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Research on the Countermeasures of Recycling Technology for Construction Waste

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Abstract: ***The recycling of construction waste is not only a challenge faced by the modern construction industry, but also an important measure to promote sustainable development. With the acceleration of urbanization, the amount of construction waste is showing a rapid growth trend. How to efficiently and reasonably recycle resources has become an urgent problem to be solved. This article focuses on the recycling of construction waste and analyzes the main problems currently faced, including bottlenecks in waste treatment technology, underlying reasons for low resource recovery rates, and insufficient regulations and policies. By optimizing and innovating existing technologies, specific measures have been proposed to improve the utilization rate of waste recycling, and how to promote the healthy development of this field through policy guidance and industry collaboration has been explored. This article aims to provide practical and feasible measures to solve the dilemma of construction waste and promote the development of green buildings and circular economy.***

Keywords: Construction waste; Recycling; Resource utilization technology; Policy support; Green Building.

1. INTRODUCTION

In today's world, the construction industry is one of the main sources of global resource consumption and environmental pollution. With the booming development of the construction industry, the amount of waste generated has been increasing year by year, especially in the context of rapid urbanization, the problem of handling and utilizing construction waste has become particularly prominent. How to turn waste into treasure while ensuring engineering quality and safety has become an urgent issue that needs to be addressed globally. Faced with this challenge, the recycling of construction waste is undoubtedly the most forward-looking solution. However, despite some technological advancements and policy support, there are still many difficulties and obstacles in practical operation. Therefore, in-depth research on the current situation, problems, and countermeasures of the recycling of construction waste has become a key step in promoting green buildings and sustainable development.

2. OVERVIEW OF RECYCLING OF CONSTRUCTION WASTE

2.1 Definition and Classification of Construction Waste

Construction waste refers to all solid waste generated during the construction, dismantling, and repair processes of buildings. The composition of construction waste is complex, involving various materials such as concrete, brick debris, wood, metal, glass, etc. There are also a certain amount of toxic and harmful substances in construction waste, which pose a threat to human health and the environment. According to the pathways and characteristics of generation, construction waste can be classified into various types such as construction waste, demolition waste, and decoration waste. Different classifications encounter different difficulties in achieving recycling, and how to classify and recycle them in an environmentally friendly and efficient manner directly determines the path of garbage recycling.

2.2 Theoretical Significance of Recycling

Waste recycling is an ideal principle of effectively utilizing materials as resources and minimizing their side effects. It is a process that maximizes the utilization of products and elements needed by humans and minimizes waste emissions. It is derived from the scientific basis of ecology and environment, with a systematic approach aimed at reducing energy consumption and pressure on the environment. Waste resource utilization is a good way to reduce material and resource waste, energy consumption, and environmental pollution. Therefore, in the application of construction waste resource utilization, it can help people carry out green building, ecological building construction, and achieve circular economy, making important contributions to the development of ecological environmental protection in the construction field.

3. PROBLEMS FACED IN THE RECYCLING OF CONSTRUCTION WASTE

3.1 Limitations of Waste Management Technologies

The main bottleneck of current construction waste treatment technology in China is the low efficiency of resource utilization and the complexity of technology. Although some advanced technologies have been applied to varying degrees in different regions, most processing equipment and technologies are still unable to adapt to the complex nature and multiple types of construction waste. For many current treatment methods, it is still necessary to address the issues of high energy consumption and low recovery rates in the sorting, crushing, or recycling of concrete, wood, and steel in construction waste [2], as well as some technical methods that cannot handle construction waste containing asbestos and other harmful substances such as waste with high lead content. These technological bottlenecks also directly reflect the challenges of scale and economy in the resource utilization of construction waste, which has become a stumbling block to the promotion of the recycling of construction waste.

3.2 Reasons for Low Resource Recycling and Utilization Rate

There are many reasons for the low recycling rate of construction waste, and the first reason for the low recycling rate is the variety of types of construction waste, the complexity of recycling, and the poor effectiveness. During the recycling process, different types of garbage, such as concrete, bricks, wood, etc., must be processed separately, which will increase the cost of sorting and processing. Difficulties in transporting, storing, and sorting construction waste, inadequate recycling facilities, and a lack of corresponding funding and technology. During the recycling process, the distribution of benefits is uneven and there is no reasonable and perfect market mechanism, making it difficult for the industry to benefit from recycling and carry out self circulation; The recycling and utilization rate of construction waste is far below a reasonable level, and there is a lack of relatively complete systematic and standardized recycling and treatment.

3.3 Insufficient Regulatory and Policy Support

The exploration of the recycling of construction waste in many countries and regions is not yet mature, and the lack of sound or perfect legal systems can lead to difficulties. Many regions lack regulations and policy support for the management, recycling, and utilization of construction waste in their relevant legal systems. When it comes to the disposal of construction waste, most of them involve environmental and pollution issues, but there is almost no support for treatment technology standards, industry management, and incentive policies. Insufficient policy support has resulted in many enterprises lacking sufficient motivation for the recycling of construction waste. Conflicts between corporate interests and environmental protection goals can lead to inadequate policy implementation and hinder resource recovery.

4. RESEARCH ON COUNTERMEASURES FOR RECYCLING TECHNOLOGY OF CONSTRUCTION WASTE

4.1 Optimization of Waste Resource Utilization Technology

Optimization of resource utilization technology for construction waste. In terms of improving the recycling efficiency of construction waste resources and reducing environmental impact, there are still many construction waste treatment technologies that are not optimized enough. For example, traditional construction waste sorting techniques mostly perform rough sorting based on types or properties, and cannot effectively sort many complex types and difficult to define components of construction waste, resulting in the waste of recyclable waste. The key to optimizing the resource utilization technology of construction waste is to improve the accuracy and efficiency of resource sorting. Currently, intelligent sorting technology can be used to identify and classify construction waste in real time from the perspective of big data systems and artificial intelligence algorithms, thereby eliminating possible errors in manual operations and achieving efficient sorting efficiency. Secondly, the chemical and physical treatment methods applied in the disposal of construction waste resources should be improved and optimized [3], in order to enhance the effective recycling and utilization rate of various elements. For example, the effective recycling and reuse ratio of metal elements, wood elements, and concrete materials in waste will be significantly increased. On the other hand, the elements contained in construction waste belong to heavy metals and harmful elements, and more advanced and effective chemical treatment methods need to be adopted in the treatment process to ultimately ensure the harmless treatment of harmful components in the waste. In short,

through the continuous upgrading of technology in the resource utilization of construction waste, it is no longer simply recycling, but achieving the re extraction and reuse of resources, and ultimately achieving scientific, efficient, and pollution-free waste treatment.

4.2 Measures to Improve the Recycling Rate of Waste

Measures need to be taken for the recycling of construction waste. Mandatory garbage classification and waste management systems can effectively improve the recycling rate of construction waste, as current construction waste is mixed waste and cannot maximize the recycling rate of waste. Classifying the source of construction waste enables effective garbage classification and recycling during the generation process, reducing the problems of construction waste generated in recycling and improving the recycling rate of construction waste. Design an effective system for collecting, transporting, and storing construction waste, which enables efficient and timely recycling of construction waste. The mandatory force of policies can achieve a certain level of recycling rate for construction waste. The introduction of policies requires construction enterprises to comply with the construction waste recycling policy, and encourages them to use more environmentally friendly building materials and construction technologies in the construction process through financial subsidies, tax incentives, and other means. It is also necessary to increase policy guidance, financial support, and funding support for construction waste recycling enterprises, enhance their innovation and technological innovation capabilities, and further enhance the recycling efficiency and effective utilization rate of construction waste. By increasing research on modern recycling technology and continuously utilizing the Internet of Things and big data technology, the classification and recycling process of construction waste can be effectively, intelligently, and rationally controlled. By monitoring the flow and rate of waste recycling, the recycling of construction waste can be achieved. Residents can be instilled with awareness of ecological environment protection, and their sense of environmental responsibility in social life can to some extent drive the public's circular consciousness.

4.3 Innovative Development of Technical Equipment

The recycling and utilization of construction waste cannot be separated from advanced technological equipment. Currently, the recycling equipment for technological equipment is mostly mechanical equipment, which has low recycling efficiency and processing quality. Therefore, innovation in technological equipment is one of the key factors for the recycling of construction waste. The main problems with waste disposal equipment are low processing efficiency, low accuracy, and high energy consumption. To solve these problems, it is necessary to start from improving the intelligence, automation, and efficient utilization of equipment, drawing on emerging technologies such as artificial intelligence, big data, and the Internet of Things, in order to enhance the accuracy of sorting equipment for construction waste, improve the processing capacity of sorting equipment, and enable real-time supervision and feedback on the working status of sorting equipment, optimize processing procedures, and reduce waste and energy consumption. In addition, increasing the energy consumption of waste recycling equipment is also worth considering [5]. With the development of new crushing, screening, compression and other equipment, the speed of waste recycling and the recovery rate of waste treatment can be greatly improved. For some new technological equipment, such as in the treatment of construction concrete waste, it can effectively improve the crushing strength of concrete waste, effectively crush construction waste, and extract resources that need to be reused. In addition, for some special wastes, such as construction waste containing harmful substances, they need to be treated in advance, and targeted treatment equipment needs to be developed to avoid the occurrence of secondary pollution during the treatment process.

4.4 Policy Recommendations for Waste Management

A sound policy system is a prerequisite for achieving efficient utilization of construction waste. The government should play an active role in the management of construction waste, providing legal and policy support, financial support, and investment to ensure timely recycling and resource utilization of construction waste. At the level of laws and regulations. The government should strengthen the construction of regulations on waste classification and recycling, and regulate the behavior of relevant units and enterprises through strict implementation of relevant regulations; In addition, corresponding legal requirements need to be made for the recycling and utilization of construction waste. In the process of use, relevant enterprises should strive to recycle waste resources as much as possible, thereby reducing the amount of construction waste generated during the construction period of construction projects. The government should increase policy support and do a good job in tax reduction and subsidy work, support relevant construction enterprises to apply advanced technologies related to the recycling of construction waste, and carry out environmental protection transformation and technological upgrading of relevant

enterprises. For outstanding enterprises and companies in the recycling and utilization of construction waste, the government can also provide corresponding rewards and punishments, effectively stimulating the technological development of enterprises and attaching importance to environmental protection and energy conservation. In the field of construction waste disposal, the government should strengthen the construction of industry standards and market access approval, and prohibit the emergence of industries with low efficiency in recycling and waste of construction waste. The government's guidance on construction waste also includes social guidance, such as environmental protection propaganda and social education.

5. CONCLUSION:

The recycling of construction waste is not only to solve the problems of resource waste and environmental pollution, achieve current urban sustainable development, but also a responsibility for future urban sustainable development. Under the current challenges of technological barriers, low recycling rates, and incomplete policies, it is necessary to solve and improve them through technological means, policy constraints, and cooperative approaches, and to find a large-scale and efficient technological path for waste recycling, in order to achieve a win-win situation of less pollution, economic benefits, and social benefits. The construction industry should fully recognize the enormous potential of resource recycling of construction waste and form a new situation of green development with the participation of the whole society.

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