Waste Disposal Optimization Scheme in Traditional Neighborhoods

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Abstract: As the problem of urban waste in China becoming increasingly serious, the issue of garbage disposal in traditional districts is also becoming a matter of concern for city managers. This paper analyzes a garbage basket used for classifying waste and designed for residents of traditional neighborhoods, installation of drive systems for small high-rise residential units in traditional neighborhoods, and design of the entire process management system for waste disposal in the community. The rough classification of household waste can be realized by considering the sources of waste; automation of the entire process can be realized through the process of waste transfer; and full supervision and operation can be realized at the end of the waste disposal process. All these measures are intended to improve the quality of life of residents living in traditional neighborhoods, to improve the efficiency of waste disposal, and to achieve the goal of waste reduction for harmless and resource-based purposes.

1. Introduction
With the development of the social economy, the traditional model of self-built village settlements has evolved into the model of street communities of commercial housing. Street communities manage the public daily affairs of their respective communities to preserve the quality of life in their respective neighborhoods. Due to the accelerating urbanization in China, the amount of urban waste produced has also increased. A situation called "garbage siege" has arisen, in which waste disposal in traditional neighborhoods has become an important problem for urban managers. In recent years, the government has attached great importance to the problem of sorting and treating urban trash, and substantial progress has been made. However, traditional community waste disposal facilities were backward, and participation by community residents was lacking; as a result, community garbage collection could not keep up with the demand. This situation seriously affects residents' quality of life; thus, there is an urgent need for measures to address this. In light of the present situation, specifically for traditional communities, this paper analyzes the impacting factors of waste disposal, puts forward the use of science and technology-based methods aimed at solving the problems of garbage disposal, and discusses a new model for the classification and treatment of waste.
2. Study impact factors

2.1 Aging of population
Aging has become a social problem in China. According to criteria established by the World Health Organization, when the population aged 60 and over accounts for more than 10% of the total population of the region, or when more than 7% of the total population of the region is over 65 years of age, the region is considered to be an aging society [1]. At present, socialized elder care has not matured; home-based elder care is still the primary model. The implementation of the one-child policy and changes in family living patterns have reduced the amount of support resources that the elderly population receives from the family; this poses a challenge to the quality of life for the elderly [2]. Elderly people in a modern society are increasingly managing their family’s daily lives; routine garbage disposal will also become a burden for the elderly due to a decline in their physical condition. To a certain extent, the aging of the population represents a lag in thinking and a lowered acceptance of new things; hence, the implementation of new garbage disposal measures are likely to encounter obstacles.

2.2 Community "aging"
With the aging of the population, there is also the “aging” of infrastructure and services provided within the traditional community. The aging of the community is reflected, among other factors, in the age of community buildings, in improvements and conveniences of community facilities and services, and in community greenery. Houses built before the change in welfare division policy of 1998 are more than 30 years old and have reached the residential design building requirement of 50 durable years [3]. Due to the construction methods that were common at the time, traditional communities were only built with one-way stairs and are not equipped with elevators. With a long time having elapsed since construction, the condition of various items in residential buildings such as water and electricity lines, doors and windows, and stair handrails have deteriorated, bringing inconvenience to daily lives of the elderly. In the traditional community, the community's garbage disposal facilities are relatively simple: the facilities are not cleaned in a timely manner, making it easy for health hazards to occur. In addition, the traditional community and the new community compared with the intelligent management system is relatively lacking, cannot be very well for the community management to achieve accurate management.

3. Idea and Methodology
At present, China's urban waste is growing at an annual rate of 8% to 9%; the annual per capita household rate of waste production in urban areas is approximately 0.45 to 0.50 tons [4]. The community is the foundation of the city and the source of garbage. China's urbanization rate began to accelerate in 2008, and by 2014 China's urbanization rate had reached 54.77% [5]. Compared with newer communities, traditional communities are backward in the front of the garbage classification, the middle of the garbage transport, the back end of the garbage disposal; there are big gaps, and these gaps in garbage treatment have brought inconvenience to the elderly. The purpose of this paper is to reduce the pressures of household waste disposal on the elderly and improve the disposal efficiency of household waste by the application of transmission technology within traditional communities, so as to realize a reduction in the amount of waste disposed and to realize the disposal of innocuous and resource-based wastes [6].

3.1 The idea of transmission technology as applied in traditional communities
In this paper, traditional residential garbage transmission and transit stations sort waste into containers of differing sizes to demonstrate the overall thinking of transmission technology within the traditional community. Small lifting platforms and horizontal conveyors are set up on the exterior walls of each building within a traditional district; a garbage collection point is set up
next to each building, as shown in Figure 1.

Figure 1. A brief diagram of the technical structure of garbage transmission

In traditional neighborhoods, residents' houses are designed with a balcony in the kitchen, where a lifting platform can be set up within the kitchen side of each residential building. A small electric door is set up on one side of the kitchen balcony, allowing the garbage to be transported to the lifting platform. When the domestic garbage reaches the transfer platform, the platform will automatically transfer it to the garbage collection point downstairs after detecting the entry of a garbage basket. During this process, residents of the traditional community are only required to sort the garbage into the corresponding blocking baskets and to transfer the garbage collection baskets to the lifting platform.

| Kitchen Garbage       | Hazardous Waste |
|-----------------------|-----------------|
| Peel and Shell Garbage|                 |
| Toilet Waste          | Plastic Garbage |
|                       | Paper Waste     |

Figure 2. Summary of garbage collection basket structure

Each household is equipped with a customized garbage collection basket that is divided into different sections. Waste is roughly classified according to origin; classification is integrated into
the daily lives of residents to encourage their participation and avoid resistance. As shown in Figure 2, the garbage collection basket is divided into four sections on average, two of which are set up for specialized kitchen waste and toilet waste; residents can place the corresponding garbage directly in the corresponding section. The remaining two sections are divided into four equal parts for the placement of peelings and fruit, shell garbage, plastics, and paper waste [7]. The garbage collection basket can be fitted with four pulleys at the bottom and is equipped with a non-slip device. A retractable puller handle is on one side of the garbage collection basket; seniors can drag the garbage collection basket to the garbage lift platform on the corresponding floor.

After the garbage collection basket is filled to a pre-specified amount, residents can transfer the basket from each floor of the garbage lift platform to the collection point downstairs. Once each garbage collection point is reached, the drive automatically collects a full amount of garbage collection baskets and returns a vacant garbage collection basket to residents.

4. Results and Discussion

4.1 The positive influence of transmission technology on waste disposal in traditional residential areas

As a result of aging, older people in traditional communities spend a lot of time in transit, and the probability of accidents increases. Transmission technology can reduce the amount of time the elderly spend in the waste transfer process, reduce the corresponding risks, and increase the amount of time available to the elderly for independent activities. The use of transmission technology in garbage disposal is conducive to the formation of superior living space that cares for the elderly and enables the elderly living within it to have a sense of belonging [8]. The transformation into suitable aging can allow the elderly to adapt to new lifestyle changes, not force people into nursing homes too soon, and allow the elderly to remain at home for a longer period of time.

Garbage collection baskets are used for the rough classification of waste; the question of to what extent residents are required to do this should consider people’s tolerance for handling waste to ensure the sustainability of this practice. After sources of waste are roughly classified, the waste is transferred via drivetrain to the garbage collection point, where the applicable resource-based recycling is then determined and assigned for different kinds of garbage. For example, kitchen waste can specifically be collected and transported to the suburbs for biogas fermentation [9], paper-based and plastic waste can be recycled for secondary use, and so on.

A garbage collection system based on transmission technology not only provides convenience for the elderly, but also silently cultivates awareness of garbage classification [10]. At the same time, the elders have a good role model. After their participation, the elderly can encourage their family members around them so that the idea of garbage classification can gradually be integrated into the public’s daily life. [11].

4.2 More consideration of transmission technology in traditional residential waste treatment

The transmission technology behind traditional residential waste treatment is composed of three parts: the vertical transmission part, horizontal transmission part, and waste transfer station. As these three parts cover an area, the setting of the waste transfer station will increase the burden on the public areas of the original community [12]. At the same time, the transmission technology can be transformed from theory to reality within the traditional community. The economic cost factors involved in equipment procurement, installation, maintenance, and repair, as well as personnel salaries, all need to be carefully considered. Is it the government, the community’s users, or the community property that should be paying for these services? In this paper, only one type of traditional residential area was considered. Whether the application of transmission technology in this type traditional residential area can be applied to other types of traditional residential areas is something we will continue to explore in the future [13].
5. Conclusions
With the aging of the population, the application of science and technology toward improving the quality of life has become inevitable. The deployment of next-generation technologies such as 5G, cloud computing, and big data will accelerate the development of new applications for garbage collection. At the same time, we should set up city garbage collection systems, daily urban waste production, regional distribution laws, resident garbage disposal behavior, and back-end treatment of large data collection to promote the effective implementation of garbage classification. Technology such as cloud computing can be used to divide waste disposal into waste storage and classification spaces, release sanitation space system, improve the efficiency of waste disposal, and optimize urban waste disposal policies. Based on the rise in the production of domestic chips, the cost of chips is reduced, making it possible to collect big data. The low latency and high connectivity of 5G technology enables real-time communication between each garbage transportation link and the cloud platform and enables the use of big data analytics; this is to provide timely and rational analysis and recommendations for optimizing the entire garbage collection process [14], to improve efficiency, and to achieve the objectives of reducing the amount of and producing more innocuous waste.

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