

The Analysis on Building the Mode of Circular Economy in Chinese Construction Industry

Xiao-gang Wu

(Doctor, Dept. of Civil Engineering, Zhejiang, University, Yuquan, Hangzhou, 310027, P.R.China)

Tu-qiao Zhang

(Professor, Dept. of Civil Engineering, Zhejiang, University, Yuquan, Hangzhou, 310027, P.R.China)

Xun Li

(Master, Dept. of Civil Engineering, Zhejiang, University, Yuquan, Hangzhou, 310027, P.R.China)

Abstract

To develop the circular economy is an important measure for implementing the sustainable development strategy. In this paper, based on the analysis on the characteristics of circular economy and the construction industry in China, to develop circular economy in construction industry is considered a significant way for realizing the sustainable development of the construction industry in China, at the same time, the component and current working emphases for constituting the circular economy mode in the construction industry in China are pointed out. In the end, five countermeasures on how to develop the mode of circular economy in the construction industry in China is put forward.

Keywords

Circular Economy, Construction Industry, Sustainable Development

1. Introduction

Since the 1990's the scholars have realized clearly that during the implementation of sustainable development strategy, the essential reason for the increasing severity of resource and environmental problems of modern time lies in the linear economy mode whose characteristics are high exploitation, low usage and high discharge. So a new type of economy that can mitigate the long-term acute conflict between environment and development effectively is needed. Now, one type of economy called circular economy can realize ecological conversion (so-called “green” direction), and utilizes natural resources and environmental capacity by environment-friendly means. Consequently, this type of economy provides

strategic theory mode for the economy transiting from conventional linear economy to sustainable economy since industrialization. To develop circular economy has been regarded as an important approach and realization form for the sustainable development of whole society.

Liu qiao^[1],Liu Zhengying^[2],Li Zhaoqian^[3] have put forward the countermeasures about establishing the circular economy mode in China; Cai ning^[4] and Li jian^[5] have discussed the corresponding measures on how to acclimate the tide of circular economy in the concrete industry and the manufacturing industry respectively. This paper is based on the construction industry in China, and under the basis of analyzing the characteristics of circular economy and the construction industry, the working emphases of constituting the circular economy mode in the construction industry in China is pointed out, and five countermeasures on how to develop the circular economy mode in the construction industry in China is put forward as well.

2. Characteristics of Circular Economy

Circular economy belongs to the economies whose main characteristic is that substances flow along closed loop, it requires peoples' activities to form the repeating circular resource-product-regenerative resource" flow process of substances, which makes the entire system and the production and consumption processes produce no or little waste, thus the win-win strategic goal of environment and economy will be realized.

Principles followed by circular economy:

- Low input of resources and low discharge of waste, i.e. reducing, belonging to the control of input and output ends;
- High utilization of resources and easy treatment of waste, i.e. reusing and recycling, belonging to process control.

3. Mode of Circular Economy in Construction Industry in China

After twenty years' development of reform, many important indexes of the construction industry in China have come out top in the world, however, when great breakthroughs of total amount have been realized, the conflicts of energy-consumption of construction industry and structure of production are unveiling increasingly. The construction industry in China is the typical industry based on large consumption of resources and energy, thus the excessive consumption of resources, destruction of resources, pollution in environment and so on all bring negative influences to social economy especially the sustainable development of construction economy itself^[6].

The characteristics of circular economy determine that to develop circular economy is the inevitable choice for the sustainable development of the construction industry. With the premise of keeping good environmental quality within the construction industry, long, rapid and healthy development of construction economy will not be achieved unless circular economy mode in construction industry is accomplished decidedly to realize output not consumption and efficiency not pollution increases in production and utilization.

The mode of circular economy in construction industry demands that economical development of construction industry should be based on natural ecological rules, and transfer conventional construction economy mode whose main characteristics are large amount of production, consumption and waste to the system in which substances are utilized reasonably and circulated and used continuously. According to the experiences of developed countries to establish circular economy mode, at the same time referring to characteristics of the construction industry in China, the chief points of circular economy of construction industry in China can be formed as follows:

- The production and consumption of construction products should be converted from using environment-polluting energies to green energies which can be regenerated;
- Try to decrease the consumption of raw construction materials and production of various sorts of construction wastes, and bring them into thorough recycling and reusing system;
- Cultivate and perfect resource recycling and reusing industry of consumed construction products, and carry out “Green Management” actively.

According to the current developing trend of construction industry, the current work emphases to establish and perfect the mode of circular economy lie in that: pressing on with the layout of circular economy in construction industry, carrying out and promoting its industrialized process^[7], eliminating lagging construction enterprises, developing the exploitation and popularization of ecological construction products and green construction materials, implementing the recycling and reusing industry of construction resources, strengthening the synthetic usage of construction waste, and so on; as for governing departments of construction industry at various levels, they should set up synthetic decision-making and negotiating mechanisms with the start of administrative point of view, and support the development of construction circular economy by policy means.

4. Discussion on Relevant Countermeasures

4.1 Changing Thinking Inertia and Surveying Own Coordinate Once again – Thought Base of Implementing Circular Economy in Construction Industry

When circular economy comes into being, the inertia of conventional concepts cannot be underestimated. This is because people have had the ultimate goal of producing outputs needed by people all along, and this thought orientation which attaches importance to results rather than course and positive effect rather than negative effect has been rooted in people’s minds. Therefore, the construction industry in China

should change its own conventional and occlusive coordinate system, i.e. increase media propagandism, popularize widely the significance of establishing circular economy mode, so as to mobilize the enthusiasm of industry and enhance participant consciousness and ability of public, which can provide sufficient preparation for establishing the mode of circular economy in construction industry, especially after the entrance of WTO.

4.2 Scientization and Rationalization of Construction Design – Precondition for Implementing Circular Economy in Construction Industry

Scientific and reasonable construction design is the important precondition for forming the mode of circular economy in construction industry. In the course of construction design, the unification of economical, social and environmental benefits should be considered and the recycling utilization of construction materials should be noticed fully, it is asked to make the best use of everything, and construction products should be easy to disassemble and utilize synthetically even after their utilization life cycle. During the design for construction products, we should adopt standard design as much as possible, and even go along large revolution for the design of construction products and production equipment crafts of products, which will make some equipment convenient to upgrade instead of being rejected wholly. At the same time, in the design for construction products, the influences to people's health and environment will be considered, harmful raw construction materials will be used none or a little, but "Green Construction Materials" will be used as much as possible.

4.3 Carrying out Technological Reform of Construction Materials and Enhancing Synthetic Utilization of Construction Resources – Important Step for Implementing Circular Economy in Construction Industry

To utilize construction resources synthetically and to transform wastes to resources and decrease their amount are the important principle and sign of circular economy. The important contents of accelerating synthetic utilization of construction resources include: strengthening scientific and technological exploitation, carrying out technology reform depending on science and technology, and adopting new harmless or low-harm crafts actively. Construction material enterprises are of the most economical potential as far as developing circular economy in construction industry is concerned. The conventional construction material enterprises will be reconstructed relying on new technologies especially computer technology, which will reduce energy consumption and pollution, and convert construction material enterprises from the most natural resource-dependent industry to the industry with good economic benefit and little wastes in the era of circular economy. Thereinto, to promote industrial ecological garden in the reconstruction of material enterprises is a good way to realize circular economy, which makes resources and energies be circulated and reused in system by simulating ecological system, and makes wastes of the former user become raw materials of the latter user so as to make use of resources.

4.4 Strengthening Construction Enterprise Management – Soft Measure for Implementing Circular Economy in Construction Industry

Circular economy is a new and advanced economy form. From the point of view of clean production, which is the important realizing means for circular economy, poor management causes 30% to 40% of discharged wastes in construction industry at present. Therefore, to strengthen management is still the main topic of construction enterprises under new positions. The management of construction products should be strengthened, scientific and strict management should be penetrated into the form process of construction products, simultaneously the sustainable evaluating index system and alarming system of construction enterprises are needed to be established, so as to spread the green producing mode of enterprises and lead construction industry to circular mode step by step.

4.5 Assistance of Government Order – Policy Restriction for Implementing Circular Economy in Construction Industry

Implementing circular economy offers higher demands for social and environmental responsibilities assumed by construction enterprises, and if the government does not make necessary inclination for construction products, then the producing form in most construction enterprises will not be brought into the orbit of circular economy consciously.

According to the demands of circular economy, as for investing policy, the country can divide construction industry and products into four categories – advocated, permitted, restricted and banned: banned products must not be permitted to be produced, and for those that have been produced already, stop-production period limit will be determined according to actual conditions; necessary supports should be afforded to advocated products in respects of bank loan, land confiscation and so on. As to tax policy, according to green environmental protection requirements of construction products, such as low input and high utilization of resources and low discharge and easy-disposal of wastes, the country can determine their tax rate to offer certain decreasing space for those construction products with little pollution to get more benefits, which will produce the impulse of investing circular economy for construction enterprises. In addition, to establish this mode will inevitably adjust the benefits and relationships of other aspects in society, and formulate necessary laws and rules to regulate circulate economy by country, so that we will have laws to fall back on, for example, relevant contents such as environmental protection can be added to the appraisal standard of construction products, Consequently, a healthy environment will be easy to form for circular economy, thus circular economy will be promoted in construction industry.

5. Conclusions

The mode of circular economy provides new theoretical framework for the sustainable development of construction industry. Therefore the construction industry in China will face a great leap, and circular economy is bringing the most profound and greatest industry change in history and creative reconstruction to us. We must follow the current situation, exert our own advantages, rebuild conventional

construction industry using information technology and green technology, and lead the construction industry in China to real road of sustainable development.

6. Reference

- Liu qiao. (2001). "Welcome the Coming of Circular Economy". *Journal of Guangdong Economy*. No.60, pp. 37-38.
- Liu Zhenying. (2001). *The Analysis on the problems of Sustainable Development in China*. Beijing: Chinses Agriculture Press.
- Li Zhaoqian. (2002). "Thoughts about Developing Recycling Based Economy". *Journal of China Population, Resources and Environment*. Vol.12, No.4:pp. 51-56.
- Cai ning, Wu Yujuan. (2002). "The Technical and Economic Analysis about Building the Circular Ecosystem in Concrete Industry of China". *Journal of Dialectics of Nature*. Vol.24, No.5:pp 40-45.
- Li jian, Gu Peiliang. (2001). "The Effective Measures and Technical Choose of Circular Economy in Manufacturing Industry". *Journal of Modern Finial and Economy*. Vol.21, No.4, pp. 35-39.
- Qiu Xiuqun, Chen Xia, Yang Yulong, Lu Guoping. (2001). "The Analysis about Factors of Sustainable Development in Construction Industry". *Journal of Construction Economy*. No.3, pp. 16-18.
- The Group of "Research of Circular Economy in Shanghai". (2001). "The Research of Developing the Circular Economy in Shanghai". *Journal of Macroeconomic Research*. No.33, pp. 3-6.