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The Implementation Path of Rural Solid Waste Recycling under the Background of Rural Revitalization

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Abstract

With the acceleration of urbanization, the amount of solid waste in rural areas continues to increase, bringing serious pollution problems to the environment. Therefore, the resource utilization of rural solid waste has become one of the important tasks of current environmental protection work. This article analyzes the current situation of rural solid waste resource utilization and proposes a path to achieve it, including government guidance, technological innovation, and social participation. At the same time, this article also discusses the difficulties and strategies for achieving the resource utilization of rural solid waste, providing a reference for the realization of rural solid waste resource utilization.

Keywords

Rural Solid Waste; Resource Utilization; Path Research.

1. Introduction

Rural revitalization is currently an important strategy in China, first proposed in the report of the 19th National Congress of the Communist Party of China in 2017. Its basic connotation is to focus on agriculture and rural areas, with urban-rural integration as the core, promote the integrated development of urban and rural areas, and achieve comprehensive rural revitalization. Rural revitalization includes agricultural revitalization, rural industrial revitalization, rural cultural revitalization, rural environmental revitalization, and rural governance revitalization. By strengthening infrastructure construction, optimizing agricultural structure, developing characteristic industries, increasing farmers' income, promoting rural cultural protection and inheritance, strengthening environmental protection and governance, and improving rural living conditions, a series of measures are taken to achieve urban-rural integration development, promote social and economic prosperity, and improve people's living standards. Rural solid waste treatment is an indispensable part of rural revitalization. With the development of urban and rural economy and society, the amount of solid waste in rural areas continues to increase, but the treatment method is relatively single, with a large amount of waste being randomly stacked or buried, resulting in environmental pollution and resource waste. The goal of rural revitalization is to achieve comprehensive rural revitalization, and the reasonable treatment and recycling of rural solid waste is one of the important contents to achieve this goal. Transforming rural solid waste into renewable resources through methods such as garbage classification, biomass energy utilization, and organic fertilizer production can not only reduce the harm of waste to the environment, but

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also add new sources of income to the rural economy, promote the development of the rural economy and increase farmers' income. Therefore, rural revitalization is closely related to the treatment of rural solid waste. In the process of promoting rural revitalization, rural solid waste management and resource utilization should be strengthened to achieve sustainable development.

With the acceleration of urbanization, more and more people are flocking to cities, resulting in an increasing population density and a growing amount of urban waste. Compared to cities, solid waste management in rural areas is more important and urgent. Unreasonable handling methods not only have an impact on the environment, but also bring a series of health problems. Therefore, the research and practice of rural solid waste resource utilization have important practical significance. This article aims to explore the related issues of rural solid waste resource utilization in the context of rural areas, in order to provide reference for improving the rural environment and improving the quality of life of rural residents. The production of solid waste in rural areas is large, mainly including household waste, agricultural waste, construction waste, etc. Among them, household waste is one of the main sources of rural solid waste. With the continuous acceleration of urbanization, many urban residents have migrated to the urban-rural fringe and rural areas, which has also led to an increase in rural solid waste. At present, there are certain problems in rural solid waste management, such as a lack of effective management mechanisms, weak infrastructure, and low quality management personnel. At the same time, due to the relatively low environmental awareness in some rural areas, it is also difficult to classify and recycle garbage, resulting in a large amount of recyclable resources being wasted. Therefore, strengthening the management and resource utilization of rural solid waste has important practical significance and development prospects.

2. Literature Review

In September 2018, the Central Committee of the Communist Party of China and the State Council issued the "Rural Revitalization Strategic Plan (2018-2022)", which made specific strategic arrangements for the implementation of the first five-year work plan of the rural revitalization strategy, to guide various regions and departments to orderly promote the rural revitalization strategy. The Plan points out that it is necessary to "take ecological environment friendliness and sustainable utilization of resources as the guidance", realize waste recycling, focus on tackling prominent problems in agricultural environment, and continue to improve rural living environment. Yang Haichao stated in his article that the recycling and treatment of rural waste is an important way to achieve resource recycling and utilization. With a focus on the resource utilization of rural waste, he actively promotes waste recycling technologies and processes, turning harm into profit and waste into treasure. At the same time, we should reduce the generation and inflow of waste from the source, actively develop green industries, improve green consumption, enhance the environmental protection awareness of villagers, strictly control the flow of waste, use economic means and market mechanisms, establish a waste recycling management system, improve the recycling and comprehensive utilization of waste, and achieve waste resource utilization. Sun Yueyue also stated in his article that the current situation of rural solid waste treatment should be given attention by national and local governments, increasing investment in rural environmental governance, and effectively safeguarding the interests of farmers and rural areas. The national environmental protection monitoring network should also be expanded to include townships and rural areas in the monitoring network. Domestic scholars should increase their research on rural solid waste treatment methods and technologies, and develop practical and low-cost technical measures to benefit nearly 1.1 billion farmers. Local governments and rural organizations should also flexibly choose reasonable waste collection and transportation models based on the local solid

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waste volume and characteristics, introduce market and supervision mechanisms, assign responsibilities to individuals, and effectively promote the reduction, resource utilization, and harmless treatment of solid waste.

Even though waste disposal is so important, the reality is still very bad. Wang Dazhong's research indicates that residents have a weak awareness and lack the technical level to handle solid waste. The main treatment methods for solid waste in rural areas include on-site random stacking, landfill, and transfer. Long term accumulation of solid waste occupies a large area of high-quality land. At the same time, it has destroyed the surrounding excellent soil and good natural vegetation, polluted the natural environment of the new countryside, and inevitably reduced crop yields, seriously affecting the construction of the new countryside. Even more serious is the illegal phenomenon of concentrated dumping of solid waste into farmland in some places, coupled with the flow of rainwater bringing polluted solid waste into farmland, which has become one of the main sources of farmland pollution [3].

Domestic scholars have also conducted corresponding research in response to this situation. Qian Meng stated in the article that the construction of ecological agricultural parks in rural areas has increased resource utilization, reduced solid waste production, and transformed traditional agricultural solid waste into usable resources such as biogas and flocculants. This not only promoted the transformation of agriculture from extensive resource consumption to ecological intensification, but also achieved sustainable development of resources. Niu Junling et al. proposed that the collection, storage, transportation, harmless treatment, and resource utilization of rural solid waste are long-term and complex systematic projects. Government functions should be highlighted, the social enthusiasm of enterprises and farmers should be exerted, comprehensive economic and technological management measures should be taken, and long-term persistence and continuous promotion can effectively solve the problem of environmental pollution caused by rural solid waste. Cui Xiaoze said that the waste resource utilization models in the development of rural industries mainly include family primary planting and breeding cycle, enterprise upgrading planting and breeding plus cycle, multi village industrial union systemic circulation County level industrial integration and circulation models [6]. Hu Duanyi suggests that before recycling solid waste, it should be selectively treated using methods such as separation, solidification, stabilization, or heat treatment to reduce the content of toxic substances in solid waste, reduce its impact on the environment, and improve the performance of resource utilization products [7]. Zhang Siqi proposed that relevant departments must attach importance to the management of solid waste in rural areas, continuously strengthen the management of solid waste in rural areas, establish and improve a comprehensive management system for solid waste in rural areas, continuously strengthen and improve the environmental construction in rural areas, and provide a good, stable, and healthy social environment for the goal of building a new socialist rural village.

3. The Connotation and Technology of Rural Solid Waste Resource Utilization

3.1. Rural Solid Waste

Rural solid waste mainly comes from solid waste generated in agricultural production and daily life. Agricultural solid waste mainly comes from straw left by crops (including corn straw, wheat straw, rice straw, etc.), fruit peels and kernels, veterinary waste, and livestock manure. The solid waste generated in daily life mainly includes food residues, discarded textiles, plastics, glass, metals, etc. According to different production, it can also be divided into two categories: agricultural solid waste and household solid waste.

In fact, the problem of solid waste treatment in rural areas has greatly affected the cleanliness and hygiene of the rural environment, resulting in low local environmental quality and causing

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some health problems. At the same time, if these solid wastes are not fully utilized, they also waste valuable resources.

3.2. Resource Utilization of Rural Solid Waste

The resource utilization of rural solid waste refers to the conversion of various waste generated in rural areas into useful resources, in order to reduce pollution, promote economic development, and promote sustainable social development. The practice of rural solid waste resource utilization has received widespread attention and discussion in relevant fields both domestically and internationally. In China, with the acceleration of urbanization, rural solid waste is facing an increasing number of problems, so the importance of realizing the resource utilization of rural solid waste is becoming increasingly prominent. In foreign countries, due to resource scarcity and the severity of environmental pollution, the resource utilization of rural solid waste has also become an important means to solve these problems.

At present, there have been many successful practical cases of rural solid waste resource utilization both domestically and internationally, which have achieved good economic, social, and environmental benefits. Compression technology is a treatment method that compresses and reduces the volume of solid waste. Common compression equipment includes compressors, compression tanks, etc. Combustion technology decomposes solid waste through high-temperature oxidation, converting it into harmless gases and ash. Landfill technology involves burying solid waste into soil, degrading organic matter through microbial decomposition, and ultimately forming stable soil. These three technologies each have their own advantages and disadvantages, and appropriate processing methods need to be selected based on different situations.

Biological treatment technology is a technology that utilizes microorganisms to decompose and degrade organic waste, thereby achieving resource utilization. Composting technology is the process of mixing solid waste with other organic matter and treating it appropriately to form fertilizer. Wet treatment technology involves soaking solid waste in water and utilizing microorganisms and other chemical substances for decomposition and degradation. Biological product technology is the process of converting solid waste into biological products, such as biofuels, biological fertilizers, etc. Biological treatment technology has advantages in environmental protection, economy, and resource utilization, but the technology cost is relatively high and requires a high level of technical proficiency and professional knowledge.

4. Cases of Rural Solid Waste Resource Utilization in the Context of Rural Revitalization

4.1. "Garbage Classification+Kitchen Waste Treatment" Mode

A classic case of rural solid waste recycling in the context of rural revitalization is the "Garbage Classification+Kitchen Waste Treatment" model in Yuhang District, Zhejiang Province, China.

Yuhang District is a county-level city in the eastern coastal area of China, with rich natural resources and human resources. However, with the development of urbanization, the amount of rural solid waste in the region continues to increase, bringing enormous pressure to the local environment. Therefore, the Yuhang District Government is actively exploring new models of rural solid waste resource utilization in the process of promoting rural revitalization. The "Garbage Classification+Kitchen Waste Treatment" model in this area is based on emphasizing garbage classification, combining kitchen waste treatment with agricultural production, and realizing the resource utilization of solid waste. Specifically, this mode includes the following steps:

(1) Garbage classification. The government of Yuhang District has carried out large-scale garbage classification publicity and education activities, which has raised residents' awareness

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of garbage classification. At the same time, the government has also established a garbage classification collection and transportation system to classify and recycle recyclable waste paper, waste plastic, scrap metal and other resources, reducing the amount of solid waste.

(2) Kitchen waste treatment. The government of Yuhang District has built several kitchen waste treatment stations in rural areas to centrally treat kitchen waste generated by local households. These kitchen waste are transformed into high-quality organic fertilizers through biological fermentation, compression and other treatment technologies, providing an important source of nutrients for local agricultural production.

(3) Agricultural production and utilization. The government of Yuhang District also organized local farmers to engage in organic agricultural production, selling organic vegetables, fruits and other agricultural products to the urban market, and achieving good economic benefits. At the same time, the government has also promoted clean energy technologies such as biogas power generation, converting rural household waste and biomass waste such as crop straw into clean energy, providing impetus for local economic development.

The implementation of this model effectively solves the problem of rural solid waste treatment, achieving the dual goals of resource utilization and environmental protection. At the same time, this model also promotes the development of agricultural production, drives an increase in the income of local farmers, and promotes the development of rural economy and the realization of rural revitalization.

In general, the "Garbage Classification+Kitchen Waste Treatment" model in Yuhang District is a very successful case of rural solid waste recycling in the context of rural revitalization. Through government guidance and social participation, the reduction, resource utilization, and environmentally friendly treatment of solid waste have been achieved, providing important support for the revitalization of local rural areas.

4.2. Resource Utilization of Waste Household Appliances

With the continuous development of technology, the speed of updating and upgrading household appliances in rural areas is also becoming faster and faster. The treatment of waste household appliances has become another focus of the application of rural solid waste resource utilization technology. At present, waste household appliances are mainly utilized as resources through disassembly, assembly, and remanufacturing. For example, in Yichang City, Hubei Province, the local government collaborated with enterprises to carry out a "rural electrical appliance recycling and utilization" activity. By recycling waste household appliances and carrying out processes such as disassembly, assembly, and remanufacturing, they are transformed into new electrical products, achieving the recycling and utilization of waste, while also driving the development of the local economy.

4.3. Resource Utilization of Plastic Bags

Plastic bags are the most common type of solid waste in rural areas. The traditional treatment method is to directly stack or incinerate it, which not only wastes resources but also causes serious environmental pollution. Therefore, how to achieve the resource utilization of plastic bags has also become one of the key points in the application of rural solid waste resource utilization technology. In China, many regions have started to carry out the recycling and utilization of plastic bags. For example, in Mengzi City, Yunnan Province, the local government has established a waste plastic bag recycling station to guide farmers to recycle, classify, and reuse plastic bags. Through this approach, not only has the resource utilization of waste been achieved, but it has also driven the development of the local economy.

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5. Difficulties and Countermeasures of Rural Solid Waste Resource Utilization in the Background of Rural Revitalization

Rural revitalization is currently an important strategy in China, and the resource utilization of rural solid waste is an indispensable part of rural revitalization. However, in practice, the resource utilization of rural solid waste still faces many difficulties and challenges. This article will explore the difficulties in rural solid waste resource utilization from the perspectives of technology, funding, and management, and propose corresponding countermeasures.

5.1. Technical Difficulties

(1) Insufficient technical level. The resource utilization of rural solid waste requires advanced treatment technology and equipment support, but currently, the technical level and equipment conditions in most rural areas are relatively backward, making it difficult to effectively treat solid waste. Countermeasure: The government can strengthen technical training and transfer, introduce advanced solid waste treatment technologies and equipment, and improve the treatment capacity of rural solid waste resource utilization.

(2) The difficulty of waste classification is high. There are various types of solid waste in rural areas, which are difficult to classify, and residents lack awareness, resulting in the waste of a large amount of recyclable resources. Countermeasure: The government can strengthen the promotion and education of garbage classification, improve residents' awareness of garbage classification, establish a garbage classification collection and transportation system, and achieve waste classification and recycling.

(3) Kitchen waste treatment technology is not mature. The treatment of kitchen waste needs advanced biological fermentation, compression and other technical support, but at present this technology has not been widely used in rural areas, resulting in the inability to effectively treat kitchen waste. Countermeasures: The government can strengthen technology research and development and promotion, introduce advanced kitchen waste treatment technology, and improve the treatment efficiency and quality of kitchen waste.

5.2. Financial Difficulties

(1) High investment cost. The resource utilization of rural solid waste requires a large amount of investment, including equipment procurement, technology updates, personnel training, etc. However, the funding sources in rural areas are relatively limited, making it difficult to meet the needs of resource utilization treatment. Countermeasure: The government can increase financial support for the resource utilization and treatment of rural solid waste, guide social capital to enter the field of rural solid waste resource utilization, and establish a diversified funding mechanism.

(2) The economic benefits are not significant. The resource-based treatment of rural solid waste generally requires long-term investment, but the economic benefits are not significant and it is difficult to attract capital to enter. Countermeasure: The government can formulate relevant incentive policies, such as tax incentives and subsidies, to encourage enterprises and individuals to participate in the resource utilization and treatment of rural solid waste, and improve economic benefits.

5.3. Management Difficulties

(1) Lack of a unified management mechanism. The resource-based treatment of rural solid waste involves multiple departments and stakeholders, and lacks a unified management mechanism, making it difficult to coordinate and promote the resource-based treatment. Countermeasure: The government can establish a unified management mechanism, clarify the responsibilities and tasks of various departments, strengthen coordination and cooperation, and achieve orderly progress in the resource utilization and treatment of rural solid waste.

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(2) Inadequate supervision. The resource utilization of rural solid waste has problems such as illegal operations and environmental pollution, but inadequate supervision has led to difficulties in regulating the resource utilization. Countermeasure: The government can strengthen regulatory efforts, establish a sound regulatory mechanism, strictly crack down on and punish illegal and irregular behaviors, and ensure the standardized operation of rural solid waste resource treatment.

5.4. Social Difficulties

(1) Insufficient awareness of residents. Rural residents have insufficient understanding of garbage classification and solid waste resource utilization, and lack awareness and motivation to actively participate. Countermeasure: The government can strengthen publicity and education, improve residents' awareness and awareness of garbage classification and resource utilization, and guide residents to actively participate in resource utilization.

(2) Low social participation. The resource-based treatment of rural solid waste requires the support and participation of all sectors of society, but the level of social participation is relatively low. Countermeasure: The government can strengthen the cultivation and guidance of social organizations, encourage enterprises and individuals to participate in the resource treatment of rural solid waste, and form a situation of social co governance.

In summary, the resource utilization and treatment of rural solid waste face various difficulties in terms of technology, funding, management, and society. The government should take effective measures to strengthen investment, promote advanced technology, establish a unified management mechanism, strengthen supervision and publicity education, guide all sectors of society to actively participate, and achieve sustainable development of rural solid waste resource treatment.

6. Conclusion and Suggestions

6.1. Conclusion

The application of rural solid waste resource utilization technology has good economic, social, and environmental benefits. With the continuous acceleration of urbanization, rural areas are also facing increasingly serious waste problems. In order to solve this problem, rural solid waste resource utilization technology has emerged. This study draws the following conclusions through case analysis and literature review of rural solid waste resource utilization:

Firstly, the application of rural solid waste resource utilization technology has good economic benefits. Through the analysis of multiple cases, it can be seen that the application of rural solid waste resource utilization technology can effectively reduce treatment costs, improve resource utilization efficiency, and achieve resource regeneration and utilization. For example, in certain regions, the recycling prices of recyclable waste such as discarded agricultural films and plastic bags are relatively high. By recycling these resources, it can drive the income growth of local farmers and promote rural economic development.

Secondly, the application of rural solid waste resource utilization technology also has good social benefits. The massive stacking of waste not only pollutes the environment, but also poses a threat to people's health. The application of rural solid waste resource utilization technology can effectively reduce waste emissions, reduce environmental pollution, and improve people's quality of life. In addition, the application of rural solid waste resource utilization technology can also drive local employment and promote social harmony and stability.

Finally, the application of rural solid waste resource utilization technology still has good environmental benefits. The massive stacking of waste can lead to the waste of land resources and damage to the ecological environment. The application of rural solid waste resource

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utilization technology can effectively reduce the discharge of waste, achieve resource recycling, reduce damage to the natural environment, and protect the ecological environment.

6.2. Suggestions

Although the application of rural solid waste resource utilization technology has good benefits, there are still many problems in the current policy support system for rural solid waste resource utilization. For example, the policy formulation in some regions is not perfect enough and lacks specific operational rules. Some regions have low efficiency in policy implementation and even face the problem of ineffective policy implementation. Therefore, based on this, this study proposes the following suggestions:

Firstly, it is necessary to strengthen the research and promotion of rural solid waste resource utilization technology, improve technical level and operational ability, further reduce treatment costs, and improve resource utilization efficiency.

Secondly, we should improve the policy support system, increase policy promotion efforts, and improve the efficiency of policy implementation. The government should formulate more detailed relevant policies, clarify the specific content and operational rules of the policies, and strengthen the promotion and popularization of the policies to improve the efficiency of policy implementation.

Finally, social participation should be enhanced, and publicity and education on the resource utilization of rural solid waste should be strengthened. The government can strengthen the promotion and popularization of rural solid waste resource utilization technology through various channels, encourage all sectors of society to actively participate in waste recycling and resource utilization, and jointly promote the development of rural solid waste resource utilization.

In summary, the application of rural solid waste resource utilization technology has important economic, social, and environmental benefits. Suggestions to strengthen technological research and promotion, improve policy support systems, and enhance social participation can promote the rapid development of rural solid waste resource utilization and achieve sustainable economic, social, and environmental development.

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