Study on Obstacle Factors and Management Tactics of Green Building Development in China

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ABSTRACT: Green building, an architectural design which integrates the concept of sustainable development, is conducive to social development and the environmental pressure reduction. Therefore, it is particularly significant to promote green building. This paper explores the connotation and characteristics of green building, discusses key factors that hinder the development of green building in China, and also puts forward the corresponding management tactics. It is suggested that the state is supposed to reinforce the design realisation and integrated management tactics, construct the management platform of green building and also to effectively promote its sustainable development.

KEYWORDS: Green building; Development; Obstacle factor; Management strategy.

1 INTRODUCTION

One of quintessences in Chinese culture is “the Union of Heaven and Human”, heaven and earth are the origin of everything in the universe (Understanding of Life • Zhuangzi) [1]. Friedrich Engels's Dialectics of Nature argues that “We should not rejoice in the triumph from nature. For every such victory, the natural world will retaliate against us.” [2] Looking back at the long development of human civilization, three industrial revolutions have greatly improved the human productivity, but the highly developed social industry has also brought unbearable damage to the natural environment. In the 20th century, London smoke, Donola, photochemistry and other pollution incidents have shocked the world and sounded the alarm to the human. In the 21st century, green building has been highly valued and promoted in the world because of integration with concept of sustainable development and contribution to the social development. Currently, the development of green building has made some achievements, which effectively reduces the energy use and environmental damage. However, due to the rapid economic development and the increasing pressure on environmental resources, the construction industry and designers will usher in more severe challenges. Compare to traditional buildings, the green building, relatively complex, holds more requirements and characteristics as well as various limited factors restrict its promotion. [3]. Based on the previous studies, this paper combines the status quo of green building in China and studies the obstruction factors and future management strategies which restrict the development of green buildings.

2 THE CONNOTATION AND CHARACTERISTICS OF GREEN BUILDINGS

In the 18th International Association of Architects Conference in 1993, the Chicago Declaration with the theme of "Buildings at a Crossroads - Building a Sustainable Future" was issued, calling for architects to take environmental sustainability as their primary responsibility and also establish a banner of green building development. Since then, the voice of sustainable development on urban construction rises up; afterwards, the wave of green building characterised as avalanche is swiping globally [4]. The application of sustainable development in the construction industry can be summed up as sustainable buildings, ecological sustainable building, green building and other terms [5]. As the sustainability is the practice in the field of construction, the principal significance of green building lies on the usage of new energy, environmental protection materials, in order to reduce construction wastes, exhaust emissions in all aspects to build environment-friendly and user-friendly architecture. China's Green Building Technology Guidelines clearly defines that the green building index system is constituted by 6 categories
of indicators “land saving and the outdoor environment, energy saving and the use, water saving and the water resources use, materials saving and the material resources, indoor environment quality and the operational management” [6]. In short, the meaning of green building is to maximize the conservation of resources (land, energy, water, materials), minimize impacts on the environment and provide a comfortable, efficient and healthy space for humans so that a symbiotic building with environment is build up. Therefore, the characteristics of green building can be attributed as a new building construction model based on the principle of harmonious coexistence with nature. The internal and external materials and energy system could be a virtuous circle and achieve zero discharge, zero pollution and zero emission in the whole life cycle of the builds.

3 OBSTACLES TO GREEN BUILDING DEVELOPMENT

The implementation of green building could improve the living environment and reduce building energy consumption to a certain extent. However, there are still many obstacles. Based on the analysis of the performance of many green buildings and the relevant research in China, this paper sums up three categories of obstacle factors of green building development from system, technology, cost, society, government, designer, developer and user, namely: green building system and mechanism, green building construction technology and pre-design and post-maintenance.

3.1 Institutional mechanism of green buildings

The development and construction of the building involve the work between the government, developers and consumers. An effective institutional mechanism of green buildings and related service helps produce game effect between the government and developers. Buchanan argues that the market would not produce an efficient natural order and any maximized value without proper laws and institutions [7]. The Ministry of Construction has developed a series of 50% energy saving design standards targeted for the three climate zones. Therefore, an initial relatively well-developed civil building skills standard system has been established. However, energy efficiency standards for the public buildings have just been a prototype [8]. However, energy conservation, land saving, water conservation, material conservation and environmental protection were proposed in the Green Building Technical Guidelines. There is no comprehensive standard system compared with the perfect green building assessment system in developed countries. At the same time, there are few development platforms for the green building and lack of efficient exchange of new technology, materials and equipment. Most importantly, the current approval process of the national government for the green building is relatively complex, which makes the building designers and developers reluctant in the development of green building, therefore, the green building has not been successful and widely used in the market [9].

3.2 Green building construction technology

In the period of the “11th Five-Year Plan”, China proposed to build a resource-saving and environment-friendly society. The 18th CPC National Congress proposed to integrate the ecological civilization construction into the urban and rural construction. The Ministry of Housing and Urban - Rural Development of China issued the green building and green eco-city development planning in the period of the “12th Five-Year Plan”. In the period of the “13th Five-Year Plan”, the concept of green development was uncompromisingly put forward and we will firmly develop production and ecological civilization to construct beautiful China [10]. The green building is to construct a structural system based on the harmonious coexistence with nature. For the climate and environment, the context and dense spacing between buildings have basic requirements, so that the construction of green building should be adapted to local conditions. Moreover, additional design requirements present increasing difficulty in technology and construction. For example, the breathable skin (sunproof blind) requires well pre-calculated daylight time and intensity in the design period, sophisticated cutting technology in the factory, and adjustable directions to absorb sunlight in post-installation, which ensures not only excellent indoor shading and lighting effects but also great energy-saving effect. Therefore, green buildings may, to a certain extent, consume more labour and longer construction cycle. The construction of green buildings requires high levels of engineering and maximizes the real advantages of green buildings to establish excellent green building image.

3.3 Pre-design and post-maintenance

The green building design is an integrated process rather than overlaying many technologies. Various designs start from goals in the beginning and repeated adjustments are needed in the design, construction and operation process to ensure the realization of green building goals. Experts in other fields are required to take part in the whole process (as shown in Figure 1). However, due to the lack of design capacity, it is difficult to promote the green buildings. Meanwhile, as green buildings involve some new technologies, equipment and materials,
coupled with the lack of relevant application experience, it is difficult for the design in the early stage to take the whole situation into account. The post-maintenance is actually the application of the architectural design and its purpose is to make the building and use function become coordinated. The various systems of construction are linked together, so the standard management procedures and system maintenance are required. However, in China, the shortcoming is the operation and maintenance management technology in the post-maintenance, which includes system maintenance, HVAC energy consumption, fire security, environmental greening and other aspects. Nowadays, timing running in the building system has caused a certain amount of energy waste, which directly leads to low efficiency and has an impact on the national energy resources.

4 DEVELOPMENT AND MANAGEMENT STRATEGY OF GREEN BUILDINGS

4.1 Establishment of sound institutional mechanism of green buildings and clear evaluation criteria

The development of green buildings is related to the trade-off between government, developers and users. The government should start by establishing more effective reward and disciplinary system of financial policy through the trade-off between developers to deepen and revise a series of taxation systems associated with green buildings, including the recognition and revision of an inappropriate green building identification system, and the establishment of widely accepted green building service. The government should pay more attention to the social responsibility of developers in the development of green building, and formulate clear evaluation criteria including energy-saving standards. Therefore, the government should eliminate the external factors that affect the development of green buildings, and give corresponding financial incentives according to the scale of green buildings.

4.2 Improving the green building construction technology and developing appropriate technical indicators

China's current green building construction technology team is scattered, lacking the type of comprehensive research institutions like the Lawrence Berkeley National Laboratory in the United States. Therefore, the most important for the development of green building in China is the formation of green building-related research institutions, through which to build China's own institutions of higher education institutions, developers, and research platform of institutions to maximize the advantages of cluster research and the talent resources. At the same time, the state should also promulgate corresponding detail technical quality control standards of green buildings and eliminate possible loopholes and deficiencies in the construction process. The development of the corresponding technical indicators can improve the efficiency and contribute to reducing the waste of technological resources.

4.3 Compliance with the design requirements of green buildings and the implementation of low-cost operation strategy

High-quality green building design contains excellent design technology, eligible for the demand of economic development and widely accepted service for humans. Architects should, in strict accordance with the standards promulgated by the state, properly improve the architectural details and determine the level of green building design, instead of driven by immediate interests. From the perspective of consumers, the price, liveability, and the cost of use are the main evaluation factors, so the maintenance and management of the green building system are particularly important. Therefore, it is necessary to implement low-cost operation strategy. For example, in order to reduce the energy consumption and the load of the system, it is needed to maximize use of temperature difference of daytime and night to cool or warm the interior space in order to achieve the most suitable living environment for consumers. For the HVAC system, optimizing the operation of the refrigerator is also crucial, which can reasonably increase the temperature of chilled water supply and improve pipeline protection to reduce unnecessary energy consumption. It is vital to establish the overall data management and management platform for the entire building system and unified control, regulation and the greatest degree of energy conservation (Figure 2).
5 CONCLUSION

Green building is not only for energy saving and low consumption, but also its ultimate value regarding to the efficient use of energy, improvement of the life quality, and sustainability achievement. Green building development requires the coordination and cooperation of new technologies, materials and equipment, and design, construction, operation and monitoring. Therefore, it is necessary to eliminate the obstacles, establish green building management platform and form an integrated management strategies. Nowadays, the development of green building is not just the theoretical concept but requires to call all efforts of social forces to boost the development of green building under the greatest possibility.

REFERENCES