

## Research on the Status, Challenges and Countermeasures of Green Building Development in China

Junbo Zhao

Southwest Petroleum University, Chengdu 610500, China.

82452942@qq.com

### Abstract

**The harmonious coexistence between man and building environment is the eternal development theme of building. With the development of modern economy and society, people are more demanding in the living environment and the way of life at the expenses of the ecological environment due to the unscientific way of development. In this context, Green Building came into being. As our country is still in the initial stage of voluntary development, related laws and regulations, standards, incentives, and technical supports are not sound. This paper analyzes the status and challenges of China's green building development and puts forward recommendations. Not only that, this paper also puts forward the direction and objectives of green building development and works harder for the improvement of green building, according to local conditions, from the laws and regulations, standards, policies, and supervision.**

### Keywords

**Green building, development status, challenge, countermeasures.**

### 1. Introduction

With industrialization and economy pace, resources and environmental problems are on the stage. The excessive consumption of non-renewable resources such as ore, oil, coal and natural gas leads to a shortage of resources, causing serious environmental pollution and energy crisis, which worsened the greenhouse effect. At the time of resources shortage and environmental crisis, the concept of green environment protection is particularly important. As a major client in resource consumption and environmental pollution, construction industry would consume a lot of stone, timber, and other resources each year, causing great pressure to the environment. [1]To develop green buildings become the main means for countries to solve building energy and environmental problems.

### 2. Research Background

In recent years, China has taken green ecological development as an important step to promote the development of transformation and put forward a series of green development strategy. [2] The development of ecological civilization in which stresses innovation, coordination, green, open and share has seen as an important part of the development strategy in the Thirteen Five-Year Program; the CPC Central Committee and State Council issued "On the Further Strengthening of Urban Planning Construction Management work", in which brought forth "application, economy, green and beauty" and first embraced the green concept into the whole process of architectural design, construction and operation; Central City Work Conference stressed that urban development should prioritize intensive development, based on national conditions, to improve the city ecological environment. What we should focus on is to seek a breakthrough on key points to improve the sustainability and livability of urban development. [3] In the strong support of national policy, China's green building business usher in a rare historical opportunity for development. The development of green building business is to promote China's energy-saving emission reduction, protect the environment, improve people's livelihood, cultivate emerging industries, accelerate urban and rural

construction mode, transform construction industry development mode, and promote ecological civilization construction. [4,5]

### **3. Development Status at Home and Abroad**

#### **3.1 China's Green Building Development Status Quo**

In general, China's green building development is still in the initial stage of voluntary development with small, dotted and scattered overall number, uneven regional development, fast development of green buildings in the south and in the eastern coastal, and slow growth in the north and in the western regions. However, there is larger gap with the large-scale promotion requirements of green building. [6]To our surprise, in the recent two years, the green building development has been accelerating due to the continuous promotion introduction of green building, the improved building evaluation system, and the maturing technology applications.

#### **3.2 Foreign Green Building Development Status Quo**

In the concept innovation of green building, foreign countries have made a lot of demonstration and practices, such as ecological housing, health housing, green office buildings and so on. At present, the most studied in the development of green building concept and practice are the United States, Japan, Britain and other countries. These countries uphold the concept of sustainable development, vigorously develop green buildings, and achieve remarkable results. Since the depth research of Britain and the United States in the 1990s, the global triggered a boom on the green building assessment. They have introduced green building evaluation system in line with the characteristics of geography to greatly specify and promote the development of green residential such as the United States LEED, the United Kingdom BREEAM, Japan's CASBE and so on. [7]

#### **3.3 Comparison of Green Building Evaluation System at Home and Abroad**

The green building evaluation system in Britain, the United States and other countries covers energy, materials, land and ecology, water, environmental protection and other comprehensive environmental performance of buildings, embracing technologies and measures in different areas.

China's green logo system is mainly based on the "Green Building Evaluation Logo Management Approach" and "Green Building Evaluation Technical Rules" for the design and evaluation. We are awarded "Green Building Evaluation Logo" after the approval of experts and evaluation agencies (China Green Building and Energy Conservation Committee). "Green Building Evaluation Logo" is divided into 1, 2, 3 stars, with 3 stars for the highest level. China's Hong Kong areas mainly implement the "Hong Kong Building Environment Assessment Standards". The evaluation system based on the main framework of British BREEAM system by the Hong Kong Polytechnic University in 1996. It is a set of building evaluation system mainly for newly-built and used office and residents. The system is designed to assess the overall environmental performance of the building. [8]The evaluation of the building environment performance is summarized as the evaluation in site, material, energy, water resources, indoor environmental quality, and innovation and performance improvement.

China's green building evaluation system still has the following problems: Firstly, the evaluation is not detailed in its objects with the distracted assessment contents; Secondly, the evaluation method is too simple without the adoption of more accurate quantitative evaluation methods; Thirdly, it pays much attention to the qualitative indicators in measures than performance; Fourthly, it is not timely with the technical development. However, the British and the United States' green building evaluation system framework has undergone several changes and a mature development, reflecting the construction industry's latest energy-saving environmental technology applications.

### **4. The Challenges of Green Building in China**

#### **4.1 There is a gap in the perception of green buildings**

Although the concept of green building has been a better promotion since its birth, there is still a gap in the conception of green building. Some believe that green buildings equate with high-tech and

high-cost buildings. That's totally wrong. This has had an impact on the widespread popularity of green buildings. And some local governments have not placed enough emphasis on the green building links to improve people's livelihood and change the urban and rural construction. Therefore, there is the prevalence of poor initiative and sense of urgency. And most planners and architects are not familiar with the concept of green building. Even construction companies haven't a clear understanding for the green building market investment returns. [9]No wonder the project decision-making had been impacted greatly. Consumers know little about the advantages of green building and environmental effects. So there are potential markets. Relevant departments and experts have not made a consensus on how to promote green building. Perhaps there is a blind fancy to western green building assessment without the consideration of national conditions. It doesn't combine the full life of the building. The blind use of cutting-edge technology will also have a strong negative impact on the development of green building.

#### **4.2 The relevant standard system is not sound**

To develop green building needs a set of scientific, standardized and feasible standard system. Only that can it provide effective guidance for the development of green building. However, from the current development of China's green building standards, there is a one-sided copy of the Western national standards without considering China's national conditions. At the same time, in the set-up of indicators, we found that there is insufficient coverage and unreasonable system. In addition, it lacks supportiveness in the green building design, construction, acceptance, operation and maintenance, and needs improving in the green building plan development, the raw material selection, and the industry operating supervision, which are unable to provide feasible incentives and punishments.

#### **4.3 Related policies and regulations are not perfect**

The corresponding policies and regulatory systems are still inadequate, especially in energy, construction, and energy conservation, leading to the lack of strong legal support in green building. And there is inadequate the whole life cycle construction management system including design, construction, operation, planning, and removal. Especially how to exert effective supervision on the quality of green building in the large-scale development of green building is an emergency we need to solve. And the existing relevant system stresses more in the architectural design, construction and energy conservation than in the materials, water, land, environmental maintenance, garbage collection and construction demolition.

#### **4.4 Existing incentives are not effective**

Compared with the traditional buildings, green buildings can play a role in energy conservation and environmental protection. So the Government should give appropriate support measures to promote the healthy development of green building industry. At this stage, China's policy to promote the development of green building is not perfect, though the introduction of energy-saving, water-saving incentives and financial subsidies, not enough to arouse the interest of the construction industry practitioners. China has not yet carried out incentives such as tax cuts and financial preferential for the green building. As for those who want to carry out green building, there is no special advantages in the land acquisition, project approval, and funding. For those who want to buy green building, the government did not develop preferential policies, which result in short green building market supply and demand, thereby hindering the development of green buildings.

#### **4.5 There is lack of technical support**

Now the basic research link of green building is still relatively weak. We need do more in key and difficult technologies. There is not a technical system integrating building function with regional characteristics. In the construction projects, those professions in planning, design, consulting, assessment, construction, and evaluation and professional institutions are wanting. Due to the slow development as well as the poor combination of construction industry and building materials, the quality of the building materials is uneven. All these factors have led to weak technical support in the industry.

## **5. Policy Recommendations**

### **5.1 To strengthen the green building development awareness**

To promote the sustainable development of the construction industry first needs to strengthen people's awareness in the development green building. To intensify the nationwide promotion of green building help people to recognize the important meaning and significance of green building, thus promoting the transformation of new ways of life for the protection of the Earth and the saving of energy. The construction workers need to strengthen the green building-related theoretical knowledge training, so that they can be fully aware of the importance of green buildings. Of course, to achieve the sustainable development of the construction industry also need relevant government departments to better improve the supervision and management functions to provide the necessary institutional protection for the green building. [10]In addition, consumers and developers need to strengthen the green building development awareness.

### **5.2 To improve the standard system and regulatory system of green building**

We need quicken the development of green building assessment standard in different climate and of diversified buildings, improve the residential, office buildings, shopping malls, and hotels evaluation criteria, and issue public buildings refinement evaluation criteria such as schools, hospitals, airports, and railway stations. [11]For green buildings invested by the government, the project budget, the construction standards and the approved pricing quotas should be revised as soon as possible. Relevant laws and regulations on the existing green building and building energy conservation should be taken in China's construction law.

### **5.3 To boost policy incentives**

The central government would increase the green building technology research and development, promotion investment, and design consulting services. The establishment of green building incentives in finance, taxation, and banking as well as the real estate developers' incentives in the land transfer, project approval, and green credit can improve financial services and guide consumers to buy green residential. Besides, local innovation incentives would be encouraged.

### **5.4 To strictly supervise the whole process of construction**

Based on the existing construction quality supervision system, we gradually establish green building review system to strengthen the management in planning, project, land transfer, and construction. In the land transfer, we take the relevant indicators of green building development as a prerequisite for land transfer. In the construction design review, we increase the contents of the green building review. [12] If not passed, the building could not be issued the construction permits. In addition, the building demolition approval system should be established. If the building does not meet the conditions, it shall not be dismantled and discarded.

### **5.5 To strengthen the development of core technologies**

In order to control the domestic pollution and perform green business, the heavy industry enterprises must change the mode of production, thereby improving the domestic market model. Enterprises should achieve the purpose of environmental protection, while ensuring the interests of certain circumstances. [13]And the most effective measure is to carry out the reform of technological innovation, accompanied by the growth of the domestic market.

## **6. Conclusion**

Whether it is based on China's national conditions or the world building development, green building has yet become the theme of the construction industry growth. China's "13th Five-Year Plan" has clearly put forward to develop energy-efficient and green buildings. This low-carbon revolution not only better guides China's construction industry to move steadily in the sustainable development, but also promotes the improvement of urban building in energy efficiency, renewable energy, assembly-style building, and green building materials market. Although the transformation will bring some impact on the traditional building, you should take this opportunity to actively cooperate with the

transformation of the construction industry. Only in this way can various types of emerging industries grow. The organic combination of the construction industry and new energy not only can reduce the construction cost, but realize a win-win development pattern between the environment and the construction. I believe China's green building, energy-saving industries, and eco-urbanization will achieve rapid development in the foreseeable future.

### Acknowledgements

This article was supported by an open experiment at Southwest Petroleum University.

### References

- [1] B.X. Qiu: New Normal and New Green Building-The Current Status and Development Prospect of Green Building in China, (China Architecture & Building Press, China 2016), p. 4-14.
- [2] B.X. Qiu: The Establishment of Five Innovative Systems for the Development of Green Buildings, Journal of Architecture, (2006) No.8, p. 5-7.
- [3] China Society for Urban Studies: China Green Building (China Architecture & Building Press, China 2017), p.23.
- [4] J.T. Lin: Green Building Ecology & Energy Saving & Waste Reduction & Health (China Construction Industry Press, China 2007), p. 307.
- [5] China Society for Urban Studies: China Green Building (China Architecture & Building Press, China 2016), p.14-15.
- [6] P. Zhang, H. Wu: On Green Building, Time Report: Academic Edition, (2015) No. 4, p.302.
- [7] S.M. Yang: On Green Building and Green Construction, Management Manager, (2013) No.31, p.280.
- [8] S. Yin: On the Development Trend of Modern Green Building Design, Guangdong Science and Technology, (2012) No.19, p. 222-223 + 215.
- [9] S. Gao: Discussion on the Development Trend of Green Building, Journal of Shenyang Jianzhu University (Social Science Edition), (2013) No.3, p. 296-299.
- [10] L. Ye, X.X. Zheng, Z.Y. Ding: China to Enhance Building Performance with Green Building Standards, Building Science, Vol.31 (2015) No.12, p.156-162.
- [11] C.H. Fu: On Green Building and Ecological Environment, Small and Medium-Sized Enterprise Management and Science and Technology Journey, (2011) No.19, p. 143.
- [12] B.Z. Li: Green Building Overview (Chemical Industry Press, China 2007).
- [13] L. Ye, X.X. Zheng, Z.Y. Ding: China to Enhance Building Performance with Green Building Standards, Building Science, Vol.32(2016) No.12, p. 6-12.