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Research on reverse logistics recycling mode of public welfare snack box based on circular economy

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Abstract: *Circular economy is the efficient use of resources and protection of the environment, reverse logistics is an important link in the realization of circular economy, the circulation process of circular economy cannot leave reverse logistics.[1] Therefore, focusing on the circular economy, construct a reverse logistics recycling model for public benefit small meal boxes that includes operators, takeout platforms, platform catering businesses, consumers, third-party catering recycling and cleaning enterprises and meal box manufacturers. Analyze the current recycling status of takeout food boxes, the business model of public benefit small meal boxes and the interests of related parties in reverse logistics recycling mode. To develop reverse logistics and promote the development of circular economy is to realize the coordinated development of environment, economy and society.*

Keywords: *Circular economy; Reverse logistics recovery mode; Environmental costs*

1. Overview of related concepts and theories

1.1. The circular economy

1.1.1. The meaning of circular economy

In the course of economic development, we should reduce, recycle and make waste harmless, so that materials in the economic system and natural ecological system can circulate harmoniously, maintaining the balance of natural ecology is an economic growth model with the efficient utilization and recycling of resources as the core and the principle of "reduction, reuse and recycling", which conforms to the concept of sustainable development. It is a resource-saving and environment-friendly economic form. It reconstructs the economic system according to the laws of material circulation and energy flow of the natural ecosystem, makes the economic system harmoniously incorporated into the process of material circulation of the natural ecosystem, and establishes a new form of economy. Circular economy is a process of comprehensive utilization of energy and its wastes in the way of clean production under the guidance of sustainable development. It requires economic activities to be organized into a "resource-product-renewable resource" feedback process; It is characterized by low extraction, high utilization and low emissions.[2]

1.1.2. The "3R Principle" of circular economy. [3]

1.1.2.1. Principle of reduction (Reduse)

The principle of reduction is aimed at the "input side", which uses less raw materials and energy, especially environmentally sound resource inputs, to achieve established production and consumption targets. This principle pursues resource productivity (as opposed to Labour productivity). We need to improve not only labor productivity, but also resource productivity, including water productivity, land productivity, energy productivity and so on.

1.1.2.2. The reuse principle (Reuse)

The reuse principle aims at the "intermediate process", extending the time intensity of products and services, requiring that manufactured products and packaging containers be reused repeatedly in the initial form, and requiring manufacturers to extend the service life of products as much as possible. This principle pursues the repeated utilization of resources. The high repeated utilization rate not only improves the resource productivity, but also reduces the output value or the pollution emission rate of the product.

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1.1.2.3. The reresource principle (Reresource)

The principle of recycling is aimed at the "output end", which requires that the discarded products can be transformed into renewable resources, recycled raw materials or energy through processing and re-entered into the production field. This principle pursues a waste recycling rate. The high recycling rate of waste can reduce the pressure on resources and the environment.

1.2. Circular economy development theory

1.2.1. Introduction of circular economy concept and theoretical research stage (1990 to 2002).

In 1998, the "3R" principle used by Germany to achieve remarkable economic results was introduced into our country for the first time, and has occupied a guiding position based on its advanced nature of the concept. The National Ministry of Environmental Protection and other relevant government departments began to advocate the development concept of circular economy throughout the country. This stage focuses on the theoretical research of circular economy, aiming to fully understand and master the core ideas and essential contents of circular economy, and let the society begin to understand and gradually accept circular economy through propaganda and other ways.

1.2.2. National emphasis and strategic decision-making phase (2003 ~2005).

Our economy develops rapidly, but the contradiction between economic development and resources and environment is increasingly obvious. At the same time, circular economy is developing rapidly in western developed countries. In view of this, the country attaches great importance to the strategy of developing circular economy and promotes scientific development with new industrialization.

1.2.3. Comprehensive pilot and continuous promotion stage (since 2006).

Many laws concerning environmental protection and management and utilization of resources have been established in our country. On January 1, 2009, the Circular Economy Promotion Law came into effect. The implementation of this law is an important symbol that China's circulation economy has entered a new stage. Since then, nationwide pilot work has been fully launched. At present, circular economy is showing at the beginning in some provinces and cities and industry, especially regional circular economy with ecological industrial park as carrier has gained rich experience, which has established a certain foundation for our country to develop circular economy in an all-round way.

1.3. Reverse logistics

Reverse Logistics refers to the process in which a merchant customer entrusts a third-party Logistics company to deliver the delivered goods from the location specified by the user to the location of the merchant customer. Reverse logistics can range from used packaging to processed takeout boxes, returns of unsold goods to machine parts. In other words, reverse logistics includes the flow of products and their packages, takeout boxes, parts, materials and other materials from customers. In short, reverse logistics is the process of recycling used, outdated or damaged products and packaging from customers, starting with final disposal.

1.4. Reverse logistics recovery mode

Reverse logistics recycling mode refers to the recycling of customers' used recyclable meal boxes to each node in the supply chain. It includes two kinds of material flow: direct resale product flow (recycling → processing → cleaning → distribution) and scrap product flow (recycling → reprocessing → distribution). In order to improve the use and recycling efficiency of charity snack boxes and further improve the utilization rate of resources, the reverse logistics recycling mode of charity snack boxes has the following four requirements: First, we will establish a supervision and disclosure system for the sanitary conditions of public welfare snack boxes, and accept the supervision of businesses and consumers on public welfare snack boxes; Second, improve the management of merchants' access to charity snack boxes and reduce the cost of using charity snack boxes; Third, to strengthen the public welfare small meal box publicity work, improve the understanding of businesses and consumers to the public welfare small meal box; Fourth, we should optimize the distribution of the recycling cabinet of public lunch boxes to facilitate consumers to return their lunch boxes. The reverse logistics recycling flow chart of charity snack boxes is shown in Figure 1.

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Figure 1: Flow chart of reverse logistics recycling of public service snack boxes

1.5. Environmental costs

Environmental cost, also known as environmental degradation cost, refers to the cost of environmental service function quality degradation due to environmental pollution caused by economic activities. In a commodity production activity, from resource extraction, production, transportation, use, recovery to disposal, all the costs required to address environmental pollution and ecological damage.

Environmental degradation cost is divided into environmental protection expenditure and environmental degradation cost. Environmental protection expenditure refers to the actual value paid to protect the environment. Environmental degradation cost refers to the value of environmental pollution loss and the value that should be paid to protect the environment.

2. Analysis of the recycling status of take-out meal boxes

2.1. The recycling status of takeout food boxes

With the rapid development of the Internet, the scale of takeout in O2O mode keeps expanding. According to Analysis visualization monitoring data show, in 2017, the scale of China's Internet food delivery market reached 207.8 billion yuan. It is expected that the Internet food delivery market will continue to grow in the next three years, and the transaction scale of China's Internet food delivery market will reach 598 billion yuan by 2020, as shown in Figure 2.

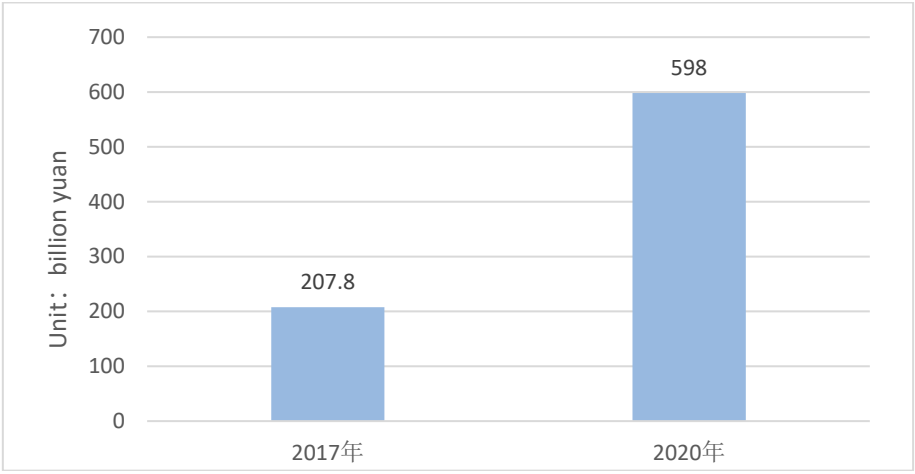

Figure 2: Chart of China's Internet food delivery market size

In such a huge takeaway market, the processing and recycling system for takeaway boxes is still in an initial stage. At present, there is no large-scale use of new recyclable environmental protection

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materials in domestic take-out food boxes. Most of them use polypropylene (PP) plastic food boxes, disposable paper food boxes and other plastic food boxes. In addition, due to the lack of standardized measures and requirements for the use of meal boxes in the takeaway industry, some businesses choose to use cheap disposable foamed plastic meal boxes to save costs, which makes the difficult situation of meal box recycling even more severe. At present, only a small part of PPT plastic meal boxes are recycled by small waste recycling stations or scavengers, while the rest of the recyclable resources are regarded as useless household garbage, which is mixed and recycled together for incineration or landfill treatment. Categories and characteristics of common takeaway food boxes:

2.1.1. One time bubble delivers the takeaway meal box

One-time bubble send take-away lunch box is one of the biggest harm when food temperature over 65 degrees, it will release bisphenol A and other toxic substances, infiltration of food, and poly acrylic in the synthesis process, if not completely polymerization, can cause dimers, trimer dissolution, these substances will cause harm to liver, kidney.

2.1.2. PP plastic meal box

Made of polypropylene, because polypropylene is relatively high temperature resistant, its maximum temperature is about 150 degrees, polypropylene meal box transparent, strong, and non-toxic harmless. The general use of music buckle box is this material, and in the disposable fast-food box also has its figure. However, due to the high stability of plastic chemical properties, the molecular chain is not easy to be destroyed, not easy to be decomposed by microorganisms, so it will cause certain pollution to the environment.

2.1.3. Paper meal boxes

The raw materials are mostly wood pulp, which is pressed and shaped by stamping molding tools, and then coated with chemical additives on the surface to prevent water seepage. The paper meal boxes are also non-toxic and harmless. In some high-end take-out shops, they usually choose this kind of tableware to package food, which looks delicate. However, this kind of meal box often consumes a large amount of wood, which is not conducive to environmental protection.

2.2. There is a problem with takeout box recycling

With the rapid development of technology and economy, takeout platform, as a new product of Internet technology, has become a convenient choice for people to order food online. At the same time, the increasing number of online food orders has brought serious environmental pollution problems. The reasons why it is difficult to recycle meal boxes are mainly reflected in:

2.2.1. The number of takeout boxes is increasing

A study by an environmental group found that more than 60 million food boxes are consumed every day. If each box is 5 cm high, the height of each box is the same as 339 Mount Qomolangma.

2.2.2. Greasy meal boxes are difficult to recycle

Usually, there will be oil stains on takeaway food boxes. Most people put the unwashed food boxes directly into the trash can, which leads to the non-recycling of oily food boxes and causes "secondary pollution".

2.2.3. Consumers have poor awareness of environmental protection

At present, the garbage classification system in China is not perfect, and most residents have not formed the good habit of garbage classification, which indirectly leads to the low recovery rate of takeaway food boxes, the disposable plastic food boxes mixed with household garbage, and then incineration or landfill, which will have a great impact on the environment.

2.2.4. Takeout boxes are scattered and have few recycling channels

At present, a complete recycling system has not been built, resulting in a small number of meal box recycling.

2.2.5. The recycling cost of takeout meal boxes is too high, and the recycling willingness of enterprises is weak

The takeaway box is made of simple materials, and the recycling cost of the box is not proportional to the profit, so it is not popular in the recycling market.

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2.2.6. The relevant laws, regulations and policies are not perfect, and the supervision and management system is not perfect

There are no mandatory policies to support the recyclable meals boxes in our country, the lack of industry standards and operational rules, the lack of supervision and management system, which leads to the development lag of recyclable meals boxes.

3. Innovating the reverse logistics recycling mode of public welfare snack boxes under the background of circular economy

3.1. Correlation between circular economy and reverse logistics recycling mode of public service snack boxes

Circular economy is an ecological economy that combines clean production, resource recycling, waste efficient utilization and sustainable development under the guidance of ecological laws.The reverse logistics of public service small meal boxes is to standardize the recycling and management of food boxes for sale with the theme of "reduce, reuse and recycle".The establishment of the reverse recycling logistics mode of public snack boxes and the integration of intelligence, technology and other elements in the recycling and recycling of takeaway boxes can save a lot of land resources and reduce the pollution and damage to the environment.From the connotation of circular economy and reverse logistics, we can see that both circular economy and reverse logistics are aiming at saving resources, protecting the environment and improving the utilization rate of resources, so as to alleviate the current situation of resource shortage and ecological deterioration.The realization of circular economy needs reverse logistics, which is the embodiment of circular economy in the field of logistics.The development of circular economy will increase the demand for reverse logistics, which will also promote the development of reverse logistics recycling mode of public welfare snack boxes to a certain extent.

3.2. Feasibility analysis of reverse logistics recycling model for public service snack boxes

3.2.1. Economic feasibility

The essence of the reverse logistics recycling mode of public service small meal boxes is to recycle, clean and disinfect used takeaway food boxes to regain their use value and reduce the pollution and destruction of the ecological environment caused by disposable non-degradable plastic food boxes.The circular economy is also the integration of clean production, resource recycling, ecological design and sustainable development to achieve reduction, recycling and harmless.It can be seen that the fields involved in reverse logistics and circular economy overlap in a large part.Therefore, the development of reverse logistics in the field of circular economy is actually an important part of the development of circular economy.In OUR country, the development time of circulation economy and reverse logistics is not long, the utilization rate of resources is low, the space of circulation economy and reverse logistics is still very great, the development of reverse logistics is beneficial to the smooth realization of circulation economy.Therefore, when vigorously developing circular economy, the government should change its concept, fully realize the important role of reverse logistics in circular economy, and incorporate the development of reverse logistics recycling of public welfare snack boxes into the development plan of circular economy in this region.At the same time, appropriate preferential policies should be formulated to encourage the development of reverse logistics. As catering enterprises should also bear the corresponding social responsibility, put reverse logistics into the strategic plan of catering enterprises, pay attention to the management of reverse logistics, so as to make it a new profit growth point of catering enterprises.

3.2.2. Environment feasibility

In circular economy, in the process of resource development, resource transformation, product production, transportation and consumption, there will be damaged goods, waste goods, household garbage and other wastes and renewable resources, which can be recovered, treated and reused.The reverse logistics recycling mode of public service snack boxes connects the production, use and recycling of takeaway food boxes smoothly, forming a closed cycle process, realizing multiple recycling of resources, improving the efficiency of circular economy and reducing the intensity of environmental pollution.

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3.2.3. Technical feasibility

At present, when we advocate independent innovation, we should increase the research and development of related technology IN reverse logistics field.The design of this product, in accordance with the principle of improving product quality and realizing green manufacturing, carries out reverse logistics recycling of public welfare snack boxes.At the beginning of the design of the product, we consider how to recycle, clean and reuse the used meal boxes, so as to facilitate the production and reuse of products.At the same time, the reverse logistics recycling of public snack boxes can extend the connection technology between the production chain and the relevant industrial chain, the research and development of recycling and reuse technology, improve the processing efficiency of reverse logistics, reduce the cost of reverse logistics, and reduce environmental pollution.

3.3. Details on the reverse logistics recycling mode of public service small meal boxes

The main body of the reverse logistics recycling model of public snack boxes constructed in this paper mainly includes operators, takeout platforms, platform catering businesses, third-party catering recycling and cleaning enterprises and meal box manufacturers. The flow chart of this recycling model is shown in Figure 3.

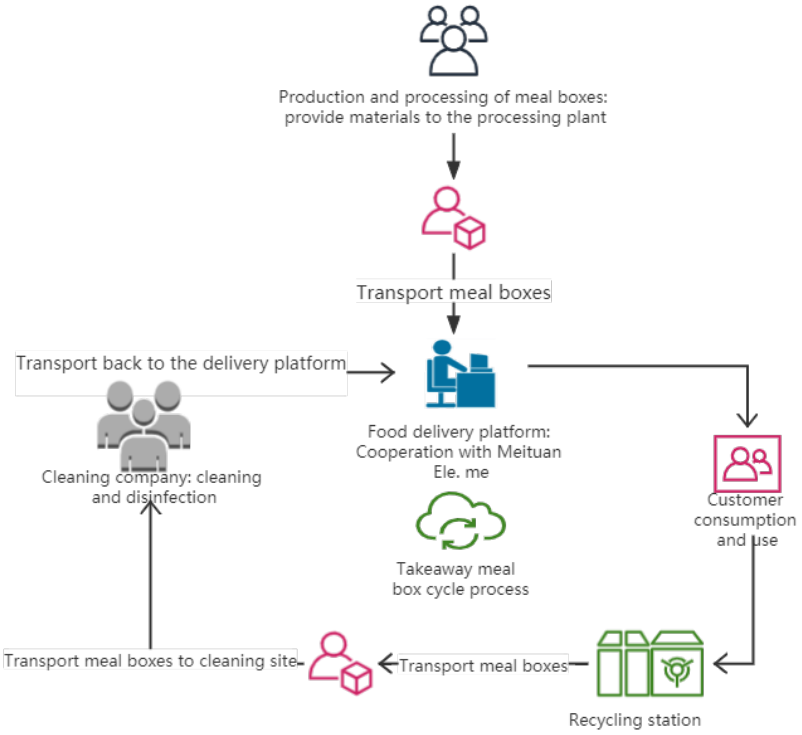

Figure 3: Pipeline network of reverse logistics recycling of public service snack boxes

3.3.1. Meal box manufacturers for public welfare small meal box production and processing

Provide new biodegradable materials entrusted boxes manufacturers for the production and processing of public small boxes, the boxes materials mainly **PBAT**, **PLA** as the main raw material, add corn biomass (polylactic acid) and compatible auxiliaries polymerization resin with biomass degradation full functions, good ductility and elongation at break, is able to recycle and reuse. Therefore, the design of such a recyclable meal box and the practice of frugality, green and low-carbon lifestyle are of great significance to the promotion of circular economy.

3.3.2. Food delivery platforms sell charity snack boxes

Relying on the cooperation with large food delivery platforms, and taking advantage of the popularity and customer resources of food delivery platforms, we will publicize and sell this recyclable small meal box on their platforms, and encourage consumers to use the meal box to reduce the environmental pollution caused by disposable tableware.At the same time, free advertising will be provided to the merchants who buy public service snack boxes on the takeout platform. The merchants

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on the platform need to carefully check the tableware options in the order information to avoid the waste caused by wrong or multiple tableware collocation.

3.3.3. The recycling of small lunch boxes for public benefit

There is a matching "ID card" and QR code on the outside of the meal box. There is a QR code scanning area on the recovery base station, which can track the real-time location of the meal box.After the meal is finished, the user will put the meal box into the nearby take-away meal box recycling base station, and get the points/energy by scanning the two-dimensional code of the box on the platform. The user can redeem the points for the platform commodities or vouchers.In addition, in this recycling mode, platform users play a supervisory role over platform merchants. For the sanitary and safety situation of tableware of platform merchants, platform users can supervise through user feedback and report on the platform, which can not only promote the effective implementation of the recycling mode, but also promote the development of environmental protection, people's livelihood, industry and economy.

3.3.4. Cleaning and disinfecting of public snack boxes

We will cooperate with reputable cleaning companies to transport the recycled meal boxes to the cleaning company, recycle and clean and disinfect the used meal boxes of consumers, and then send them back to the cooperation platform for use, so as to realize the reverse logistics recycling of the public meal boxes.

4. Business model analysis of reusable public benefit snack boxes

In order to ensure the feasibility of the recycling system of recycling meal boxes, the recycling operation mode of "production + sales + recycling" is adopted, which is as follows:

4.1. Production:

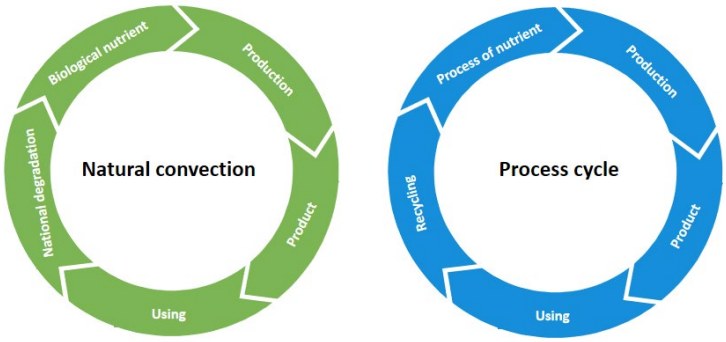

Figure 4: The "double loop" business model

With the purpose of "green and low-carbon cycle" [4] and adhering to the concept of green development, we have cooperated with environmental protection technology companies to develop a public benefit snack box with the characteristics of multiple cycles, easy cleaning, non-toxic, high temperature resistance and light quality. The samples of the developed public benefit small meal boxes are sent to the meal box manufacturers for mass production. The production process must strictly comply with the production requirements of the operator. For example, the meal box material must be degradable material, the appearance of the meal box must be printed with a special LOGO and two-dimensional code. The production of public service snack boxes follows the natural cycle and the process cycle, as shown in Figure 4.

4.2. Sell:

Adopt the circular economy model to achieve a good combination among the government, platform, merchants and consumers. We actively responded to the call of the state to promote environmental protection, and promoted the smooth progress of recycling of small lunch boxes for public benefit. The platform can encourage merchants to use charity snack boxes through incentive mechanisms, such as offering certain discounts or promotional policies to merchants who use charity snack boxes. After the meal is finished, consumers will put the meal box into the nearby recycling cabinet, and scan the

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two-dimensional code of the public welfare small meal box on the platform to get the points or energy, and the points can be exchanged for the platform's commodities or vouchers.

4.3. Recycle:

Mainly sales of new public welfare small meal boxes, drive the development of a number of industrial chains in the aspects of takeaway meal box recycling cabinet manufacturing, meal residue treatment and meal box recycling and cleaning. The third-party recycling logistics enterprises can cooperate with other companies and the property management of the community to manufacture recycling cabinets and place them in the community to recycle public food boxes. In addition, the leftovers collected by the recycling cabinet can be recycled to the relevant processing center. In order to facilitate the recycling of meal boxes, the cooperative platform merchants must use the public benefit snack boxes provided by the platform in accordance with the requirements. There is a matching "ID card" and two-dimensional code on the outside of the charity lunch box. There is a two-dimensional code scanning area on the recycling base station to track the real-time location of the lunch box, so as to realize the recycling and cleaning of the charity lunch box. Through the environmental protection technology innovation, reverse logistics recycling and circulation system design of meal boxes, it can not only promote the development of environmental protection and people's livelihood industry economy, but also reduce carbon emissions, thereby boosting the realization of the national strategic goal of carbon peak and carbon neutrality.

5. Benefit analysis of related parties in reverse logistics recycling mode of public welfare snack box

5.1. Operator

5.1.1. Operation execution

In the beginning, in order to respond to the national circular economy policy and obtain the support of the national government, the team constructed the "reverse logistics recycling model of public welfare small lunch boxes" and implemented the model at the same time. As the operator, it needs to connect with the execution subject of this mode, including the operator, meal box manufacturer, takeaway platform, platform catering business, consumers and third-party catering recycling and cleaning enterprise.

5.1.2. Income from meal box manufacturing

The operators will provide the manufacturing materials of the charity small meal boxes to the catering manufacturers, earn the price difference on the basis of their manufacturing costs and transportation costs, and sell them on the takeaway platform with the method of "small profit, quick turnover".

5.1.3. Food and beverage waste recycling income

Meal boxes usually contain food residue after use, which is collected after a simple cleaning in the recycling cabinet. Selling food scraps to specialist treatment centres, such as waste disposal companies, for further sorting and reprocessing. After treatment, it can be used to produce industrial crude oil, protein feed, bio-organic fertilizer and biogas, etc. [5], which can be sold for profit. In this way, there is no waste of materials, no pollution to the environment, but also can be made into valuable products, fully implement the circular economy "reuse", "resources" principle.

5.2. Meal box manufacturer

5.2.1. Steady sales revenue

Under the reverse logistics recycling mode of public snack boxes, the manufacturers of lunch boxes can establish long-term cooperative relations by signing relevant agreements with the operators, so as to ensure their own stable sales channels and stable production and operation.

5.2.2. Establish a good brand image

The public food box is made of new degradable and environmentally friendly materials. The food box has the characteristics of multiple cycles, easy cleaning, non-toxic, high temperature resistance and

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light weight. It can establish a good brand image of "green and low-carbon cycle" for meal box manufacturing and lay a good foundation for future development. At the same time, it can attract more customers and thus improve the business volume.

5.2.3. Secondary manufacturing saves costs and increases revenue

When the charity snack boxes are damaged in the reverse logistics recycling mode, after the third-party cleaning company cleans, disinfect and picks out the damaged meal boxes, the meal box manufacturer can recycle, process and reuse them. On the one hand, it can save the raw material cost of meal box manufacturers, on the other hand, it can broaden the business scope of meal box manufacturers. For recycled meal boxes, manufacturers can re-process and manufacture new products for sale, which can save costs and increase other income, and fully implement the principle of "reduction" and "reuse" in circular economy.

5.3. Food delivery platform

5.3.1. Get stock

In the reverse lgistics recycling model of public snack boxes, the delivery platform can serve as the investor, without necessarily investing capital. However, it is necessary to make use of the popularity of the delivery platform and the information resources of the platform's caterers and consumers to promote, publicize and sell the public benefit snack boxes in this mode. Although there will be a loss and no profit in the early stage, there will be a certain profit in the later stage in the face of China's huge population and the development of takeout industry, which will have an economic impact on the market development of circular meal boxes.

5.3.2. Establish a good corporate image

The establishment of the reverse logistics recycling mode of public snack boxes is to respond to the national circular economy development policy, save resources and protect the environment as much as possible. In addition to responding to national policies and making contributions to the national circular economy, the takeout platform can also establish a good corporate image of "low carbon circulation and enthusiasm for public welfare" and lay a good foundation for the future development of the enterprise.

5.3.3. Important Position

In the reverse logistics recycling mode of public service small meal boxes, the takeout platform grasps the information resources of platform catering businesses and consumers, occupying an indispensable and important position, which provides great convenience for the implementation of this mode.

5.4. Platform catering business

5.4.1. Saving Cost

In the reverse logistics recycling mode of charity snack boxes, the platform catering businesses participating in this mode use the charity snack boxes purchased on the takeout platform. Since the meal box is recycled, after being used and recycled and sent to the cleaning company for cleaning and disinfection, the meal box will be uniformly returned to the platform catering businesses for further recycling within the allowed number of times. The cost of circular meal boxes is reduced after amortization, which effectively saves the purchase cost of meal boxes for catering businesses on the platform.

5.4.2. Free Publicity

For the delivery platform catering businesses that use the public welfare small meal boxes in this model, after investigation, they can carry out free advertising on the delivery platform.If the caterers on the takeout platform purchase and regulate the use of public service snack boxes, and the caterers operate with integrity, the takeout platform can provide free online advertising for them, or even set up special offline advertising space for them to publicize for free.

5.4.3. Establish a good image

For platform catering businesses participating in the reverse logistics recycling mode of public snack boxes, they can improve their awareness of environmental protection and respond to national policies while making profits from sales on the takeout platform. It can set up a good image of "green

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environmental protection, circular development", increase consumers' favorable degree, drive consumers to live green, and form a benign circular economic operation.

5.4.4. Right to oversee

After receiving the cleaned cycle meal boxes, the catering businesses on the platform have the right to supervise whether the cycle meal boxes are clean and hygienic enough. If the meal box is not cleaned and sanitary enough, the operator of the model can feedback and report, and the operator will give the merchant a certain amount of compensation after verification, and investigate the cause to solve the problem.

5.5. Consumer

5.5.1. Preferential benefits

In the reverse logistics recycling mode of charity snack boxes, consumers eat the food in the containers of charity snack boxes and put the boxes into the recycling cabinet after using them. The recycling cabinet has a scanning and identification function, which can scan the two-dimensional code on the lunchboxes and track the location of the lunchboxes. Consumers can get certain points after they put them in the recycling cabinet, and the accumulated points can be exchanged for coupons on the takeout platform or some daily necessities.

5.5.2. Promote environmental awareness

The consumers used the charity small meal boxes made of new degradable and environmentally friendly materials and voluntarily put them in the recycling cabinet after use. They participate in the process of reverse logistics recycling of public welfare snack boxes, which is conducive to the cultivation and improvement of their own environmental awareness and personal quality, and also contribute to the development of circular economy in the country.

5.5.3. Right to oversee

As the users of meal boxes, consumers enjoy the right to supervise the sanitary cleaning of the public meal boxes in this model and the right to supervise the food and beverage businesses on the platform. If any problem is found, the operator can be given feedback and report. After verification, consumers can get a certain amount of red envelope compensation as a reward for supervision.In addition, the operator will continue to investigate and track the problems reported by consumers to solve the problems or make improvements.

5.6. Third partycatering recycling cleaning enterprises

5.6.1. OPERATING INCOME

In the reverse logistics recycling mode of public snack boxes, third-party catering recycling and cleaning enterprises are responsible for cleaning and disinfection, and can sign relevant agreements with the operators to establish a long-term cooperative relationship. In this era of "fast food", more and more people order takeout and use takeout meal boxes. When cyclic meal boxes are used, it is inevitable to do the cleaning and disinfection of meal boxes.The cleaning company plays a vital role in this model, affecting whether the whole model can proceed smoothly, so that the cleaning company has a stable source of income, In addition, the amount of meal boxes is very large, which can bring considerable income for the enterprise and ensure the sustainable operation of the enterprise.

5.6.2. Establish a good corporate image

Nowadays, people have very high requirements for food safety, and the biggest problem of circular meal boxes is sanitation. When the cleaning company in terms of health, eliminate people's doubts, it can establish a good corporate image of "high cleanliness, strong hygiene", bring positive impact to the enterprise, and lay a good foundation for future development. At the same time, it can attract more customers and increase business income.

6. Conclusion and prospect

This article is based on the good small boxes reverse recovery mode of circular economy research, aimed at today's large take-out lunch boxes no recycling and cause the phenomenon of huge resource

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waste and environmental pollution, puts forward the contains delivery platform, merchants, the user, the third party food manufacturers recycling cleaning companies and boxes reverse recovery model, the application of the model can realize effective recycling take-out lunch box, But it still needs to be based on certain conditions.

6.1. The government has improved relevant legislation

6.1.1. The government must clarify the recycling responsibility and reward and punishment system of food delivery platforms and box manufacturers through legislation.

As the delivery platform of the box outflow and the manufacturer of the box sales for profit should bear due legal responsibilities and social obligations. The government makes clear that the legislation can force the responsible subject to bear its corresponding recovery responsibility, and the platform or enterprise that fails to comply with the regulations can also be punished by referring to the relevant system, while the platform or enterprise with good implementation effect can be rewarded by referring to the relevant system.

6.1.2. The government provides subsidies

The large recycling volume and high recycling cost of takeaway food boxes are the main reasons why enterprises are unwilling to take the responsibility of recycling actively. Therefore, for the responsible subject of the lunchbox recycling mode, the government should establish a corresponding subsidy mechanism for its sorting cost, transportation cost and other recycling links. The perfect subsidy mechanism of the government can promote the effective completion of the recycling task of enterprises.

6.2. Food delivery platforms play a positive role

In today's social background of advocating green environmental protection, take-out platforms, as the beneficiaries of providing trading platforms for merchants and consumers, should bear the main responsibility for the disposal of outbound garbage. Food delivery platforms should formulate detailed industry norms, standards, systems and countermeasures for the use and recycling of food boxes. When fulfilling the recycling obligation of food boxes, food delivery platforms should strictly comply with relevant laws and regulations of the government and actively promote the operation of the recycling mode. In selection boxes manufacturers and third-party food recycling enterprises cleaning, take-out platform should be clear their own needs, establish a standardized screening criteria, in each region selection more efficient and reliable business cooperation, and regularly boxes of the venture evaluation to evaluate the production and recycling situation, does not conform to the requirements of enterprise for appraisal review timely rectification or replacement. In this way, the delivery platform can effectively supervise the recycling enterprises and ensure the effective reverse recycling mode of meal boxes. [5]

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