users can find and follow them.

For couriers, they can scan QR codes and intelligently plan delivery routes on their phones to improve delivery efficiency. Users can not only search for nearby recycling points on the Green Promise App to complete the recycling independently, but also make an appointment for a courier to come home to and collect packaging, which is very intelligent and convenient.

Overall, the “Green Promise” sustainable express packaging system can combine software and hardware, attract consumers and various stakeholders in both material and spiritual aspects, maintain the sustainable operation of the system, truly improve the recycling efficiency of express packaging, and reduce express waste.

According to conservative estimates of China’s existing express packaging volume, there is an opportunity to replace 5.5 billion traditional express

packages with “Green Promise” recycled packaging every year. Using a recyclable express box once can reduce carbon emissions by 37 grams, resulting in a cumulative reduction of 2,035 million tons of carbon emissions. By using QR codes to view delivery details, 31.4 billion pieces of traditional address paper can be saved annually. Zipper packaging, saving 43 million packages with plastic tape that can wrap around the Earth.

# The Green Promise Reuse System

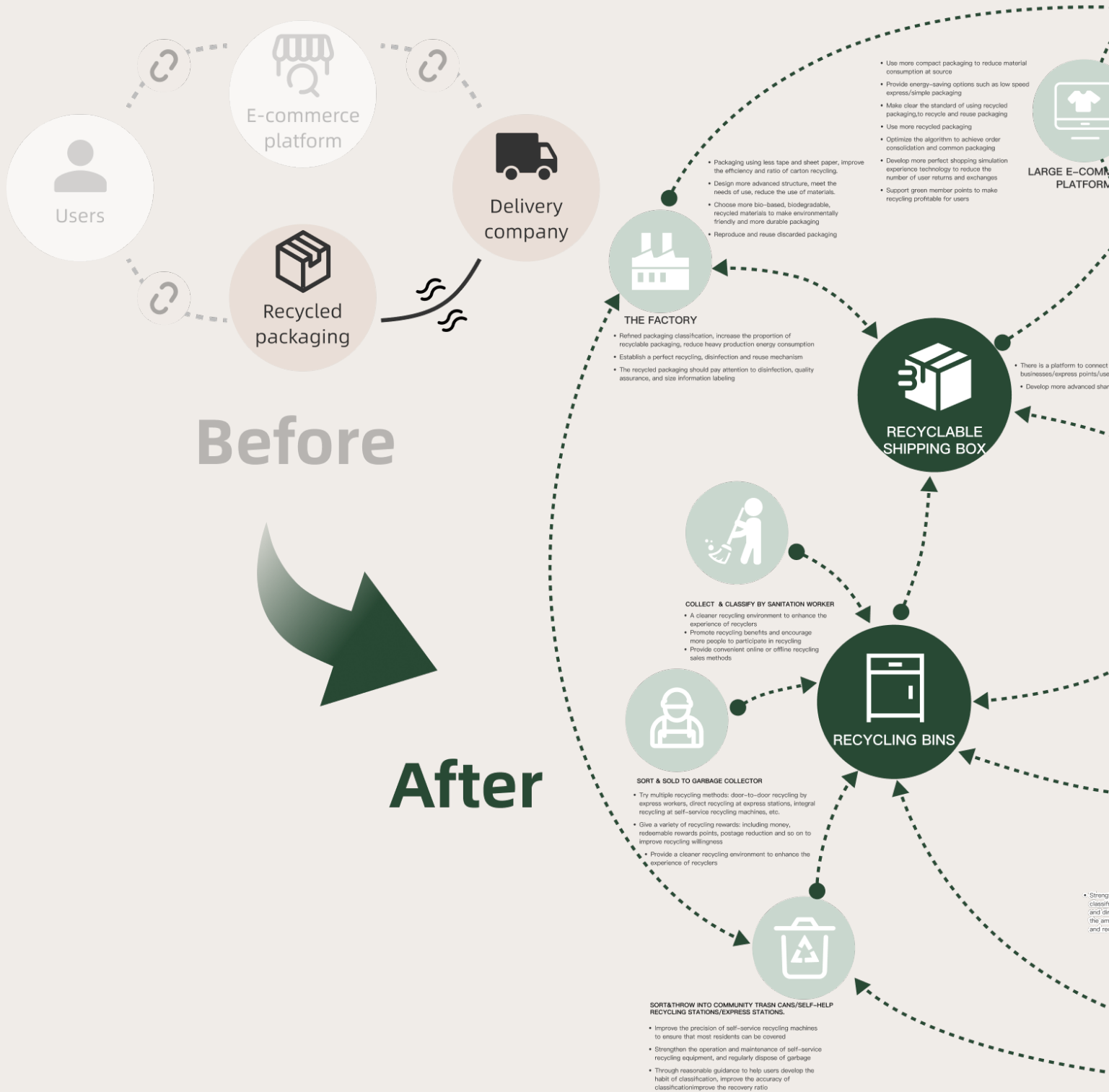
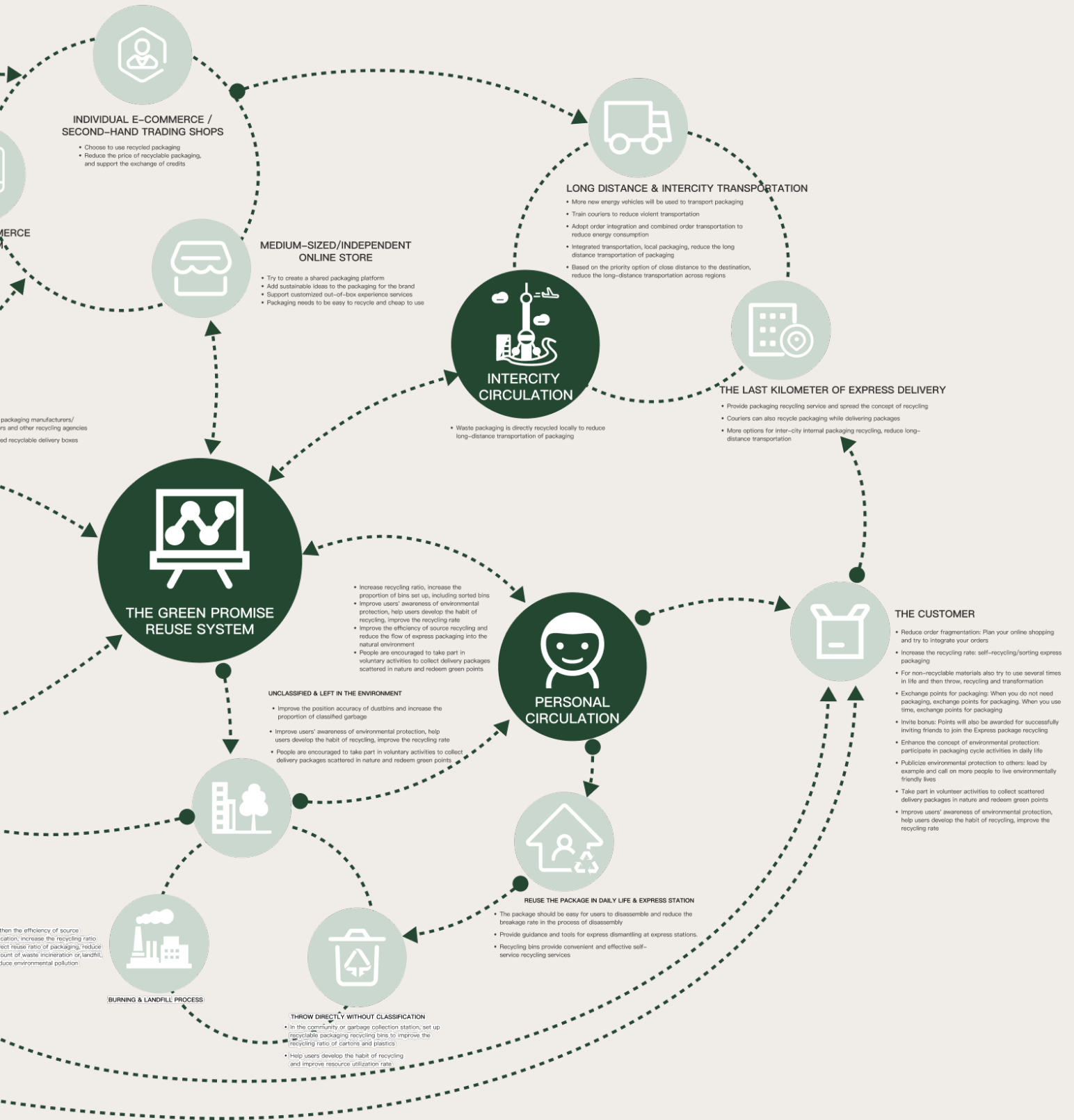


Figure 7-1. The Green Promise Reuse system map  
 Drawn by the author





## 7.2 Advantages Of Reuse System

The new express reuse system designed by us has the following advantages:

1. By replacing the existing packing boxes with recycling boxes, the amount of garbage caused by express packaging can be reduced, Can reduce the consumption of resources and environmental pollution. The reusable packaging can be recycled many times, and the additional cost is the energy consumption of recycling and reshipping them, but these can greatly reduce the consumption of

resources compared to reproducing thousands of boxes.

2. Reduce the use of sheet paper and tape. Express packaging will use a lot of tape, and the use of tape not only aggravates the white pollution, but the separation of the carton from the plastic tape also increases the cost of recycling. At the same time, sheet paper is also a large consumption. Reusable packagings avoid the use of tape, through zippers and smart locks, to achieve pack-



Figure 7-2. Summary of Advantages  
Drawn by the author

aging. At the same time, in the process of express transportation, the machine can scan the QR code to obtain the logistics information of the box, and carry out automatic sorting operations.

3. The recovery process is simplified and the recovery efficiency is improved. The nearest recycling bin location can be retrieved through the mobile APP. The reusable packaging box design is easy to fold and users can operate it. Intelligent recycling bins with high distribution density can provide convenient recycling services. Mass recovery and transportation, improve the efficiency of circulation.

4. The recycled recycling boxes meet the local delivery demand first and are stored in the recycling warehouse in the city to reduce unnecessary long-distance transportation of empty recycling boxes. In the operation system of recycling boxes, we set up warehouses in different regions of the country. The recycled recycling boxes first enter the city's warehouses. When there are insufficient or excessive recycling boxes, they can be stored or supplemented through regional warehouses. The warehouses in different regions can also communicate with each other to achieve a balance of use and avoid unnecessary long-distance transportation of recycled bins.

## 2 QR code sheet reduces waste of paper sheet



## 4 Urban circulation rather than long-distance transportation



## 7.3 Considerations Of Reuse System

### 7.3.1 Current status and limits

The entire green promise reuseable express packaging system has a complete design, including reuseable express packaging, smart recycling bins, and intelligent reusing App.

But the entire plan is still in a basic conceptual stage and has not yet been implemented into practical life. So the design still has the following limitations:

#### 1) Lack of financial and human support

Whether it is the production of sustainable packaging models, the prototype development of intelligent recycling bins, or the development of apps, it requires a significant amount of funding and more technical support. But authors are only two students who lack deeper technical and economic resources to further promote the implementation of the project. So we can't really put this project on the ground. At the same time, due to time and resources, our reusable box has not made an actual model, but we think that if we have the opportunity in the future, this model will actually be made and verified.

#### 2) Lack of verification of real usage scenarios, unable to further optimize the design

Design is a reflective practice, where a solution is being designed, it's not the end, but the beginning. The design project needs to be applied in real life scenarios, to discover problems, and iteratively optimize them continuously, in order to make it a truly excellent solution. Currently, there is only a draft plan that has not been optimized, in the process of design landing, there are actually many

details that need to be considered and optimized. So there is a big space for improvement.

#### 3) Lack of verification of business model

We considered the simple business model of this design, hoping to attract more users by making corresponding design points for different types of users. We hope to gain enough users so that the project can offer a wider range of services and become profitable. However, in the actual business environment, whether we can achieve the desired effect has yet to be verified.

At present, our design plan still takes Shanghai as the main promotion area. Shanghai is a relatively developed city in China with relatively high level of hardware facilities and personnel services. If the experience of Shanghai can be replicated and promoted to the whole country, it also needs to be verified.

So we still need to think more about the business model of the program, how to make sustainable profits and how to carry out large-scale promotion and so on.

### 7.3.2 What we have learned

The whole project was very challenging for us, to understand the current situation of express packaging, to understand different user groups, to look at the solutions that exist in the market, to develop our own ideas. But we also learned a lot from the process, Especially looking at problems and finding solutions from a systemic perspective.

#### 1) Pay more attention to sustainability

Sustainable development is an important issue in



today's society. As global environmental problems become more and more serious, it is worth thinking about how human behavior can reduce its impact on the natural environment.

At present, with the rapid development of e-commerce business, the pollution problem of express delivery in China is becoming more and more serious. After receiving express delivery, I will also worry about the impact on the environment when I face a pile of unpacked express packages. So when I did this project, I was also very interested. Through the research of the project, I pay more attention to the whole life cycle of the product design, whether it can reduce the consumption and waste of substances through some designs or cooperation, and achieve a balance of the system.

## **2) Focus not only on design but also feasibility**

The design scheme we give is not only a simple product design or app design, but also a set of packaging system. Therefore, it involves the extensibility and practicability of the scheme. Actually in the design process, we focused more on how to attract different users to use our products, including merchants, ordinary users, couriers and so on; We study how reusable packaging boxes can be easily and cheaply recycled and how operating costs can be reduced; We study how to design the express boxes which can reduce the use of disposable consumables and improve the reuse of resources. We think these are very important parts of our design scheme.

After thinking about these points, I think our design scheme has a greater possibility to be promoted and implemented in real business practice, and can achieve a win-win situation of economic and environmental benefits.

## **7.3.3 Optimization opportunities**

Although the entire solution has not been tested in daily life and has its own limits, but it aims to fundamentally enhance users' awareness of environmental sustainability and is committed to solving problems from a systematic perspective. There is still a lot of optimization space and opportunities, as shown below:

### **1) Seeking diverse stakeholders to participate in project design, not just as research respondents**

The design team also needs experts and stakeholders from various disciplines and industries to collaborate together. However, the current research only has two design student authors and lack the diversity in personnel. In the future, We should also be more open to inviting various users and industry practitioners to participate.

### **2) Seeking cooperation or support from relevant companies and organizations**

At present, China's express delivery companies or e-commerce companies have also promoted some recyclable express boxes, but for various reasons, they have not been applied on a large scale. They have the money, technology and workers, and if we can do relevant collaborative research, maybe we can get more inspiration from each other. Our program is also possible to carry out real promotion and landing practice.

So seeking support from relevant companies, organizations, and institutions that are equally concerned about this issue maybe we can get more professional feedback and support!

### **3) Optimizing the reuse system by continuous practice and reflection**

Starting from the MVP model (Minimum Viable Product), in actual usage scenarios, search for a target user experience model to quickly validate the feasibility of the solution at the lowest cost, and continuously optimize the structure, materials, and recycling service experience of the express box, continuously optimizing and improving the solution.

**4) Apply for patents for good solutions, to facilitate commercialization implementation**

For high-quality solutions that have been tested, can apply for patent protection to facilitate subsequent business cooperation negotiations and establish a self-supporting sustainable business model.



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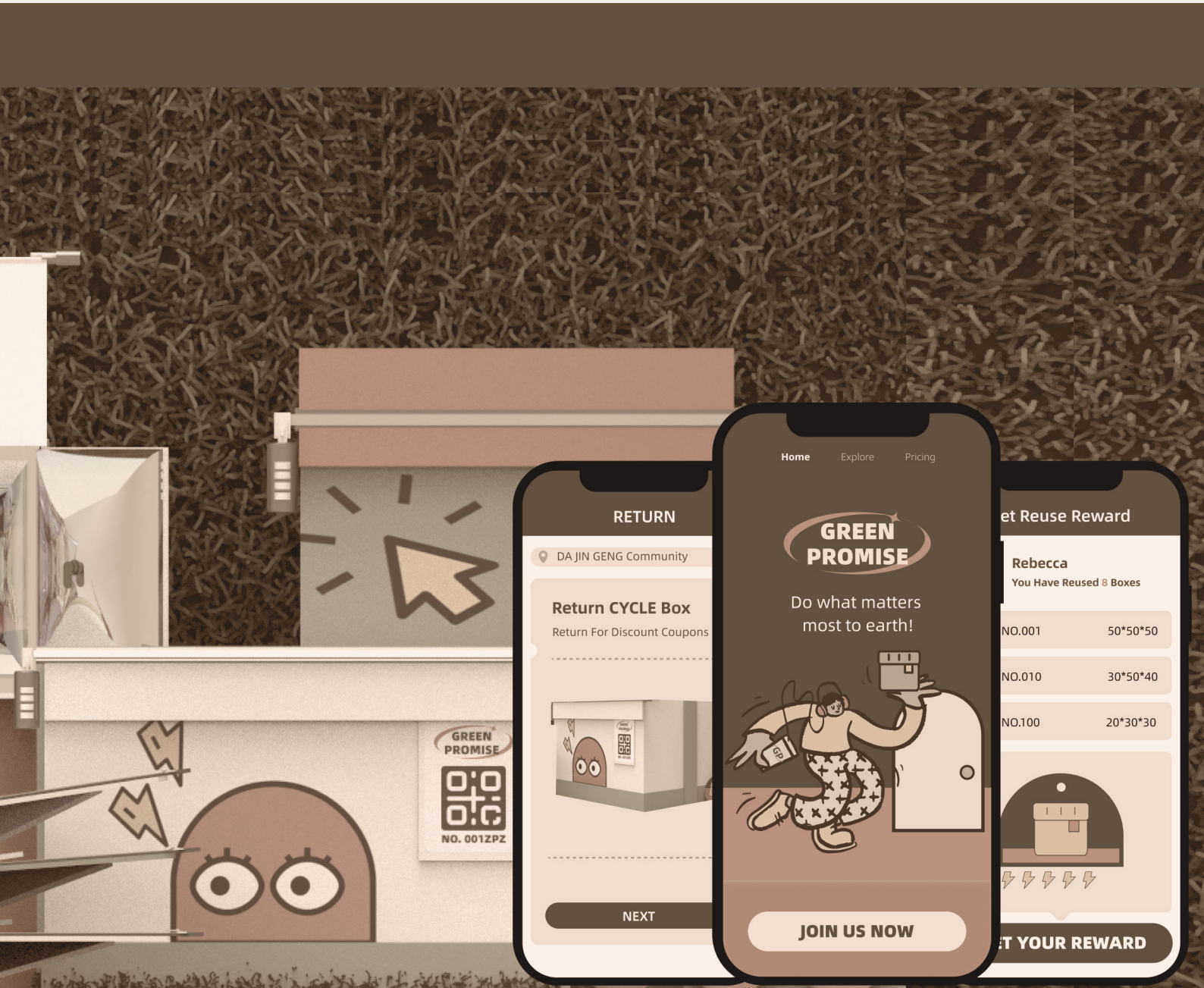
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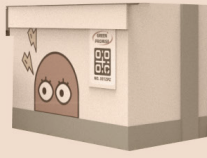




RETURN

DA JIN GENG Community

**Return CYCLE Box**  
Return For Discount Coupons



NEXT

Home Explore Pricing

**GREEN PROMISE**

Do what matters most to earth!




**JOIN US NOW**

Get Reuse Reward

**Rebecca**  
You Have Reused 8 Boxes

NO.001	50*50*50
NO.010	30*50*40
NO.100	20*30*30



**GET YOUR REWARD**