

The Innovation Research of the Life Garbage Charging System Research in Beijing

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Abstract

There are some problems in Beijing municipal solid waste charging system such as low charge standard, the single charging means and the mode. Because the way of charging the life garbage in the United States, Germany, Korea, Singapore and other countries is clear and punitive measures are appropriate, therefore these countries have achieved very good results in the life garbage charge. Beijing can make reference to the successful experiences of foreign life waste collection, and explore the innovation of life garbage charging system in Beijing by establishing rational and effective way of charging life garbage, establishing sound punishment measures and realizing the industrialization of waste management.

Key words: Life garbage; Charging system; Innovation research

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INTRODUCTION

Life garbage is not only an important factor in polluting the urban living environment, but also a great obstacle

to the sustainable development of cities. With the development of harmless treatment capacity and the level of life garbage, the capital investment is also increasing. With the development of harmless treatment capacity and the level of life garbage, the capital investment is also increasing. The life garbage charging system can provide financial support for the harmless treatment of life garbage, thus effectively ensuring the orderly management of garbage reduction and classification.

1. THE CHARGING SYSTEM OF LIFE GARBAGE IN BEIJING

There are two main types of charging for living garbage: fixed fee and metered charge. The fixed fee mainly includes the single charge rate by the household, the single charge rate according to the area's garbage generation quantity and so on; the measuring charge is collected according to the standard trash can, the standard garbage bag, the trash label or the trash sign and so on. Beijing from September 1999 on the levy of life waste, the current use of life waste charging system for the fixed fee system. The main items of the municipal solid waste charge in Beijing are sanitation cleaning fee, entrusted clearing fee, garbage transportation fee, and municipal solid waste disposal fee, which corresponds to three aspects: garbage collection, garbage removal and garbage disposal. Among them, the municipal solid waste disposal fee is divided into residents of the household garbage disposal fee and non-residents of the household garbage disposal fee, household waste disposal fee unified by the Urban People's Government, the street offices responsible for the specific implementation, specifically for the city Life waste treatment. Non-residential category of garbage (including food waste) charges 25 yuan / ton, the residents of the domestic garbage charges as shown in Table 1:

Table 1
The Residents of the Domestic Garbage Charges

Charge name	Measuring unit	Charge standard	Charged object	Charge department
The garbage disposal	Household / month	3 yuan	Residents of this city	The district offices
The garbage disposal	Person / month	2 yuan	Outsiders in Beijing	The district offices

The refuse transportation fee shall be charged by the department of garbage collection and transportation to the social unit entrusted with the clearance, garbage entrust

freight belongs to the non-resident category of life waste charge, specific charges as shown in Table 2:

Table 2
The Refuse Transportation Fee

Charge name	Measuring unit	Charge standard	Charged object	Charge department
Garbage entrust freight	ton	25 yuan	Social unit	Garbage removal and transportation department

Life garbage removal fee is garbage collection and transportation departments entrusted to the residents of the residential area of the property company or management unit charged, life waste and transportation costs are also

based on the household garbage and non-residential household waste to implement the different charges, specific charges as shown in Table 3:

Table 3
Life Garbage Removal Fee

Charge name	Measuring unit	Charge standard	Charged object	Charge department
Garbage clearance	Household / year	30 yuan	Housing property unit(person)	Property company
Garbled garbage cleared freight	Tube / month	120 yuan	Housing property unit(person)	Management unit

On November 18, 2011 Beijing introduced the “The living garbage management regulations of Beijing”. Article 8 of the Regulations refers to the principle of paying more fees and charges for more emission, charging less for less emissions, paying more for mixed refuse, paying less for sorting garbage. Gradually establish metering charges, classification valuation, easy collection of life waste treatment fee system to strengthen the management fees to promote life waste reduction, classification and resource utilization. More payment for multi-emission, less payment for less emissions, in line with the international practice “who produces who pay”; Mixed refuse to pay more, pay less for waste classification, reflecting the determination of Beijing to further strengthen the management of life garbage. Gradually establish metering charges, classification valuation, easy collection of life waste treatment fee system to strengthen the management fees to promote life waste reduction, classification and resource utilization, showing Beijing wants to shift to a more diverse approach of toll collection. With the improvement of people’s living standards, urban residents have a higher demand for environmental sanitation, Beijing strengthen the management of life garbage by allocating more and better life garbage separation recovery devices and equipment, most of these inputs come from government investment. However, the government’s funds are limited, in order to protect the necessary investment in management of life waste, does not affect the effectiveness of management of

domestic waste, Beijing Municipal Commission of City management and the Beijing Municipal Commission of Development and Reform issued the “Beijing Municipal Commission of City management and the Beijing Municipal Commission of Development and Reform on the notice of strengthening the city’s non-resident garbage collection fee “on December 16, 2013 to adjust the charging standards for living garbage. The adjustment mainly for non-residential category of garbage, the adjustment mainly for non-residential category of garbage, and for the city’s 32 million non-resident units, including organs, enterprises and institutions and corporate bodies, ordinary residents are not affected by this adjustment. The notice pointed out that the garbage generation units and sewage units to implement the new garbage charging standards, living garbage from the original 25 yuan / ton to 300 yuan / ton; food waste from the original 25 yuan / Ton to 100 yuan / ton; construction waste disposal fee from the original 16 yuan / ton adjusted to 30 yuan / ton since January 1, 2014.

2. PROBLEMS OF BEIJING MUNICIPAL SOLID WASTE CHARGING SYSTEM

2.1 Living Garbage Charge Standard Is Low

Because the requirements of environmental pollution control and technology to deal with the conditions have undergone great changes, the cost and difficulties of life

garbage treatment since the implementation of garbage collection system for more than a decade. National Development and Strategy Research Institute, Renmin University of China release the “China’s municipal solid waste management status assessment study” on June 4, 2015, this study pointed out that the amount of life garbage cleared in Beijing is 648.31 million tons, the social cost of waste disposal as high as 1,530.7 yuan / ton, the total social cost of waste disposal as high as 1,530.7 yuan / ton, the total social cost of waste management as high as 9.923 billion yuan account for 2.1% of Beijing’s current fiscal expenditure.” (Renmin University of China, 2015) The implementation of non-residential waste charges 300 yuan / ton of charges standard at the beginning of 2014 in Beijing is low, compared with 1,530.7 yuan / ton of social costs of waste disposal. Beijing needs to consider adopt the way of full cost of household waste management. Over these years, municipal solid waste management is considered to be social welfare undertakings, the management fees of life waste are mainly rely on financial funds, it is difficult to attract social investment, waste management marketization, and the level of industrialization is low.

2.2 Way of Life Garbage Charging Is Singal

Beijing’s collection of municipal solid waste management fees mainly by the Beijing Municipal Management Committee, the district and county people’s governments shall be responsible for organizing the implementation, The subdistrict offices, township and town people’s governments are responsible for the specific collection work of life garbage management fee in their respective jurisdictions. Beijing’s living garbage collection costs mainly adopt the method of fixed fee. At present, charges for domestic refuse are collected using both metered and fixed tariffs, mainly through taxes, direct charges and fees collected in the public utilities and other means in developed countries. Beijing is currently using a fixed fee system for life waste, through direct charging means, that is mainly through the government directly charges garbage for residents, enterprises and units to reduce the amount of waste generated and encourage recycling. To take a fixed fee for domestic waste, the operation is relatively simple, but also for the local government to raise revenue. However, the fixed amount of fees charged to a fixed amount of household garbage, that is no matter how much garbage generated by individuals and units are only required to pay the same fee. Such a charging system of scale fees is unfair because the same amount of waste fee is paid regardless of the amount of waste generated, which is not conducive to the reduction of household waste. For the realization of the goal of reducing domestic waste, a relatively simple way is currently using in Beijing. Beijing needs to continue to explore and study how to develop metering and other charges more reasonable and effective way of living garbage in Beijing.

3. THE PRACTICE OF CHARGING LIFE WASTE IN FOREIGN COUNTRIES

3.1 The Practice of Charging Municipal Solid Waste in American

In the United States, urban waste is contracted by a company that specializes in waste collection and disposal. Residents pay the monthly waste disposal fee to the municipal administration, which then contracts with these waste management companies. Each waste-handling company’s waste collection practices vary, such as the size, color, or style of the waste separation facility, and basically the waste is classified as recyclable and non-recyclable. At present, many areas in the United States using a called PAYT (pay-as-you-throw), which is “polluter pays” garbage metering charging system. In the PAYT system, residents need to put on the corresponding tag on the garbage bags or signs, such labels or signs printed by the government and sold in accordance with a certain price, and government levies a living garbage treatment fee on residents in this way. For example, in the United States, Charlottesville, Virginia, the town began in July 1992 to levy garbage disposal fees. It takes 80 cents for residents to buy a special label on each garbage bag. Some areas of the United States are also using excessive fees to residents of the garbage collection of a certain fee, that is, within a certain amount of life waste free or low-cost, beyond the number of charges or higher fees, beyond the number fee or charge higher fees, excess charge is also a form of the metering. As in the United States of Seattle, every household residents produce less than four barrels of garbage every month to pay only \$13.25. After the implementation of this provision has produced very good results, Seattle waste reduction of more than 25%.

3.2 The Practice of Charging Municipal Solid Waste in Germany

Germany’s refuse collection system, the principle is to comply with the economy, one-time, rationality, accuracy, affordability and measurement convenience. German city life garbage disposal is collected by large and medium cities of the region or city administration of waste management department, usually by written notice to the residents or unit, residents or units through bank transfer to the designated account. Germany levies municipal waste treatment fees, usually in three ways, including fixed fees, metered charges, and fixed fees and measurement fees combined. Germany’s metering charges are measured in litter bins, waste collection and transportation companies to provide 2-4 bins for residents, including the remaining waste recycling bins. In Nuremberg, Germany, the family garbage disposal charges according to the family of the remaining garbage collection bucket volume and empty

frequency collection, the usual calculation method for the remaining garbage collection barrel volume (liter) * per liter price (Euro) * empty frequency (52 times per year), Which is 0.059 euros per liter price.” (Chen, 2008). Generally 90 liters of garbage per year, the average annual fee of about 360 Mark. The direct payment of a notice by the government to the residents or the property management agency for the payment of a waste disposal fee. In most cities of Germany, using the way of combining the fixed charge and the metering charge. For example, in Freiburg, Germany, the portion of the fixed fee is based on the household population, the portion of metering charge is based on the volume of rubbish collected by the gray trash bin (which only contains the life waste to be disposed) and the collection frequency. Levying of waste disposal fees on manufacturers is an indispensable part of the German waste charging policy. The levying of waste disposal fees by producers is a fuller expression of the “polluter pays” principle, which is responsible for the entire life cycle of the products they produce. Levies a waste disposal fee on producers, and makes more restrictions and restrictions on the materials of the products they produce, thus promoting their innovative production technology. According to the German Environmental Protection Agency statistics show that after the garbage charging policy implementation, household composting in the courtyard increases Kitchen waste reduction of 65%; packaging manufacturers for the packaging waste recycling costs required to pay up to 250 million to 300 million US dollars.

3.3 The Practice of Charging Municipal Solid Waste in South Korea

South Korea began in 1995, according to the number of garbage bags levy garbage disposal fee. Residents must put garbage into the designated garbage bags can be shipped, the cost of waste disposal and other related costs are included in the cost of garbage bags, different capacity garbage bags are charged a different fee. The designated garbage bags mainly include 7 kinds of 5L, 10L, 20L, 30L, 50L, 75L, 100L, capacity, manufacturing location and other information are marked on the garbage bags. In order to ensure the smooth implementation of the garbage collection by bag, South Korea to implement the garbage bag real name system, each household needs to mark the house number and name on the trash bag. The biggest problem of the implementation of garbage metering fees is the phenomenon of random dumping. In order to prevent such incidents, South Korea installed cameras in the places of this phenomenon is more likely to be happened, while encouraging residents to report the conduct of dumping at will, the government authorities will give informants a certain amount of bonus. South Korea's garbage disposal costs, 60% borne by the Government, residents themselves bear 40%. After 10

years of implementing the system of living garbage fees charged by the garbage bag in South Korea. Nationwide use of the provisions of the standard garbage bags up to 99% or more, the implementation of nearly 20 years later, the national waste generated more than 37% of the amount of garbage, garbage classification and recycling rate increased by 40% (Hu et al., 2013). From 2013 to the present, in order to reduce the amount of food waste generated, South Korea's policy of vigorously promoting the charging of food waste by weight throughout the country. According to the relevant departments of statistics show that Seoul now produces about 3,384 tons of food waste per day.

The South Korean Ministry of environment has reduced the amount of food waste generated by 20% to 10% after the policy was implemented to reduce the amount of food waste by weight, the national annual savings of about 5 trillion won the garbage disposal fee. (Pei, 2016)

From 2012 onwards, Seoul City, South Korea in the food waste bins installed RFID technology tracking system, dumping garbage into the bag will automatically weigh and in accordance with the weight of the money.

3.4 The Practice of Charging Municipal Solid Waste in Singapore

Since the founding of the Republic of Singapore in 1965, it began to implement the garbage collection system. Industrial enterprises and large commercial institutions (such as large shopping malls, shopping malls) and other non-public areas of garbage collection and disposal has been subject to market-oriented professional services and to pay the relevant costs. Prior to April 1996, the collection and disposal of waste in public areas such as residential areas and small commercial centers were mainly charged and disposed of by the Public Utilities Board, at that time the average monthly fee of 7 yuan per family SGD. After 1996, Singapore's Ministry of the environment to subordinate professional team reorganized as SEMAC company, the collection and transportation of municipal solid waste to achieve market-oriented operation. The government charges the garbage producers at first, and then transfer the waste disposal fee to SEMAC. As a result of the marketization of waste collection and transportation operations, as the company form of operation SEMAC companies need to pay the relevant taxes, so the government charges rose to an average of about 8 yuan per month SGD. Since 1999, the Singapore garbage collection and transportation industry to further market-oriented, higher degree of privatization, leading to lower fees. The current waste collection in the public sector in Singapore mainly consists of waste collection and disposal costs. The current waste collection in the public sector in Singapore mainly consists of waste collection and disposal costs. Garbage collection fee is collected by the garbage collection and transportation company to garbage collection and transportation costs,

the price of waste collection and transportation in the bidding has been identified. Singapore's refuse collection fee is collected by Singapore Energy Co., Ltd., which is charged by the waste collection and transportation company. It is usually paid together with the water fee and electricity fee. The garbage collection company will pay 0.5 yuan SGD per month to Singapore Energy Co., Ltd., one month later, Singapore Energy Co., Ltd. would issue a red letter of advice to residents or shops who are not pay the refuse collection fee, asking them to pay the garbage disposal fee. In the case of one or two unsuccessful recovery, will be directly out of power, water, breaking the transport, this garbage charging way makes Singapore garbage collection rate close to 100%. Garbage disposal fee is the cost paid by the garbage collector to the waste disposal unit. The main body of garbage charging is Singapore's five state-owned waste disposal units. At present, since the main disposal facilities are all owned by the State. At present, since the main disposal facilities are all owned by the State, therefore, the disposal price is determined by relevant government departments on the basis of price changes, disposal costs and other relevant factors in comprehensive landfill and incineration. Incineration and landfill disposal prices are basically the same, according to the distance is divided into 77 yuan and 81 yuan SGD.

4. FOREIGN GARBAGE COLLECTION EXPERIENCE SUMMARY

4.1 Garbage Charging Mode Is Clear

In many foreign countries, life waste charging methods mainly include the fixed and quantitative fees two ways. Developed countries are uphold the "polluter pays" principle, and their garbage collection system has been legalized, standardized. whether it is fixed or quantitative fees, there are clear and specific provisions. Such as the United States, South Korea, the main use of garbage bags metering charging; Germany and Singapore use trash can to measure the charges; however, for the same method of measurement, countries use different pricing methods, such as the United States through the sale of labels or signs, and tags or signs tied to garbage bags on the way of garbage charges. South Korea is through the sale of garbage bags of different specifications to the way garbage charges. Countries according to their own characteristics, the implementation of different, clear, specific ways of garbage collection, which has achieved good economic, social and environmental benefits.

4.2 Appropriate Punitive Measures

Appropriate punishment measures can enhance the residents' environmental awareness and promote the management of domestic garbage. Such as in South Korea, metering fees will lead to the phenomenon of

some random dumping of garbage. In order to prevent such a situation, South Korea installed some monitoring equipment in where prone to dumping garbage, and gave a certain reward to those who report the conduct of free garbage dumping. In Singapore, the Singapore Energy Company Limited will issue a red notice to the unpaid residents or shops after one month, Requiring them to pay the garbage disposal fee; in the case of one or two unsuccessful recovery, will be directly out of power, water, off transport. These similar punitive measures are very effective in encouraging the residents to actively implement the specific provisions of the management of domestic waste. These similar punitive measures are very effective in encouraging the residents to actively implement the specific provisions of the management of domestic waste, in this process that is to develop their own environmental awareness and also can affect people around each other.

5. INNOVATIVE EXPLORATION ON THE CHARGE SYSTEM OF MUNICIPAL SOLID WASTE IN BEIJING

5.1 Create a Reasonable and Effective Way of Charging

The establishment of a reasonable and effective charging platform. In Many countries abroad in order to protect the collection rate of domestic waste charges, the cost of living garbage is usually attached to the water, electricity, natural gas and other public utilities charging system. At present, Beijing's water, electricity and other public utilities have their own charging platform, garbage also has its own charging channels. Beijing municipal waste collection fees charged by multiple departments, in order to complete this work requires a lot of manpower and material resources, resulting in the cost of living garbage charging process increased. But also because a variety of garbage charges charging standards are not uniform, the relevant charging facilities are not in place, leading to the garbage collection rate is not high. Therefore, the need to establish a reasonable system of effective life garbage charging platform, not only can improve the collection rate of domestic waste, but also can reduce the cost of domestic waste charges. This paper proposes the following two kinds of life waste charging scheme:

5.1.1 Fixed Fee System Attached to the Public Goods

Beijing's electricity and water charges are collected by "one table" approach, residents use the calendar year (January 1 to December 31 each year) as the cycle for the implementation of the ladder price, water charges. Therefore, Beijing can use the fixed fee, the garbage and water or electricity charges paid together, and then the garbage collection and transportation departments to refuse a certain percentage of the total fee as a fee paid

to the water charges, electricity charges departments or units. For urban and rural “subsistence allowances” and rural “five guarantees” can be exempted from the cost of living garbage, for these residents or units who are not in accordance with the provisions to pay the cost of living garbage will receive the appropriate fines and administrative penalties. It is convenient to use the fixed fee way of collecting the living garbage fee in the public utility charging system, easy for residents to pay the cost of living garbage and to solve the low collection rate of living garbage, but also can reduce the cost of living garbage fees; however, if use this way of collecting the living garbage fee need to transform much of the public charging system and spend a lot of money.

5.1.2 Through the Garbage Bags for Metering Fees

On November 18, 2011, the 28th Session of the Standing Committee of the 13th People’s Congress of Beijing Municipality adopted the “Beijing Municipal Solid Waste Management Regulations”, which referred to the gradual establishment of the life waste treatment fee system that include some institutions like measurement fees, classified pricing and so on. Although in 2011, Beijing has made it clear that the gradual establishment of domestic waste metering and charging system, however, due to various reasons such as the operation, has not yet introduced a specific measure of domestic waste charging method. Many countries with successful experience in life waste management have implemented metering charging system. For example, South Korea since 1995, according to the number of garbage bags for garbage charging, residents must put garbage into the specified garbage bags can be shipped; The cost of garbage bags includes the cost of waste disposal and other related costs. Beijing can also the of selling garbage bags to charge life waste, garbage bags are divided into different specifications and different specifications of the garbage bags charge different fees in order to meet the different needs of residents and units, garbage can only be collected and placed in designated garbage bags, garbage bags can be sold in street offices, community properties, or sales outlets designated by the refuse collection and transportation department. In the early stage of charging through the garbage bags residents can be free to give a certain number of garbage bags, and they need to buy their own garbage bags beyond the scope. For urban and rural “low income households” and rural “Five Guarantees”, residents can receive an average number of garbage bags every month. This charging method, strong operability, can promote the source of waste reduction, promote garbage classification and resource utilization levels, garbage fees costs will not rise significantly; however, this kind of charges need to strengthen supervision, to develop a management approach to adapt to this measurement. In view of the problem of solid waste charging mode

and method too single in Beijing. We can consider to take the fixed charge system, in which living garbage fee attached to public utilities charge system. Then in parts of the pilot areas gradually develop metering charging system through garbage bags, accumulating of relevant experience, finally put the life garbage metering charging system popular in the city. To strengthen the management of municipal solid waste through the effective and reasonable charge of domestic garbage, and promote the reduction, classification and resources of life waste.

5.2 Establish Sound Punitive Measures

Both South Korea and Singapore have adopted severe punishment measures to ensure the effective implementation of the garbage collection system, and have achieved good economic and social benefits. Beijing should be based on specific garbage charging methods, explore the reasonable and effective means of punishment, not only conforms to the development requirements of the times, and can play a deterrent role, and thus improve the pay rate of life garbage fees. Beijing can establish public platform related with the enterprises and institutions of credit, publish those who do not pay the life garbage fees in accordance with the regulations or do not act in accordance with the provisions of the garbage littering on the public platform, give the corresponding punishment to these enterprises and other non-resident units who are not pay the cost of garbage fees in accordance with the provisions.

5.3 Realization of Multi Participation in Waste Management

In some foreign countries because the implementation of life waste management of multi participation, promoting domestic waste management enterprises to actively improve their own living garbage treatment technology, reducing the cost of living garbage; waste collection and transportation in Singapore has already realized the waste collection and transportation of multi participation, which makes the degree of privatization of domestic waste collection and transportation of garbage disposal so as to reduce the cost of living garbage fees, the standard of living garbage fees of residents are therefore reduced. Beijing life garbage fees standard is low, so residents and social units to pay the cost of living is not enough to pay the actual cost of living garbage treatment, most of the waste management needs of government subsidies. In order to reduce government waste management financial input pressure, Beijing can try to achieve multi-party participation in waste management, gradually form an entire chain of the management of life waste that government supervision and leadership, non-governmental organizations involved, while business operations. The quantity and quality of the enterprises in Beijing are not enough to realize the industrialization

of domestic waste management, which is to realize the multi participation in the management of municipal solid waste. The government should encourage the establishment and development of enterprises related to waste management by means of subsidies or tax breaks and other preferential measures, take efforts to make the goal of waste management to multi participate come true earlier, reduce the standard of living garbage fees and the pressure on the government and residents.

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