Research on the Development of Green Packaging

Xuanyu Ji1*, Menghui Yang1, Ling Ma1 and Yuntong Yang1
1 Shandong Jiaotong University, Jinan, Shandong Province, China
*Corresponding author’s e-mail: 1076932367@qq.com

Abstract. With the continuous development of world economy and science and technology, the logistics industry occupies more and more proportion in people's daily production and life, but the pollution generated in each logistics link also increases. So the development of green logistics is already imminent. This paper focuses on the demand analysis of green packaging in logistics, and comparison, and finally proposes specific measures to develop green packaging. Through research, the development of green packaging should first pay attention to the choice of green materials, such as using recycling turnover boxes instead of cartons, electronic signatures to replace the original triple delivery slip. Secondly, the development of green packaging requires the joint efforts of all walks of society, including the government, enterprises and consumers.

1. Introduction
The 19th National Congress of the Communist Party of China (CPC) must "unswervingly implement the concept of innovative, coordinated, green, open and shared development", "accelerate the establishment of a legal system and policy orientation for green production and consumption, and establish a sound economic system for green and low-carbon and circular development." The Chinese government attaches more and more importance to green development. In recent years, prominent industrial status, industrial pattern gradually optimization, technology level, environmental materials use, clean production, energy conservation and emission reduction and resources recycling technology gradually promoted, the implementation of "packaging and packaging waste", "limit commodity excessive packaging requirements" and other standards, make the circular development has initial results, but there are still some problems. At present, there is still pressure on ecological and environmental protection and faces challenges. Postal has played an important supporting role in the fight against COVID-19, and the industry has maintained rapid growth in the post-epidemic era. In 2020, China's express delivery business volume will exceed 70 billion yuan, and the production volume of express delivery packaging waste will remain at a record high level. We should accelerate the transformation of traditional logistics to sustainable green logistics, and carry out the maximum greening in packaging. With the principle of "resource saving resources, reduce pollution", "green consumption, environmental protection purchase", "reuse, multiple use", "classification of recycling, recycling", "environmental protection, survival" as the concept, better promote the development of green logistics, and then to reduce energy consumption, reduce emissions, realize the sustainable development of economic, social and environment.

2. Analysis of packaging Status
Receiving and dismantling express delivery has become a common phenomenon in our life. According to statistics, in 2014 the total express business is 14 billion, because of express package packaging
"garbage" total reached 2.8 million tons, can fill nearly 200000 football field, only a year express package packaging tape can around more than 300 circles, the PVC as the main raw material tape, is a only landfill or incineration can not be natural degradation, so effective processing express packaging is closely related to our living environment.

Xingquan Gu, an associate professor at the Chinese Institute of Metrology, pointed out in a study on China Express Standardization that China spends about 182,000 tons of corrugated cardboard because of excessive packaging, equivalent to the average annual cutting of 1,547 hectares of forest. Of the annual consumption of about 300 million cubic meters, nearly 10% is used for a variety of product packaging. The main raw material wood pulp accounted for 40%, wood over 20 million cubic meters. Below, we will first conduct a data analysis of the 2015 - 2020 express business, as shown in Table 1 and Fig. 1:

Table 1. Data Analysis of Express Business in 2015 - 2020

| Year | Express delivery business volume | Growth over the previous year |
|------|---------------------------------|-------------------------------|
| 2015 | 206.7                           | 48.00%                        |
| 2016 | 312.8                           | 51.33%                        |
| 2017 | 400.6                           | 28.07%                        |
| 2018 | 507.1                           | 26.59%                        |
| 2019 | 635.2                           | 25.26%                        |
| 2020 | 833.6                           | 31.23%                        |

Fig.1. Data Analysis of Express Business in 2015 – 2020

From the above extremely huge express delivery data, it can be seen that the resources consumed in logistics every year accounts for a huge part of the total resource consumption. In addition to reducing the proportion of transportation, we can also packaging green in logistics packaging. Logistics packaging is mainly composed of express outer packaging and packaging materials. So we can choose to achieve green by recycling express packaging or reducing the use of packaging materials.

3. Use analysis of packaging materials

According to the development index of the 13th Five - Year Plan, China 's total express packages exceeded 70 billion yuan in 2020, and China's per capita express packages increased from 0.01 in 2000 to about 50 in 2020. To prevent damage during transportation, the necessary packaging must be performed. Therefore, with the rapid growth of the number of express goods, it has also produced a large number of express packaging waste. Here we analyze the use of packaging materials through data:
3.1 Analysis of express delivery packaging materials

According to Greenpeace released by a global environmental protection organization, express packaging can be divided into paper and plastic according to the material type. In 2018, China consumed 8,560,500 tons of paper express packaging materials, accounting for 90.95% of the total express packaging materials; Plastic packaging materials are 851,800 tons, accounting for 9.05% of the total express packaging materials. As shown in Table 2 and Fig. 2:

Table 2. Analysis of Consumption Structure of Paper Express Packaging Materials in China in 2018

| Packaging materials                      | Consumption quantity |
|-----------------------------------------|----------------------|
| Paper - type express delivery package   | 90.95%               |
| Plastic - type express delivery package | 9.05%                |

Fig. 2. Analysis on Consumption Structure of China Express Packaging Materials in 2018

3.2 Paper packaging

Corrugated paper is the most consumed material in paper packaging. According to Greenpeace data, corrugated paper consumption in 2018 in China's express delivery industry reached 8,233,000 tons of corrugated paper, accounting for 96.17% of paper packaging. In total, paper packaging, other paper packaging includes single paper and document bag envelope paper and indirect packaging material tape core, accounting for 3.83%. As shown in Table 3 and Fig. 3:

Table3. Statistics and Forecast of the Consumption of Various Express Packaging Materials in China from 2000 - 2050

| Packaging materials     | Consumption quantity |
|-------------------------|----------------------|
| Corrugated paper        | 96.17                |
| Single paper            | 2.19                 |
| Cover the cover paper   | 1.39                 |
| Tape tape core          | 0.25                 |
3.3 Plastic packaging
Plastic packaging materials mainly include plastic bags, plastic film, plastic foam, plastic woven bag, bead bag, transparent tape and filled plastic, etc. Among them, ordinary plastic bag films accounted for the highest proportion, and the quality accounted for 62.90%.

3.4 Consumption and forecast of express packaging materials
According to Greenpeace, a global environmental protection organization, the consumption of various express delivery packaging materials in China has increased from 20,600 tons in 2000 to 9,412,300 tons in 2018. If effective measures are not implemented to control, according to the current development trend of express delivery, the consumption of express packaging materials will reach 41.2705 million tons in 2050, which will bring huge resource burden and environmental pressure. As shown in Table 4 and Fig.4:

| Year | Consumption (ten thousand tons) |
|------|---------------------------------|
| 2000 | 2.06                            |
| 2018 | 941.23                          |
| 2050 | 4127.05                         |
4. An Empirical Study on Green Packaging in China

4.1 SUNING’s shared express box "small yellow box" and zero glue carton
In 2017, SUNING Logistics launched a recyclable shared express box "small yellow box", which only requires a green box button to open the box and remove the express. "small yellow box" does not use any tape, the Courier can fold and take away. It is understood that this shared express box can be folded for at least 60 times. Compared to the first generation, the single box weight of the version 2.0 shared express box is only 50 grams, most importantly realizing a more lightweight folding design, making it more convenient during storage and transportation, and 100% recycling pollution recycling. At present, 13 cities across China, including Shanghai, Nanjing, Shenyang, Chengdu, Wuhan, Zhengzhou and other cities have launched 100,000 shared express boxes, including the 2.0 shared express boxes used in Beijing and Hangzhou.

At the same time, compared with the traditional wet and broken cartons, SUNING zero rubber cartons are more durable and anti-fall, which is not only convenient to protect the environment, but also can play a better protective role in logistics and transportation, it is also easy to facilitate the stacking of products in the warehouse and transportation, which can effectively improve the logistics and transportation efficiency, save the warehouse capacity, and improve the logistics turnover rate.

4.2 IKEA’s green packaging
IKEA has very strict requirements on the environmental protection measures of the packaging materials, not only requiring the packaging materials to meet the recycling or secondary reuse, but also requiring the greening of the packaging materials. IKEA pays attention to the large scale of the packaging unit in the packaging process. Large scale packaging is conducive to the mechanization of the logistics system in the process of loading and unloading, relocation, storage, transportation and other on, speed up the operation link, save packaging materials and packaging costs, but also conducive to the protection of the goods. IKEA pays attention to the number of product unit packaging. Take Howt teapot as an example, IKEA uses the product shape to put several of them upside down, and one packaging can accommodate 10 pieces of products, compared with only six, which improved the number of packaging of the product unit and saved the packaging materials.

With the continuous advancement of the green governance of express packaging, the growth rate of packaging consumption is gradually decreasing. This is because express delivery enterprises actively practice the concept of green development and fully perform in the application of green packaging.

Fig. 4. Statistics and Forecast of Various Express Packaging Material Consumption in China from 2000 - 2050
Among them, the electronic surface sheet basically realizes the full coverage. In 2019, the use of electronic face sheets was equivalent to saving 2,696 cubic meters of water. Tape slimming plans for full application, with 75% of deliveries less than 45 mm (Traditional adhesive tape is below 60 mm), Reduce 450 million meters of adhesive tape usage annually. The circular packaging was widely used in the transit link, and the use of assembled bags was reduced by 96.4% year on year, saving 2.48 billion disposable plastic woven bags. About 2 million recyclable boxes (boxes) were used during recycling, 80 million, and 78 million cartons.

5. Conclusion
This paper believes that the role of the government is developing circular economy and the implementation of green logistics. The government may, through legislation, prohibit the use of certain packaging materials, establish a storage and return system, formulate relevant recycling or reuse laws, restrict excessive packaging, establish various research institutions to evaluate packaging materials, and advocate the development and application of new packaging materials. At the same time, at the enterprise level, the packaging unit can achieve large and centralized packaging, moderate packaging, packaging materials green, the selection of materials easy to recycle and regenerate materials, the development of new packaging materials and packaging to meet the requirements of green packaging.

Acknowledgement
This paper was subsidized by “Construction and Practice of Three-dimensional Teaching Materials for Transportation Professional Applied Talents” in 2019 in Shandong Jiaotong University.

References
[1] China Enterprise Green Logistics Development and Management Strategy [ J]. Wang Enshen. Chinese Business Theory. 2019 (01)
[2] Research on the Current Situation and Development Trend of Green Logistics [ J]. Ma Yanjing. Chinese and foreign entrepreneurs. 2018(24)
[3] Exploration on the Development Strategy of Green Express Packaging [ J]. Xie Yanqing. Shopping mall is modern. 2020(03)
[4] Discussion on Green Packaging in China Express Industry [ J]. Qi Denglin, Wang Ruiting. Logistics science and technology. 2019(05)
[5] Foreign Green Packaging Regulations and Green Development Practice [ J]. Liu Fengwei, Huang Yanan. China Post, 2018 (09)
[6] The Application of Green Packaging [ J]. Yang Yong. Shanghai packaging. 2015(02)