Research on Online Shopping Packaging Recycling Strategy under Big Data Environment

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Abstract. Online shopping has greatly facilitated people's lives, but not properly recycled express packaging, not only cause waste of resources, but also destroy the environment, and "reduce, reuse, resource" as the principle of circular economy. Based on the data of 309 questionnaires, this paper analyzes the present situation of online shopping packaging recovery in China. It is expected to play a certain role in realizing the efficient and recycling utilization of resources, protecting the environment and promoting the green and sustainable development of the express industry.

1. Introduction

With the rapid development of E-commerce industry, online shopping has become one of the essential shopping methods in people's lives, and the volume of express delivery has also increased. According to the statistics of the State Post Office, the volume of express delivery in 2019 reached 63.52 billion pieces. From November 1 to 11, 2020, the national postal and express enterprises handled 3.965 billion pieces of express delivery, and 675 million pieces were processed on November 11 alone. At the same time, it also brings a huge amount of online shopping packaging garbage, because consumers' awareness of green environmental protection and recycling is not strong, many packages are difficult to recycle, thus consuming too much natural resources and social resources. In this paper, the appropriate recovery strategy of online shopping packaging will be put forward on the principle of reduction, reuse and resource utilization.

Chinese scholars have done related research on online shopping packaging recycling. Wang Jian (2014) believes that in the process of logistics development, each logistics link has affected our environment to varying degrees, and the recovery of online shopping packaging will improve the environmental problems to a certain extent [1]. According to the concept of recycling economy, Zou Xiao (2016) believe that modern logistics should reasonably plan outlets and distribution centers, change packaging methods, adopt degradable and easily recycled packaging materials, and establish waste recycling logistics, and uniformly recycle and dispose of packaging wastes [2]. Based on the theory of circular economy, Wang Xinyu (2017) found that waste products produced between packaging enterprises and merchants can be recycled by both parties and interested enterprises, so as to achieve the circulation of production, sales and recycling, and effectively promote the recycling of packaging [3]. Chen Minling (2019) recommends the use of straw pulping and papermaking as raw materials for online shopping packaging [4]. Zheng Kejun (2020) thinks that we should adopt the systematic thought to construct the incentive system from the three dimensions of government policies and regulations, enterprise technology and management, consumer interest perception and social
responsibility, in order to promote the recycling and reuse of express packaging[5].

2. Present Situation and Problems of Online Shopping Packaging Recovery

According to the Environmental Protection Organization Green Peace, Get rid of Plastic Binding and China Environmental Protection Federation jointly released the China online shopping packaging waste generation characteristics and management status of the study report. In 2018, domestic online shopping packaging materials consumed 9.41 million tons, among them, paper packaging materials account for 91% of the weight, plastic packaging materials account for about 9%. Meanwhile, these production, materials that use and process these materials emit about 13.03 million tons of carbon dioxide, it takes 710 million trees to absorb. It is understood that, at present, in China's express delivery industry, the actual recovery of cardboard and plastics is less than 10%, the overall recovery rate of packaging is less than 20%. The focus of logistics industry development in China is rising from scale and facility upgrading to recycling logistics and resource recycling. In general, China's online shopping packaging recovery has the following problems.

2.1. Environmental Awareness Needs to be Strengthened

Some consumers do not establish a sense of environmental protection and recycling, in the removal of express delivery, often use cutting tools to open packaging, directly resulting in packaging damage, it is difficult to recycle again. Some consumers do not have a strong sense of classification and recycling, and the packaging is not classified and recycled after being dismantled.

2.2. Less Recycling Channels

Online shopping packaging has not yet formed a good recycling system, recycling channels are few and single, some consumers have the awareness of recycling, but it is difficult to find recycling channels. There is no special online shopping packaging recovery department in the enterprise to manage the related business, there is no clear function division and corresponding classification recovery mechanism, it is difficult to achieve convenient recovery, and reduce the efficiency of recovery.

2.3. Inadequate Legislation

Although the development of China's modern logistics industry has received national attention in recent years, and put forward international standards and industry standards for the logistics industry, some of them are still not regulated by law, and it is difficult for relevant regulatory departments to supervise them. China's express package recycling policy is not perfect enough, the lack of the corresponding reward and punishment mechanism to assess the participation of enterprises in packaging recycling, the supervision of businesses, express industry and logistics enterprises needs to be high.

2.4. Difficult Recovery of Packaging Materials

The online shopping packaging materials used by domestic express delivery enterprises are mainly woven bags, express electronic waybill, envelope, tape, plastic bags, cartons and foam buffers, etc. The main components of packaging materials are polyethylene, which is difficult to degrade naturally, and the degradation cost is high, so it is very difficult to deal with. Plastic bags, tape and foam blocks and other internal fillers used very large, these materials are harmful to people and the environment, there is no suitable technology to properly handle these materials. Some of the materials cannot be used again, can only be incinerated or buried as garbage, causing pollution to the environment and wasting a lot of resources.

3. Sample Survey and Data Analysis

The data of this study mainly come from the network questionnaire survey, 315 valid questionnaires are collected from the network, 309 valid questionnaires are collected after screening and answering
incomplete questionnaires, and the effective rate of the questionnaire is 98.09%. The sample was reasonably distributed in the dimensions of sex, age, income, residence and so on.

3.1. Statistical Distribution of Samples

### Table 1. Demographic distribution description.

| Category            | Individual characteristics | Number of persons | Percentage (%) | Category            | Individual characteristics | Number of persons | Percentage (%) |
|---------------------|-----------------------------|-------------------|----------------|---------------------|-----------------------------|-------------------|----------------|
| Gender              | Male                        | 144               | 46.6%          | Place of residence  | Urban                      | 165               | 53.4%          |
|                     | Female                      | 165               | 53.4%          |                     | County                     | 42                | 13.59%         |
| Age                 | Under 18                    | 36                | 11.65%         |                     | Townships                  | 45                | 14.56%         |
|                     | 18-30 years                 | 255               | 88.52%         |                     | Rural                       | 57                | 18.45%         |
|                     | 31-50 years                 | 18                | 5.83%          |                     |                             |                   |                |
|                     | Over 50                     | 0                 | 0%             |                     |                             |                   |                |
| Income level        | 3000 and below              | 168               | 54.37%         |                     |                             |                   |                |
|                     | 3000-6000                   | 99                | 32.04%         |                     |                             |                   |                |
|                     | 6000-10,000                 | 30                | 9.71%          |                     |                             |                   |                |
|                     | Over 10,000                 | 12                | 3.88%          |                     |                             |                   |                |

As can be seen from Table 1, the ratio of men and women in the sample is close to 1:1, and the distribution is more balanced. The majority of the population in the survey was 18-30 years old, accounting for 88.52 percent of the survey. Most of the people in this age group are new college students and new and old people who have already worked. They are relatively more likely to buy online and contact with online shopping packaging than other social groups. Under the age of 18 is high school students and below, there is no independent economy, more busy learning, and less contact with express delivery. People in the 31~50 age group actually shop more. The number of people with monthly income below 3000 yuan accounts for 54.37%. Perhaps because the questionnaire is mostly college students or new entrants into the workplace, wages are generally not high. The highest proportion of residence in the table is the city, accounting for 53.4%, the level of urban development is high, and the transportation is convenient, online shopping is fast. In general, the sample composition is reasonable, and the collected data are representative for the research of online shopping packaging recovery.

### Table 2. People's understanding and views on online shopping packaging.

| Issues                                | Variable          | Number of persons | Percentage (%) | Issues                                | Variable          | Number of persons | Percentage (%) |
|---------------------------------------|-------------------|-------------------|----------------|---------------------------------------|-------------------|-------------------|----------------|
| Delivery packages received            | Beautiful         | 51                | 16.5%          | How to handle express packaging       | Throwing trash cans| 222               | 71.84%          |
|                                       | General           | 216               | 69.9%          |                                       | Waste recycling   | 12                | 3.88%          |
|                                       | Simple            | 42                | 13.59%         |                                       | Leave the dress   | 63                | 20.39%         |
| Composition of packaging materials    | Cartons           | 222               | 71.84%         | Delivery company                      | 9                 | 2.91%            |
|                                       | Plastic bags      | 198               | 64.08%         | Other                                 | 3                 | 0.97%            |
|                                       | Foam filler       | 255               | 81.55%         | Are you aware of the contamination    | Know what you know| 216               | 69.9%          |
|                                       | Other             | 48                | 15.53%         |                                       | I don't know      | 93                | 30.1%          |
From the data in Table 2, it can be seen that most of the express packages received are cartons, plastic bags, foam fillers, and the combination of these three materials is also very common. As for the problem of handling express packaging, most of them chose to throw trash cans, accounting for 71.84%, which shows that the recovery rate of online shopping packaging is very low. 69.9% of people know that the pollution of online shopping packaging is serious, but because there is no suitable recycling channel, online shopping packaging is mostly discarded, resulting in environmental pollution.

| Issues                          | Variable                      | Number of persons | Percentage | Issues                          | Variable                      | Number of persons | Percentage |
|---------------------------------|--------------------------------|--------------------|------------|---------------------------------|--------------------------------|--------------------|------------|
| What do you think of the recycling | Strong support                | 204                | 66.02%     | Support online shopping packaging improvement | Support                | 285                | 92.23%     |
|                                 | General                       | 69                 | 22.33%     |                                 | No support                  | 12                 | 3.88%      |
|                                 | Not good                      | 15                 | 4.85%      | It doesn't matter               | It doesn't matter           | 12                 | 3.88%      |
|                                 | It doesn't matter             | 21                 | 6.8%       | Would you prefer freight after improvement | Willingness                 | 153                | 49.51%     |
| Willingness to participate in site recycling | Not willing                   | 18                 | 5.83%      |                                 | Not willing                 | 156                | 50.49%     |
|                                 | Willingness                   | 156                | 50.49%     | Would you like to use a second packing box when sending a courier | Willingness                 | 195                | 63.11%     |
|                                 | Situation                     | 135                | 43.69%     |                                 | Not willing                 | 21                 | 6.8%       |
| Willingness to recycle          | Willingness                   | 219                | 70.87%     |                                 | Situation                   | 93                 | 30.1%      |
|                                 | Not willing                   | 36                 | 11.65%     |                                 |                               |                    |            |
|                                 | It doesn't matter             | 54                 | 17.48%     |                                 |                               |                    |            |

From Table 3, we can see that more than half of the people support the recovery of online shopping packaging. 50.49% are willing to participate in the recovery of online shopping packaging at designated locations. 70.87% are willing to recycle online shopping packaging free of charge. Not only that, 92.23% people support online shopping packaging improvement to achieve recycling, but whether the improved freight increase, support and opposition close to 1:1, 63.11% are willing to send express recycling of the second packaging box. Thus, for online shopping packaging recycling, most people maintain a supportive attitude.

3.2. Descriptive Analysis of Data

| X/Y                          | Throwing trash cans | Waste recycling | Leave the dress | Delivery company | Other | Subtotal |
|------------------------------|--------------------|-----------------|-----------------|------------------|-------|----------|
| Male                         | 105 (72.92%)       | 6 (4.17%)       | 24 (16.67%)     | 6 (4.17%)        | 3 (2.08%) | 144      |
| Female                       | 117 (70.91%)       | 6 (4.17%)       | 39 (23.64%)     | 3 (1.82%)        | 0 (0.00%) | 165      |

From Table 4, we can see that from the data obtained, the treatment methods of the two online shopping packaging are mainly throwing garbage bins, and the proportion of waste recycling is not much different, which is 4.17%. The proportion of women leaving clothes in online shopping packaging is higher than that of men.
Table 5. Methods of handling delivery packages by people of different age.

| X/Y     | Throwing trash cans | Waste recycling | Leave the dress | Delivery company | Other | Subtotal |
|---------|---------------------|-----------------|-----------------|------------------|-------|----------|
| Under 18 | 24 (66.67%)        | 3 (8.33%)       | 6 (16.67%)      | 3 (8.33%)        | 0 (0.00%) | 36       |
| 18-30 years | 189 (74.12%)     | 9 (3.53%)       | 48 (18.82%)     | 6 (2.35%)        | 3 (1.18%) | 255      |
| 31-50 years | 9 (50.00%)        | 0 (0.00%)       | 9 (50.00%)      | 0 (0.00%)        | 0 (0.00%) | 18       |
| Over 50  | 0 (0.00%)          | 0 (0.00%)       | 0 (0.00%)       | 0 (0.00%)        | 0 (0.00%) | 0        |

Table 5 shows that 66.67% of the people under 18 years of age choose to throw online shopping packaging in the trash can. The proportion of people aged 74.12% and 31-50 years old choose to throw trash cans and dress things, each accounting for 50%. The reason why the questionnaire is published online is that young people are online. Different reasons for handling online shopping packaging at each age may be related to the concept of life.

Table 6. Methods of handling courier packages by persons of different places of residence.

| X/Y     | Throwing trash cans | Waste recycling | Leave the dress | Delivery company | Other | Subtotal |
|---------|---------------------|-----------------|-----------------|------------------|-------|----------|
| Urban   | 129 (78.18%)       | 3 (1.82%)       | 30 (18.18%)     | 3 (1.82%)        | 0 (0.00%) | 165      |
| County  | 24 (57.14%)        | 3 (7.14%)       | 12 (28.57%)     | 0 (0.00%)        | 3 (7.14%) | 42       |
| Townships | 24 (53.33%)      | 3 (6.67%)       | 15 (33.33%)     | 3 (6.67%)        | 0 (0.00%) | 45       |
| Rural   | 45 (78.95%)        | 3 (5.26%)       | 6 (10.53%)      | 3 (5.26%)        | 0 (0.00%) | 57       |

As can be seen from Table 6, the methods of dealing with packaging in different places of residence are much the same. The proportion of people who choose to throw trash bins in cities and rural areas is about 78. County towns and townships are 57.14% and 53.33% respectively.

3.3. Questionnaire Analysis Results

The results showed that there were differences in the choice of online shopping packaging treatment among people of different sex, age and place of residence. According to the survey data, in the treatment of express packaging, the proportion of cities choosing to throw away the packaging directly is higher, the township ratio is low, some people choose to keep the packaging for repeated use, young people also choose to throw away packaging directly, men and women deal with the same way, mostly choose to discard. Thus, online shopping packaging recovery rate is low, and most people recycling concept is not strong.

4. Strategy to Promote Recovery of Online Shopping Packaging

In order to promote the recycling of online shopping packaging in China, recycle resources and reduce environmental pollution, the following measures can be adopted.

4.1. Increased Publicity and Environmental Awareness

The government should actively implement the concept of ecological progress and energy conservation and environmental protection. The government should strengthen the publicity of green, environmental protection and recycling, and consumers should establish the awareness of recycling and recycling of online shopping packaging waste, so as to achieve the sustainable development of online shopping packaging economy, green and pollution-free. The government should encourage enterprises to participate in the construction and transformation of recycling sites and optimize the design of recycling sites. Logistics and e-commerce enterprises should add the concept of sustainable development and recycling to their corporate philosophy. On the premise of energy conservation, emission reduction and efficient production, they should use degradable and recyclable packaging materials, greatly reduce raw materials and energy consumption, maximize benefits and minimize pollution, and realize green development.
4.2. Strengthening Reverse Logistics Management and Establishing a Sound Recovery System
The government and enterprises should actively build a nationwide express package recycling system. Enterprises should carry out packaging recycling at each express delivery point and carry out large-scale recycling and treatment of online shopping packaging waste, which not only effectively reduces the environmental pollution caused by packaging waste, but also improves the utilization rate of resources and reduces the procurement cost of enterprises. At the same time of establishing the packaging recycling system, the government should formulate corresponding reward and punishment policies and regularly inspect the packaging recycling results. At the same time to carry out consumer waste packaging recycling work, do a good job of waste recycling. Enterprises should integrate industry resources, optimize facility configuration, establish scientific and reasonable commodity packaging standards, optimize packaging design, and apply new online shopping packaging technology, so as to reduce the cost of recycling and processing express packages and increase economic and environmental benefits brought by reverse logistics.

4.3. Promote Standardization of Online Shopping Packaging and Promote Recycling of Express Packaging
Enterprises should consult together to develop standard size packaging, so that all kinds of products can be assembled at will according to the size in the container, transportation tools and storage and transportation warehouse, and maximize the use of logistics handling tools and storage space. Industry associations should actively plan and guide, break the boundaries between enterprises, integrate industry resources, optimize the allocation, according to the different characteristics of products, formulate unified and reasonable standards for commodity packaging, reduce unnecessary consumption, and promote the recycling of express package.

4.4. Enhanced Policy Support to Establish a Resource Recovery Platform
The government should introduce relevant laws and regulations to standardize the logistics market as soon as possible, make effective regulations on the standardization of packaging materials, and promote the recycling and reuse of express packages. Legislative support should be given to the research and development and promotion of green biodegradable materials for express delivery, so as to enhance the enthusiasm of enterprises in the research and development of green package for express delivery. At the same time, increase financial investment, tax relief and credit policies and regulations to support efforts to improve the enthusiasm of enterprises and consumers to participate in the recycling of express packaging. The government should give certain financial subsidies to logistics and express delivery enterprises that actively carry out packaging recycling business, and assist third-party enterprises to build consumer-oriented resource recycling platform, so that online shopping packaging recycling can get faster development.

4.5. Optimizing Online Shopping Packaging Materials and Promoting Green Logistics
E-commerce and express delivery enterprises should work together to actively study degradable new packaging materials, find lower cost online shopping packaging methods, and change the traditional online shopping packaging design concept on the basis of green environmental protection and energy conservation. Research and development of packaging conducive to recycling enterprises. Appropriate increase in funds to buy renewable new environmental protection materials as express packaging, strengthen the safety of cartons, improve the degradable rate of packaging bags, packaging tape, improve the recovery rate and reuse rate, so that the secondary packaging in the market better circulation, the purchase cost of online shopping packaging materials can be greatly reduced.

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