Research on the creative design of express package recycling system basis on internet

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Abstract: As E-commerce and online shopping advance swiftly and vigorously, a growing number of people choose shopping on the Internet as their major way of shopping. As the online shopping is in vogue, the problem lying in the package of express has gradually drawn people’s attention. As the data reveals, the number of paper boxes that China’s e-commerce brought about is over 10 billion. The packages of express resulted in environment pollution and waste of resources. At present, China does not yet have an efficient and comprehensive express packaging recycling system, and the only sustainable recycling design has a small application range and the effect is not obvious. For the purpose of improving the recycling rate of packages and in response to the “sustainable development strategy”, this paper, from the standpoint of consumer psychology, the real consumption situation and package recycling status quo, makes use of the Internet as the bridge to realize the design of virtual APP and recycling device, so as to form a complete recycling system of express package. This system mainly utilizes the gravity sensor, information processing system and storing and arranging device, and is backed by sophisticated techniques. The researches have shown that, the simplification of creative recycling system, the time-saving effort, high efficiency, as well as the conception of the smart classified recycling have changed the traditional way of recycling. These improvements have greatly reduced the pollution and waste that express packages caused and make the resources being used for the second time a reality.

Keyword: Express Packages; Recyclable; Sustainable Design; Green Design.
1. Introduction
The society of the 21st century is an economic society with rapid development of knowledge innovation 2.0. With the rapid development of China's Internet, online shopping has become an indispensable part of most people's lives, which has driven the rapid development of China's express industry and promoted the country's economic development and social progress. However, the rapid development of the express delivery industry has caused the waste of express packaging resources to become more and more serious, which has become an indispensable phenomenon in life. According to relevant statistics, the average daily processing volume of China's express delivery reached 85.71 million pieces, and the maximum daily processing capacity exceeded 250 million pieces. In 2018, the turnover of “Double Eleven” reached 213.5 billion yuan. It can be seen that hundreds of millions of courier boxes will be used and waste.

Considering that China's current express packaging recycling technology is backward, the recovery rate is low, the system is not perfect, and the recycling awareness is low, the large number of packaging boxes are piled up and the degradation is difficult, which brings great pressure to the ecological environment. The prevalence of online shopping has brought rapid growth in express delivery volume and the introduction of environmental protection and energy saving concepts, making the market demand urgent. At present, there is no express recycling device design on the market. Similar sustainable products only stay in the extended use of express packaging functions. Due to its limited use, it did not effectively solve the problem, especially without considering consumer needs. And our recycling system is based on the "analysis of consumer consumption patterns" as a starting point. It is a simple, efficient, and humanized product. It not only solves the current waste of express packaging in the Chinese market, but also has great market development potential.

2. Current situation and development trends at home and abroad
2.1 Domestic situation and development trend
Due to the surge in the number of express delivery caused by online shopping, the disposal of discarded express packaging has become an urgent problem, however, due to the late start of China's express delivery industry, at present, domestic express delivery packaging only has the functions of convenient use, convenient transportation, and the like, and the recycling property is poor. Most of the existing environmentally friendly express packaging designs are difficult to implement, and their practicability is poor. The discarded packaging has not been fully utilized, which indirectly leads to deterioration of the ecological environment.

In response to this situation, the existing green express packaging design in China—Maktobu tissue box (see Figure 1), This design reuses the originally used express packaging box for secondary recycling and gives it the function of express packaging tissue box. The clever idea has alleviated the current situation of waste of express packaging to a certain extent, but it is difficult to promote and use it for a long time because of its low practicality.
2.2 Current situation and development trends abroad

The use of express packaging in foreign countries is more environmentally friendly. The United States, Germany, Japan and other countries have promulgated relevant laws and regulations on express packaging, for example, regarding the recycling and reuse of express packaging. Germany proposes that packaging and waste management should be carried out in the order of "reduction, reuse, recycling and reprocessing". Designers pay more attention to the innovation environmental protection and sustainability of express recycling.

Foreign countries in the express packaging recycling, and promote "green express", such as the United States recycling packaging companies can be tax-free, Japan multi-purpose carton sorting and recycling, Germany advocates no packaging and simple packaging, and established a courier packaging recycling system. The use of various advanced technologies and innovative design patterns not only improves the environment, but also effectively improves the recycling rate and recycling awareness of express delivery. For example, a large number of recycling stations have been established in Japan, and the waste packaging that has been classified by users has been transported to a dedicated processing center for recycling and remanufacturing by means of timed recycling, collective transfer, and the like. In addition to setting up a special garbage collection station, there are also special recycling signs, such as ovals representing cartons, etc., to facilitate recycling classification.

3. Summary of recovery system achievements

The express packaging recycling system is mainly composed of APP and recycling equipment, which realizes the recycling of express packaging through humanized process, saving the cost of express delivery enterprises. Microcomputer control technology, automation technology and communication technology are adopted to solve the problems of low utilization rate, waste and serious pollution of express package and improve the secondary utilization rate.

Express packaging recycling system design. In order to improve the efficiency of express recycling and environmental awareness of secondary utilization, establish and optimize a set of recycling process from the user to the express carton —— recycling device to collect carton packaging —— carton packaging recycling.

Design and development of intelligent classification of recycling equipment. In order to simplify the recycling process and improve the work efficiency, the intelligent classification concept of the recycling device is proposed on the basis of the traditional recycling bin. The
recycling and classification by mechanical movement not only saves space, but also saves time and effort for the courier in the packaging recycling process.

Humanized recycling APP design. Due to the weak environmental awareness of many users, the innovative design of this recycling system starts from the consumer psychology of the user, and links the points earned after the recycling with welfare contact, on the contrary, overdue non-recycling will directly affect user reputation through data identification. Through humanized layout, content and function design, the APP takes full account of the psychological needs of users and the Courier, so as to improve the experience between users and the recycler.

4. Innovative design of express packaging recycling system

4.1 Recycling APP design

Recycling APP development, using the "Internet" as a bridge, design an easy-to-use, user-friendly app, and connect the payment terminal to the APP by analyzing the user's consumption. APP is divided into "data identification module, data processing module and management background module". First, the user scans the code, and then delivers the courier box, and the data identification module further identifies the user information and the carton quality QR code and the like, and feeds the information back to the processing module system; The data processing module analyzes and converts the feedback information into corresponding integral values, synchronizes the integral value to the recovery device through the Internet, and completes the recovery of the express package by the recovery device; The management background module is associated with the courier company, and the relevant data is synchronized with the courier company system. After the courier confirms the information, the points will be distributed to the user account according to the user information, and the user can use the points according to their own consumption habits for the mail offer, the mall, thereby completing the entire recycling process.

![Recycling device design renderings](image-url)

Figure 2. Recycling device design renderings.
In addition to meeting the requirements of express packaging recycling, APP also extends other life demand functions, such as express inquiry, logistics tracking, shipping, shopping, etc. Users can perform related operations according to their needs.

4.2 recovery device design

Through analyzing the psychology of users, understanding the needs of users and market research, the recycling device is finally designed, which is composed of gravity sensor, information processing system and storage and finishing device. Its structure is simple and its functions are complete. The method of use only requires the user to split the express carton
and crush it flat, the whole recycling process can be completed by scanning the code after putting into the recycling device.

The recovery device is divided into three parts: gravity sensor, information processing system and storage and finishing device, the user will put the folded carton into the device, and the gravity sensor inside the device will be subjected to gravity, thereby converting the sensed information into a two-dimensional code, and synchronizing the information to the display screen to feed the information back to the user;

The storage and finishing device divides the area according to the specifications of the carton, and by flipping the gravity sensor, put the cartons according to the specifications, and stack the delivery cartons neatly through the operation of the mechanical arm.

According to the difference of carton, the design of recycling device can be divided into two recycling methods, the first is the device with a delivery port, carton directly after the input of flattening weighing;

The second form is structurally divided into two layers, the upper layer is divided into two partition, a total of three delivery ports, not only effectively save space, but also make the Courier in the packaging recycling process save time and effort.

5. Summary
With the national green development strategy put forward, sustainable development will become the general trend of product development, express packaging carton as a resource for recycling, if it can be handled properly, it will bring better social benefits, not only comply with the current national green development strategy, but also protect the environment and promote the sustainable use of resources.

In view of the current domestic no good express packaging recycling system, the paper proposes to connect the APP with the payment and recycling device through the design of the express recycling APP and the express recycling device to form a complete express carton

![Design of express package recovery device](image_url)

**Figure 5.** Recycling device design route.

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recycling system, to a certain extent, it can alleviate the problem that the current express carton is piled up into mountains and is difficult to recycle.

Through the combination of the recycling device and the APP, the pollution of the express packaging and the waste of resources are greatly reduced, the recycling efficiency is improved, and the secondary recycling of resources is realized.

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