Perspective

"Internet +" recyclable resources: A new recycling mode in China

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ABSTRACT

"Internet +" recyclable resources recycling is a new recycling program which developed quickly in China over the past three years. Indenting problems faced by internet recycling programs and summarizing typical modes are in need and necessary. To better realize and promote the new recycling way in China, we investigate related governmental departments and 10 represented enterprises that put "internet +" recycling into practice in China. From our investigation, we identify the problems faced by the enterprises and show four typical internet recycling modes. Based on the problems and cases analysis, the implications for sustainable "internet +" recycling are discussed. We suggest building a connection between online and offline, establishing a variety of profit models, educating older generations on the "internet +" recycling platform, and meeting the recycling requirements on low-value recyclable resources through the application of smart machines.

1. Introduction of "internet +" recycling

There are billions of municipal solid waste generated by urban households in China with the increase in urbanization and a changing consumption structure (Liu et al., 2015; Gu et al., 2015). Recycling municipal household waste effectively is an important factor to reduce environmental pollution and conserve resources. However, the recycling system in China is not well built. There are almost 20 million curbside peddlers. The low-valued recyclable wastes have not been collected and most high-valued recyclable wastes are recycled in an informal way. It caused problems such as lack of materials for utilization on recyclable resources by authorized enterprises, illegal disposal resulting in secondary environmental pollution, and so on. "Internet +" recyclable resources recycling is a new recycling program which has been developing rapidly in China over the last three years (Wang et al., 2015; Zhou, 2016). This new "internet +" recycling program is a revolution of the traditional recycling method, which implements the internet idea, technology, and mode into the way of recyclable resource recycling. It helps to solve the problems that are faced by tradition recycling such as asymmetric information and the high percentage of informal recyclers (Zhou, 2015; Song et al., 2016). The Chinese government is paying attention to "internet +" recycling. The "internet +" recycling has been discussed in the government documents since 2015. Many recycling enterprises are also trying to develop the new "internet +" recycling program, such as the "Recycling Brother" project from GEM Co. Meanwhile, several studies have introduced the importance of "internet +" recycling and explored the building and developing of "internet +" recycling mode (Li et al., 2014; Zhou and Gao, 2015; Wei, 2016; Wei, 2016). There is a demand for the government and recycling enterprises to get the knowledge on different types of "internet +" recycling. However, there are not enough studies summarizing different types of "internet +" recycling modes. To address this need for information, we undertook the comprehensive study of "internet +" recycling mode for China. Due to our research goal, we carried out a deep investigation on related governmental departments and "internet +" recycling enterprises that have not been well studied previously. The results of our research will be able to supply information on the sustainable development of "internet +" recycling for the Chinese government and recycling enterprises.

2. Problems of developing "internet +" recycling

2.1. The off-line system cannot satisfy the on-line system development

The construction of an off-line system cannot keep up with the development of the on-line system because the construction on the off-line system, such as door-to-door collecting, requires much more human and material resources compared with the on-line system building.

2.2. The profit models are still being explored

Due to the low value of most recyclable resources and high door-to-door collection costs, many "internet +" recycling companies rely on finance to keep operating. During the survey, many "internet +" recycling companies mention that one important problem faced by them is to explore a for-profit model.

2.3. "Internet +" recycling cannot be easily accessed by aged people

The major participants with time and willingness to submit and collect the recyclable resources are older people. The older people have difficulties learning or accessing the "internet +" recycling system. They still prefer selling the recyclable resources to the curbside recyclers.

2.4. The recycling area and type are very limited

Due to the high logistics and labor costs, it is difficult for "internet +" recycling enterprises to extend their collecting service in large area. Meanwhile, the major recyclable waste type being collected is electronic products with high value. Glass waste and old clothes are not included.

3. Case studies on "internet +" recycling modes

3.1. Xiamen "Waste Uncle": chain operation & supply chain finance

Waste Uncle (Xiamen) Environmental Protection Technology Co., Ltd. is referred to as the "Alibaba" of the recycling industry. One feature of Waste Uncle is the "internet +" chain operation mode (Fig. 1). Currently, there are 23,585 recyclers joining in Waste Uncle as franchisees. The other feature of Waste Uncle is building the "internet + recyclable resources + supply chain finance" service platform (Fig. 2). Waste Uncle has signed strategic cooperation agreements with financing institutions such as Bank of China and China Construction Bank.

3.2. Shanghai "Aihuishou": collaborating with e-commerce companies & "cash for clunkers"

The word of "Aihuishou" in Chinese means loving recycling. The "Aihuishou" website is the biggest O2O (Online to Offline) electronic products collecting internet platform in China now (Fig. 3). It has been in operation for six years with over 30,000 thousand customers, and has one million orders per month. The core competitiveness of Aihuishou is collaborating with famous e-commerce companies to supply the "cash for clunkers" service.

3.3. Hunan "Dafeng": "five-in-one" creative recycling mode

Dafeng is a recyclable resources company that was built in 2010. Starting in 2014, Dafeng developed the CRM (Customer Relationship Management) system and built a "five-in-one" creative recycling mode. It is shown as in Fig. 4. The building of a garbage bank can not only promote the recyclable resources submitting willingness by residents but also increase customer stickiness of using the "internet +" recycling website and app supplied by Dafeng. The pilot program was carried out in a community with 3260 residents on September 19th 2015. Until the end of December in 2015, the number of registered members accounted for 52.9%. Daily door to door service reached 50 times per day. The statistical data showed that each registered resident who used Dafeng "internet +" recycling system can get an economic value equal to 15–60 yuan RMB from garbage bank. Meanwhile, the government can save at least 50% of municipal waste transportation and disposal fees.

3.4. Beijing "Incom": smart recycling machine & small-sized compression stations

Beijing "Incom" is a very famous recycling company in the industry. The company developed the smart recycling machine that was placed in communities, shopping malls, subway stations, and other public areas. Residents can put plastic bottles into the machine and get a reward to their bank account or transportation card. Using a smart recycling machine can save labor costs and can also make money by selling advertisement space on the machine. At the same time, Incom built the internet of things platform and provides online appointment and door-to-door collecting service. To decrease the transportation costs, they built small-sized compression stations. This logistics design can improved the transportation effectiveness a lot (Fig. 5).

4. Conclusions and recommendations

4.1. Building a connection between online and offline

Combining internet with traditional recyclable resources recycling is a new direction for the development of the solid waste management

Fig. 1. Brand image of Waste Uncle.