"Blue Whale Project" — Solution to Community Waste Classification Service System Design

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ABSTRACT

In recent years, more and more people pay attention to environmental problems. The correct classification of garbage directly affects environmental governance. Based on the community classification group in Shenzhen, China, this paper puts forward the community garbage classification method for the government to enforce the garbage classification measures. Aiming at the problem of community garbage classification, first of all, we need to understand the number of households, living habits, garbage delivery behavior, and from which to sort out and analyze the characteristics of typical characters, then simulate the different character types in the garbage classification process of functional needs and emotional changes, clear and optimize the delivery process, and promote the correct classification. "Blue Whale Project" actively cooperates with the government to improve the waste classification system and supporting facilities. Combined with Internet technology, it establishes the classification community culture and promotes waste classification education, encouraging users to be willing to and able to classify, so as to achieve a new situation of correct waste classification in the community. As a result, we created the "blue whale project" through the mode of "one bucket, one bag" and apply to improve the user classification experience, improve the enthusiasm and correctness of garbage classification, and strive to provide reference value for the promotion of garbage classification in the community.

Keywords: Environmental issues, Garbage classification, Community, Typical people, User of habits, User of experience, Reference value.

1. INTRODUCTION

The meaning of the "Blue Whale Project" is homophonic with the garbage project. The Blue Whale represents the ocean and has the characteristics of cleanness and nature, so it's called "Blue Whale Project". Taking Japan as an example, the implementation of waste classification measures promotes citizen participation through reward and punishment, supervision, incentive and restraint mechanisms. At the same time, the government and society cooperate in governance, which highlights the importance of public participation [1].

At present, there are two popular community garbage collection methods in China, namely: "Xiao huang gou" mode to set up recyclables and hazardous waste recycling devices, and "Aobei" mode to set up "two buckets of one bag" — two buckets are other garbage collection bins and kitchen waste bins, one bag is recyclable garbage.

The advantages of the "Xiao huang gou" model include clear sorting, efficient recycling, many drop-off sites in small areas, and recyclables that provide monetary feedback and promote users to drop off in the Xiao huang gou's recycling bins. The disadvantages of "Xiao huang gou" are: low price of recyclable materials, high threshold of cash withdrawal, operation threshold, lack of kitchen waste and other waste recycling services [2]. The advantages of "Aobei" are simplicity and reasonableness, allowing users to sort their waste more intuitively, the provision of a recyclable bag that helps users to store and drop off their recyclables, and the provision of two bins to facilitate the collection of other waste and kitchen waste. The disadvantages of "Aobei" are: fewer delivery sites, extra purchase of recyclable bags, lack of delivery of harmful waste, and poor loading of other garbage items into other garbage cans when other waste objects are large [3].

The "Blue Whale Project" adds a "bucket" of kitchen waste to the existing number of household bins, so that the extra trash can be used for other waste and hazardous waste, without wasting bin resources. The trash can also be recycled without breaking the bag, simply place the bin inside the machine and clean and dry it. The trash is equipped with hooks that do not take up space and is equipped with a user-friendly carrying handle and a lid that makes it easy to carry and does not give off smell. The bags are provided in partnership with the government for recycling purposes, with no additional cost to the user for the bags, reducing the barrier to participation. Working with waste sorting plants to increase market power and maximize the price of recyclables, the bags have a large capacity and come with common recyclables on the face to reduce the risk of mis-delivery [4]. The "one bucket, one bag" is tied to an application that allows for full data tracking, while building a community culture, increasing responsibility, and using public pressure to increase acceptance and motivation [5],[6]. For users who do not know how to use or do not use smart devices can feedback with the community, and personal gains can be returned in the form of door numbers. The "Blue Whale Project" provides users with large-capacity, easy-to-carry recyclable bags and increases the price of recyclables to increase their motivation to drop off recyclables, optimizing the experience of using and recycling kitchen waste bins without smelling or getting your hands dirty. The "Blue Whale Project" actively cooperates with the government to set up multiple recycling stations in the community, lower the threshold for participation in purchasing bags and improve recycling facilities. For those who do not know how to use or do not use smart devices, we offer a rebate in the form of a door number to expand the number of participants and maximize the extent of waste separation in the community, so as to achieve a situation where community users are willing and able to separate waste.

2. COMMUNITY HOUSEHOLD WASTE SUB-CATEGORY LINE FOR RESEARCH

2.1 Figure and Table of Data Analysis

As shown in "Figure 1", the main reasons for community residents to refuse to separate their waste are: First, the recycler mixes the separated rubbish bins for recycling, which leads residents to think that their separation is unnecessary and to resist waste separation. Second, the kitchen waste is often accompanied by leftover food and soup, so tearing the bag and dropping it off is easy to get your hands dirty and stains the smell, making the drop-off experience poor. Third, kitchen waste needs to be torn through the rubbish bag before it can be discarded, kitchen waste is often accompanied by leftover food and soup, tearing the bag to deliver is easy to dirty hands and will be contaminated with smell, the delivery experience is poor.
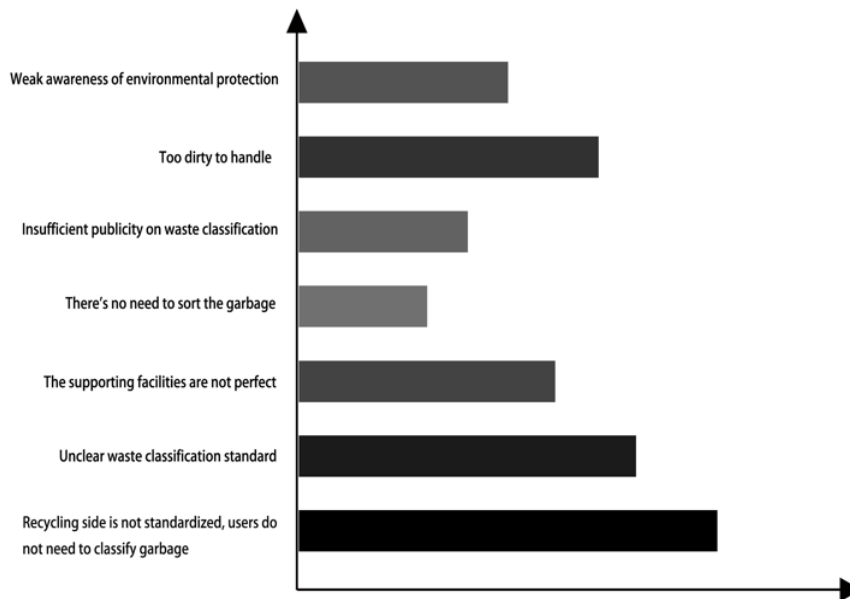

Figure 1 Proportion of daily garbage of community residents.

As shown in "Figure 2", the average daily weight of waste generated by each household in the community is about 1.5 KG. Kitchen waste is the first, accounting for 60% of the total weight of waste, which is about 0.9 KG. The breaking of bags for kitchen waste is a tricky problem that most residents have to face in the delivery process, and is a pain point in the waste separation and delivery process. The second largest proportion of recyclables, accounting for 20% of the total weight of waste, is 0.3KG, and with the accumulation of time, the sale of recyclables is a good income.
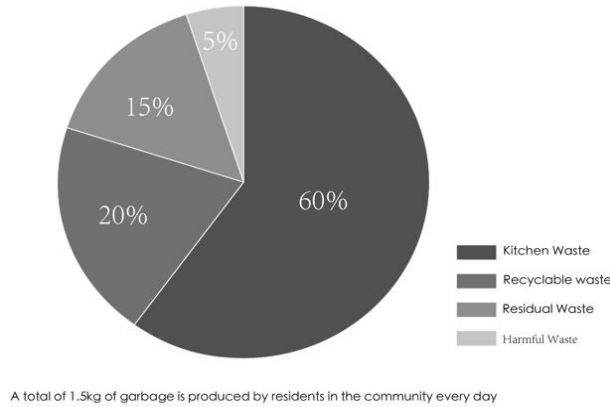

A total of 1.5kg of garbage is produced by residents in the community every day

Figure 2 Analysis of refuse to classify garbage in community.

2.2 *Three Types of Community Typical People*

Through the methods of user research, interviews and observations, a sample of people from a typical community in Shenzhen was taken for testing, and three typical groups of people were concluded: shared youth, middle-aged people and retired elders with children. The characteristics of the young people who share a house are: they have pets, they often order takeaway, they often shop online, they occasionally take out the rubbish, they know they have to break the bags of food waste, but they get their hands dirty easily and are averse to doing it. The characteristics of the middle-aged group are: they travel a lot, they don't have pets, they have children, they shop online a lot, they usually throw out their rubbish in the morning when they go to work, and their knowledge of waste separation is weak. Retired seniors with children are: they have children, cook a lot at home, take out the rubbish every day, don't know how to use smart devices, know that food waste has to be broken into bags, but don't like to do it.

Analysis of behaviour: users have pets, often generating pet food packaging and pet excrement. Users often order takeaway and online shopping, often generating packaging boxes. Users with children often generate boxes of children's toys, milk powder and diapers. It is known to all that when customers are throwing away their rubbish and can coordinate with recycling companies to collect them, saving human resources, kitchen waste can only be disposed of in kitchen waste bins if the bag is broken, but most people are reluctant to do this.

2.3 *Analyzing the Pain Points of a Typical Person's Journey Map*

In the case of middle aged people, it is not clear how garbage is sorted, which leads to confusion and misclassification. When it comes to recycling, the rubbish can be stacked up too much to be delivered at once. There is no incentive, no motivation to classify rubbish. Seeing that the garbage truck mixes and recycles the sorted waste, it doesn't feel necessary to sort its own waste.

3. SERVICE SYSTEM DESIGN

The community's service system is designed to optimize the satisfaction of the user's waste sorting experience, to motivate the user to actively participate in waste sorting and correct delivery, and to improve the front-end and back-end service system, to ensure sorting and transportation, and to continuously improve technological innovation in sorting, thus providing a mutually beneficial and long-term sustainable operation [7].

3.1 Users Use the Process

Users can collect rubbish bags and bins by scanning the code through the smart device (users who do not know how to use or do not use the smart device can operate by means of community-bound door numbers). Simply take the trash cans or bags to the nearest recycling station, which is equipped with a cleaning and drying machine to clean the odorous delivery device immediately. The bags are packed and transported through the recycling station to the sorting plant, which sorts and weighs them and then feeds the data and revenue to the user via application in real time, and provides a cleaning and drying function for the bags, which can be used again and again. The bin is placed inside the food waste recycling machine and the bin enters the cleaning and drying area to produce a clean bin immediately. Other waste and hazardous waste recycling machines also have a cleaning function for secondary use. The recycling station has a video loop of the operation process to avoid misuse and supervision and to save human resources. The recycling station operates 24 hours a day to meet the needs of the community at different drop-off times. The rubbish bags and bins are tied to individual accounts via application, allowing for data tracking and community sharing.

3.2 Social Waste Sub-service System

The recycling stations generate waste from community users, who then deliver the recyclables to a sorting plant, which processes the recyclables into useful resources such as plastics and metals, increasing resource utilisation and providing feedback to community users. The recycling station sends the food waste to the food waste treatment plant, which transforms it into biofuel, electricity and organic fertiliser, which can be used to green the community's plants and promote recycling. Other waste and hazardous waste can be dropped off at the collection point, which provides waste disposal and free cleaning services.

3.3 Stakeholders

The "Blue Whale Project's" stakeholders include government, users, recycling bins, and sorting plants. The government buys waste sorting services from recyclers and provides them to community users, who achieve the government's planned waste sorting goals through the correct waste sorting methods, and obtain sorting plant revenue, data, sorting plants to obtain the correct waste sorting resources, while providing waste disposal services to recyclers, recyclers helping the government to meet garbage sorting targets, providing users with quality waste sorting services and coordinating sorting plants to help improve the efficiency of recycling station waste disposal. Stakeholders to optimize the user experience and improve service levels.

3.4 Service Relationships

When the user uses "one bucket, one bag" for garbage delivery, first through the verification of identity information into the recycling bin, the garbage is delivered to the designated garbage collection machine, the recycling machine will detect whether the delivery equipment is damaged (reduce the operating costs of accidental damage), or if it is not, pays a sum of money to collect the new delivery appliance again. After the garbage bags are sorted and weighed by the sorting plant, the recoverable material revenue information can be fed back through application.

3.5 Business Canvas

Business canvas is able to rationally and comprehensively comb out the operational logic and provide a long-term operating conditions basis. The "Blue Whale Project" opens up user delivery-garbage collection-waste-treatment relationships, optimizes the user experience, motivates and fosters user classification habits, and creates sustainable community waste classification models. The business canvas of the "Blue Whale Project" is shown in "Figure 3".

Figure 3 Business canvas of blue whale project.

4. PRODUCT SERVICE DESIGN

The "Blue Whale Project" provides community users with a "One bucket, One bag" model of waste collection, with the "one bucket" improving the delivery experience of food waste, and the "one bag" facilitating the convenience and feedback of recyclables. "One Bag" facilitates the delivery of recyclables and provides feedback on revenue, optimising the experience and increasing participation, thus creating a situation where community users are willing and able to separate their waste. The "one bucket, one bag" can be bound to an application to visualise information, establish a community culture, improve waste separation education, foster willingness to separate, and increase product coverage [8].
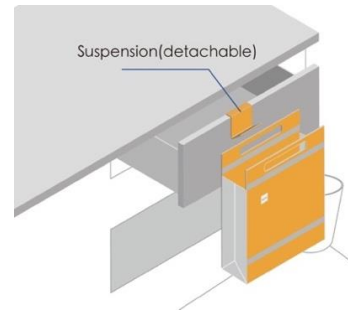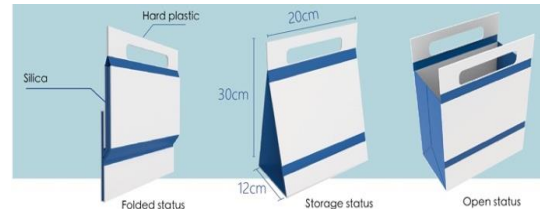
4.1 Trash

The trash is designed for kitchen waste, which has an identity chip on it and will be fed back to the user via application when the binding is successful. The handles of the trash cans are made of hard plastic to ensure the comfort and service life of the armrests, which are folded to eliminate the spread of odors and are easy to store, with suspensions that can be hung on the edge of the kitchen bench, saving space and preventing foot and pet mishaps when used by users ("Figure 4"). The trash cans are 12cm wide and 30cm high and can be used for 1-2 days of kitchen waste storage ("Figure 5").

Figure 4 Hanging status.

Figure 5 Trash can status.

4.2 Garbage Bags

Designed exclusively for recyclables, the bags have identification chips, are made of environmentally friendly materials. The bag is printed with information about common recyclables and can hold up to 30L of recyclables. The size of the bag is 75cm wide and 45cm high, which is sufficient to store a week's worth of recyclables ("Figure 6").
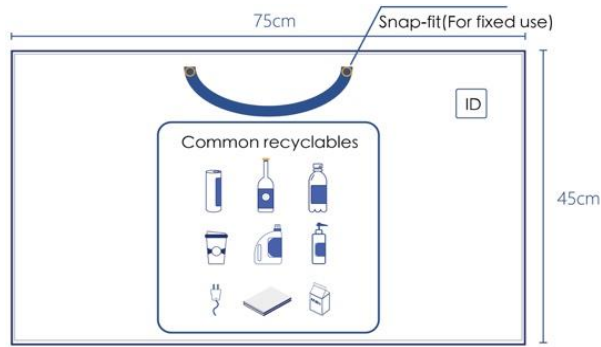
Figure 6 Garbage bag.

4.3 Application

The function of application is to provide data feedback after the bag is tied to the bin and to build a community culture of waste separation, making use of public pressure to develop user habits of willingness and willingness to separate ("Figure 7").
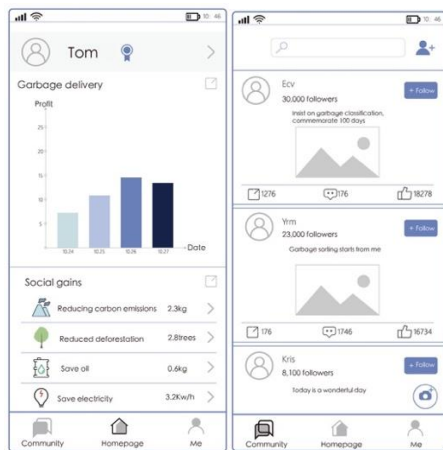

Figure 7 Data information and community culture.

5. CONCLUSION

Waste classification is a national movement that requires the establishment of a comprehensive waste separation system and supporting facilities, as well as the promotion of universal participation in waste separation through incentives and publicity and education. It is necessary to analyze the pain points of the waste separation process and solve them in order to increase the participation of users. The "Blue Whale Project" uses the "one bucket, one bag" model, with the "one bucket" helping users to solve the tricky problem of food waste delivery, and the recyclable bag helping users to solve the problem of recyclables delivery and return the money. The "One Bucket, One Bag" model helps

users to solve the tricky problem of kitchen waste delivery, while helping users to solve the problem of recyclables delivery through the form of recyclable bags and return a considerable amount of revenue, enhancing the user experience and profitability of waste separation. The "One Bucket One Bag" is bound to application, providing users with real-time waste separation data, building a community culture of separation and creating a community waste separation atmosphere of willingness, knowledge and love for separation.

The "Blue Whale Project" actively cooperates with the government to abolish bag fees and lower the threshold for membership, while increasing the number of recycling stations to improve the convenience and efficiency of waste delivery [9]. It also coordinates with sorting plants to improve the price and efficiency of recycling and optimise the waste sorting experience. The "Blue Whale Project" provides quality waste sorting services to community users, solves community waste sorting problems for the government, provides sorting plants with correctly sorted waste resources, clarifies the entire service system process, improves process operational efficiency, and is dedicated to providing reference value for community waste sorting initiatives in China.

The innovations of "Blue Whale Project" are as follows: First, the garbage can is specially designed for kitchen waste, which is tasteless and portable, and solves the problem of dirty hands after broken bags. Second, cooperating with the government, "one bucket, one bag" can participate without user's payment, reducing the threshold of participation and improving user's participation. Third, the surface of garbage bags is printed with common recyclables, which is convenient and intuitive, and reduces the risk of wrong delivery. Fourth, a service system process, closer to the user,

encourages user participation and improves satisfaction.

Due to the short lead time of the "Blue Whale Project", there are still some shortcomings in equipment operation and operation processes and details, and the authors believe these problems will be gradually optimized and resolved in the future.

The next step of the "Blue Whale Project" is to review the data analysis of typical communities, gradually improve the service system, improve the user experience process, and summarize the operational experience, and then consult with the government, in order to provide reference value for China's community waste classification model.

AUTHORS' CONTRIBUTIONS

Yi Tang wrote the manuscript and analysed data. Fan Huang contributed to revising and editing.

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