

# *The Enlightenment of Rural Waste Management Mode in Developing Countries to China*

Xi Huang<sup>a,\*</sup>, Hongzhen Zhang<sup>b</sup>

Hao Jing College of Shaanxi University of Science and Technology, Xi'an 712046, Shaanxi, China

<sup>a</sup>HX928495@163.com, <sup>b</sup>ZZ283702@163.com

\*Corresponding author

**Keywords:** Developing Countries, Rural Waste Management, Social Capital

**Abstract.** At present, the rapid growth of rural waste has become the focus of attention all over the world. Compared with the industrialized treatment of cities, the problem of decentralized rural waste more complicated. Developed Countries have beautiful rural environments and complete facilities, benefited from perfect legal guarantees, market-oriented operation models and scientific management systems, but the experience of rural waste management in developing countries cannot be ignored. Developing countries have formed some social relationship management paths with organizational boundaries and emotional factors, and their management experience may play a positive role in solving my country's rural management problems.

## 1. Introduction

The emergence of garbage not only reflects the rapid economic and social development, but also highlights the contradiction between human beings and the environment. Faced with the dilemma of waste disposal, Developed Countries provided some vivid lessons. Since the 20th century, as the industrial development, in order to cope with the environmental problems, Developed Countries have taken a series of measures to established a sound domestic waste management system gradually.

The experience of environmental management in Japan is that there are laws to abide by, strict law enforcement and diversified collaborative participation to promote the public to strictly abide by the rules and regulations of garbage disposal [1]. The experience of environmental management in U.S. is that establish a parallel power enforcement system, and use the government to purchase services to implement waste management [2].

The British domestic waste management model is that the central government decentralizes power to local governments for independent management, and implements hierarchical management according to the pyramid-shaped "Waste Stratification" strategy [3].

In developed countries, waste management has formed a complete treatment system around improving legislation, institutional constraints, and the participation of the market and the public.

However, in order to solve and eliminate the problem of waste management, in addition to advanced treatment technology and scientific management system, we should also reflect on the logic and needs of the public's environmental behavior, whether it is possible to extend the environmental social network of villagers' independent participation from social relations, linking the participation of more villagers, that is one of the effective methods to improve the villagers' awareness of environmental protection. Social capital does not only exist in cities, isolated and small-scale poor rural areas may have richer social capital, which is conducive to the establishment of a solid way of group cooperation. Under the framework of waste management promoted by the government, developing countries draw support the bonding effect of social capital in rural areas and the mutual benefit trust mechanism between villagers to meet the waste management needs of villagers. Their management ideas have certain reference for rural waste management in China.

## **2. Rural Waste Management Experience in Developing Countries**

### **2.1. Social Capital Promotes Villagers' Self-governance**

The most representative theory of Trust and Reciprocity research comes from Putnam's "Social Capital Theory". Social capital is a network of civic participation, and the norms of reciprocity and trust embodied in such agreements can promote cooperation, there by establishing mutually beneficial institutional rules to overcome the dilemma of collective action and improve social efficiency [4]. By using the normative mechanism, trust mechanism and network mechanism of social capital, realized information sharing, resource sharing and benefit sharing. Vietnam, a transitional Developing Countries, government intervention is still the main management method since the lack of small and medium-sized civil organizations. However, family-centered group organizations and mechanisms for establishing cooperation and trust with villagers play an important role in waste management [5]. Vietnamese villagers attach great importance to household waste disposal, especially livestock households. They can obtain livestock feed and crop fertilizer from garbage, so they are willing to compost simply. Self-interested thinking is an important factor for Vietnamese villagers to compost waste voluntarily [6]. The intimacy of the group promotes the establishment of the mutual benefit and trust mechanism of the villagers, and influences others through personal benefit behaviors, so that they can participate in this action that can obtain more benefits.

The effect of garbage disposal in northeastern Thailand depends on economic incentive mechanisms and social recognition factors. The voluntary mechanism effectively promotes the division of labor and cooperation among family members in garbage disposal through family education. The application of economic incentive mechanisms and community business mechanism stimulate the enthusiasm of villagers to participate in waste management [7]. Regional environmental social networks can bring more villagers into management with the help of a mutually beneficial trust mechanism, and continuously expand the scope of participation [8]. For those who are unwilling to participate, the villagers may punish them by adopting social arbitration methods such as exclusion and discussion, forcing them to actively participate in it. The villagers' self-supervision can strengthen the behavior of public participation [9].

The focus of rural waste management in Guatemala lies in the identification and education of community work teams. Through curriculum education, helped students to understand the importance of waste disposal, and guided in environmental protection behaviors such as waste classification. At the same time, the authorities included indigenous villagers in the action group and gave them the right to participate in garbage disposal [10]. In poverty-stricken rural areas in

Egypt, lack of the infrastructure for waste management. Villagers choose the path of cooperation to compost organic matter and kitchen waste as animal feed. The idea of “Turning waste into Treasure” reduces the environmental risks caused by random waste discharge[11]. Around villager autonomy and mutual assistance, developing countries create a path of cooperation between families and villages in waste management. Self-interested and altruistic are conducive to the construction of mutual benefit and trust mechanism among villagers, thus promoting the formation of rural waste management models in Developing Countries. Realized the family-centered waste composting and resource, village-based cooperation path. In order to mobilize the enthusiasm of villagers for waste management autonomy, developing countries virtue of social capital, realized the participation of the linked groups, and build the mutual benefit trust mechanism, and the rural environment to participate in the network path.

## **2.2. Environmental Programs Promote Waste Management**

The government's policy support and financial support, waste treatment mode, and waste management plan are the main factors affecting the sustainable recycling of waste in developing countries [12]. The main challenge facing rural waste management in developing countries in the 20th century is that the government authorities do not match corresponding policies and financial support, resulted in the lack of infrastructure, backward treatment technology, and low enthusiasm for personnel participation. With the increasingly serious environmental pollution, which threatens the ecological environment of residential areas, some areas have begun to propose garbage management plans to improve the environment of rural residential areas.

Johannesburg, South Africa revolves around the five grades of waste source prevention, utilization, recycling, treatment, and resource recovery. The local government plays a comprehensive review role. The government according the reality of waste disposal and environmental impact to adjusts the management mechanism [13]. Most countries choose the rural areas as natural shelters for urban landfills and neglect the issue of garbage pollution, while the Ukrainian government has established sanitary protection zones shared by towns and cities in rural areas, and uses a pollution source monitoring and tracking system to monitor The distribution of harmful substances and the pollution to the surrounding soil, air and groundwater, to avoid the pollution of urban landfill to the rural environment [14]. The key to waste management in Ghana is the government developing a comprehensive policy system, including sanitation inspections, infrastructure development and community engagement. Provide sanitation companies with valid data and expand infrastructure services to every location in Ghana with the help of a national waste database to ensure adequate funding for waste management programs [15].

From plan formulation to plan implementation, rural waste in developing countries implements waste management plans actively. It is essentially a process of cooperation between the government, the market and the public. During the implementation process of the waste management plan, government pay attention to the feedback on the status of dynamic management and the implementation effect of each node. Effective supervision can detect problems in time and help the government to make corrections in a timely manner. Not only the completion of staged assessment indicators, but also the purpose of improving the environment.

## **3. Enlightenment of Rural Waste Management in Developing Countries to China**

In 2011, China's rural garbage output was about 200 million tons, which is equivalent to the sum of more than 600 urban garbage disposals [16]. However, only 36% of the sampled villages in 100

villages in five provinces across the country provide garbage collection and disposal services [17]. In 2017, 40% of the organic villages in China still do not have garbage collection and treatment facilities. The severe rural pollution situation has attracted more and more attention.

Garbage disposal involves the government, enterprises and villagers. The functional departments at all levels in the county, town and village provide support in terms of policies, finance and technology according to the central decision. The enterprise is a service purchased by the government and is mainly responsible for the collection, transfer and classification of garbage. For disposal, the villagers sort the organic waste at the source, and convert the organic waste into energy and fertilizer through the methane-generating pit. The recyclables are sold to small waste recycling vendors in the streets, and the non-recyclables are placed in the collection box. The decentralization of living in rural areas makes it difficult for many enterprises to obtain government service fees to offset the high cost of collection and transportation, unable to carry out other businesses other than garbage collection, transportation and treatment, and it is difficult to effectively integrate into garbage management. In the end, the cleaning, collection, transportation, and treatment of garbage contracted by the government, and other entities lack enthusiasm to participate. Once the government is separated from it, the garbage in villages and towns will face a situation of no one to manage. The government as the governance center will inevitably lead to sufficient service fees for enterprises when the supply is sufficient, and high participation enthusiasm. Farmers also build the methane-generating pit under the government's subsidy.

Multiple levels of distributional injustice persist. The first is the obvious spatial differences. The dual system of urban and rural areas has led to the backward economic development of rural areas in my country. Compared with the strong financial resources of cities, a large amount of funds are invested in special waste management activities every year. The governments in rural areas do not have sufficient financial and material resources to support, and many villages have not even established the most basic collection stations. The garbage only be dumped in rivers and ravines at will, and the lack of infrastructure has become one of the problems restricting the improvement of the local environment. The gap between the eastern and western regions has widened, and it is difficult for the poor western regions to keep up with the pace of governance in the developed eastern regions. On the one hand, village collection and township operation in developed eastern regions will not be affected by regional costs, while this model in remote rural areas in the west is limited by the cost of garbage transportation.

On the other hand, the villagers in the western rural areas have a simpler lifestyle, and their consumption levels are far below the standards in the central and eastern regions. Therefore, the composition of garbage is relatively simple and the quantity is small. Simply applying the same governance model across the country will inevitably lead to local discomfort and lack of pertinence. The second is the low salary of environmental protection personnel. Many townships have not established environmental protection agencies, and the administrative personnel engaged in the environmental protection industry have a weak sense of existence. Due to the nature of their work, the leaders of higher-level departments do not pay attention to them. The labor of the cleaning staff of the family company is not proportional to the salary. The cleaning staff of the village cleaning, collection and transportation are mainly composed of villagers. So the rural waste management still needs to be strengthened. However, few studies paid attention to the intercommunication of solid waste management in rural China and some developing countries. There so many common problems, such as the relatively weak environmental protection system, infrastructure, and environmental protection concepts. Learning from the rural waste management model of developing countries may also suit my country's national conditions.

### **3.1. Utilize Local Customs to Promote Rural Self-governance**

In the cultural network, leaders and elites have absolute power and persuasion, they can influence others and [18]. By giving full play to the absolute authority of patriarchy, it focuses on improving the environmental awareness of core family members. The villages and towns government should change the posting notices and slogans propaganda methods, improve the environmental awareness of villagers in household propaganda, persuade core family members in a targeted manner, popularize the knowledge and importance of classification and processing, improve the family spontaneous awareness of participation.

Village leaders and elites are the core figures in village affairs management who can influence the villagers' behavior. They are the officials of village committees, or villagers with prestige and high morals. As the link between the villages and towns government, village committee has the responsibility to communicate the plans and instructions of the villages and towns government effectively. The means of communication include villagers' mobilization meetings and gatherings and exchanges in the centralized and decentralized villagers. At the same time, village committee should do a good job of recording the opinions of the villagers, feed back the villagers' suggestions and ideas to the villages and towns government in a timely manner, and play a good role as a bridge for two-way communication. On the other hand, the fear of gods can control the behavior of villagers to a certain extent. Leaders and elites can use persuasion to warn the villagers to fear nature is to fear gods and land, arouse the needs of villagers to protect the land and nature, and reduce the waste of garbage. Discharge at will. The core figures of the nodes of the social network are the key to influencing the flow of social capital. Making full use of the village leaders to influence the environmental behavior of the villagers is an effective way to promote waste management.

### **3.2. Strengthen Government Support and Improve Management Mode**

It is very important to ensure adequate supply of rural waste management infrastructure. Avoid gaps in the flow and expansion of public services, increase investment in rural agricultural infrastructure construction, such as the rational setting of garbage collection points and disposal points; the complete deployment of corresponding cleaning personnel and publicity personnel. Introducing the market mechanism in the collection, transportation and processing links, outsourcing services can reduce the financial pressure of the government, that is conducive to the establishment of a full-process supervision system. Not only the dynamic monitoring of the whole process of pollutant treatment, but also supervision accurately on the direction of funds, the effect of execution, and the classified treatment behavior of villagers.

Encourage rural enterprises to give back to the countryside. Taking full advantage of the collective ownership of rural enterprises, the local government can act as an assisting hand for rural enterprises to provide rural enterprises with preferential policy support and financial subsidies for services such as outsourcing collection and transfer, transfer station construction, and disposal sites. The subsidy price is based on the amount of garbage and the transportation distance. The market-oriented and industrialized garbage disposal model can drive the development of the rural economy. The public-private partnership model can reduce the government's financial cost of maintaining and operating infrastructure, and at the same time, it can reduce the secondary pollution of garbage disposal. It is an effective way of multi-subject governance.

## **4. Result**

From the perspective of self-interest and altruism, under the framework of waste management plans, and with the help of a mutually beneficial social network, developing countries have gradually established a waste management model with organizational boundaries but more emphasis on autonomy and mutual assistance by taking advantage of the status of rural leaders and elites. There are obvious development differences and spatial differences between the developed and developing countries, urban and rural areas. We cannot generally carry out garbage management models in rural areas that do not fit the rural area and cultural environment. Based on needs and regional characteristics, a collaborative rural waste management model with government-led plans and villagers' conscious participation is purposefully constructed.

## References

- [1] Chifari R., Lo Piano S., Matsumoto S., et al. Does recyclable separation reduce the cost of municipal waste management in Japan?. *Waste Management*, 2017, 60:32-41.
- [2] Everett J W., Peirce J J. Curbside Recycling in the U.S.A: Convenience and Mandatory Participation. *Waste Management & Research*, 1993, 11(1):49-61.
- [3] Ring J K, Peredo A M, Chrisman J J. Business Networks and Economic Development in Rural Communities in the United States. *Entrepreneurship Theory & Practice*, 2010, 34(1):171-195.
- [4] Putnam R D, Leonardi R, Nonetti R Y. *Making Democracy Work: Civic Traditions in Modern Italy*[M]. Princeton University Press, 1994:69-80.
- [5] Poon J P H, Thai D T, Naybor D. Social capital and female entrepreneurship in rural regions: Evidence from Vietnam. *Applied Geography*, 2012, 35(1-2).
- [6] Tam Thi Nguyen, Tsunemi Watanabe. Win-win outcomes in waste separation behavior in the rural area: A case study in vietnam. *Journal of Cleaner Production*, 2019, 230.
- [7] Boonrod K. Towprayoon S. Bonnet S, et al. Enhancing organic waste separation at the source behavior: A case study of the application of motivation mechanisms in communities in Thailand. *Resources, Conservation and Recycling*, 2015, 95:77-90.
- [8] Panya N., Poboon C., Phoochinda W., et al. The performance of the environmental management of local governments in Thailand. *Kasetsart Journal of Social Sciences*, 2017:S2452315116301163.
- [9] Zhijian Zhang, Liange Zhao. Voluntary monitoring of households in waste disposal: An application of the institutional analysis and development framework. *Resources, Conservation and Recycling*, 2019(143):45-59.
- [10] M.A. Zarate, J. Slotnick, M. Ramos. Capacity building in rural Guatemala by implementing a solid waste management program. *Waste Management*, 2008, 28(12).
- [11] Ibrahim M I M, Mohamed N A E M. Towards Sustainable Management of Solid Waste in Egypt. *Procedia Environmental Sciences*, 2016, 34:336-347.
- [12] Troschinetz A M., Mihelcic J R. Sustainable recycling of municipal solid waste in developing countries. *Waste Management*, 2009, 29(2):915-923.
- [13] Zelda Z. Rasmeni, Daniel M. Madyira. A Review of the Current Municipal Solid Waste Management Practices in Johannesburg City Townships. *Procedia Manufacturing*, 2019, 35.
- [14] Nataliia Makarenko, Oleg Budak. Waste management in Ukraine: Municipal solid waste landfills and their impact on rural areas. *Annals of Agrarian Science*, 2017, 15(1).
- [15] Simon B., Prince A., Odame A D., et al. Comparative Analysis of Households Solid Waste Management in Rural and Urban Ghana. *Journal of Environmental and Public Health*, 2016, 2016:1-10.

- [16] He P J. *Municipal solid waste in rural areas of developing country: Do we need special treatment mode?*. *Waste Management*, 2012, 32(7).
- [17] Feng Wang, Zihua Cheng, Ann Reisner, Ying Liu. *Compliance with household solid waste management in rural villages in developing countries*. *Journal of Cleaner Production*, 2018, 202(20):293-298.
- [18] Prasenjit Duara. *Culture, Power and the State: Rural North China, 1900-1942*[M]. *Stanford University Press*, 1991:21-32.