Analysis of the status quo of green building operation management and countermeasures

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Abstract. Green buildings are of vital importance to reducing building energy consumption. In recent years, with the support and encouragement of many parties, green buildings have developed rapidly, and the number and scale of green building projects have been continuously expanded, which will undoubtedly become the future development trend of the construction industry. However, the current level of operation and management of green buildings is low. Poor operation management and maintenance in the later stage have led to low utilization efficiency of various equipment used in green technologies. After a large number of green buildings are put into operation, they have not achieved the expected operating results. This article focuses on green building operation and management, the status quo and problems of green building design innovation and the life cycle perspective of green building operation management related development strategies, in order to make up for the "shortcomings" of the expected value of green building public policy, improve the green level of green buildings, to achieve green operational management makes theoretical contributions.

1. Introduction

In the context of building a resource-saving and environment-friendly society, vigorously developing green buildings has become my country's energy economy development strategy. The "13th Five-Year Plan" of the Ministry of Housing and Urban-Rural Development of the Ministry of Housing and Urban-Rural Development clearly listed the "implementation of the overall quality improvement action for green buildings" as the main task. Strengthening operation management, implementing technical measures, and ensuring operational effectiveness have become "ten During the Three Five-Year Plan period, China's green building development is the top priority. The operation and management stage of green buildings is the stage to implement various green technologies and obtain environmental, economic, social and cultural benefits. The establishment of a scientific and effective green building operation management evaluation system is conducive to the implementation and realization of sustainable development goals.

However, many green buildings have poor management during the operation stage, which not only fails to achieve the goal of environmental protection, but may also cause a waste of funds and resources due to improper design. Therefore, for the large-scale promotion of green buildings, the study of its applicable green operation and management strategies to ensure that green building technology can play a green role is of great significance for achieving energy saving and emission reduction, and efficient use of funds and resources.
2. Current status of green building operation and management

Green building refers to the maximum saving of resources and effective protection of the environment during the whole life cycle of the building, thereby providing residents with a more comfortable and livable environment. The operation and management of green buildings must strictly follow the design requirements of green buildings, and use green building technology from the perspective of environmental protection and resource conservation to improve the efficiency of equipment operation. In the "Thirteenth Five-Year Plan for Building Energy Conservation and Green Building Development", the Ministry of Housing and Urban-Rural Development puts forward the goal of 2 billion square meters of green building area in China from 2016 to 2020, and clearly stated that attention must be paid to the actual effects of green building operation and management.

From the perspective of the whole life cycle of a building, the energy consumption of a green building in the operation phase accounts for more than 70% of the whole life cycle. The operation management phase is the stage to control the building's service quality, operating costs, and achieve ecological goals. The construction period of a construction project is generally only 2-3 years, and the operation period can reach several decades; the cost of the construction period of the construction project only accounts for 15% of the full life period, and the maintenance, repair, and renewal fees during the operation period are as high as 85%. This shows that the operation and management stage of a building occupies an important position in the whole life cycle.

At present, the level of green building operation and management in my country is low, and the poor operation management and maintenance in the later period have led to low utilization efficiency of various equipment used in green technology, and the benefits of green building operation and management cannot be fully utilized. My country's existing property management companies are engaged in simple traditional property management, to be precise, security, green maintenance, cleaning, and maintenance. They lack a professional green building operation management team and a standardized management system. In practice, many projects that have obtained high-star design evaluation marks in the design stage are unable to achieve the design expectations and benefits due to the lack of effective operation management capabilities and real operating data in the later operation stage, and the actual energy consumption is high. In ordinary buildings, this will not only increase the benefits of the life-cycle energy consumption that cannot meet the design expectations, but also increase the cost of the operation period and bring more burdens to users, which goes against the original intention of green building design. Whether a green building is green or not and its degree of greenness mainly depends on the effect after its operation. Only effective green operation management can ensure the real effect of the actual operation of the green building.

At present, green buildings are developing from a regional contiguous pilot to a comprehensive promotion of large-scale construction. The number of green buildings built and put into operation is increasing. However, according to data analysis and actual investigations, it is found that as a large number of green buildings are completed and delivered, there is a general phenomenon of disconnection between green building operation management and design and construction. A large number of green buildings have not achieved the expected operating results after they are put into operation, which largely depends on the lack of design optimization in practice, which has become the biggest shortcoming to realize the expected value of green building public policies. The project builder and the construction supply chain are the policy executive and common agents of the green building action. The reason is that the essence of green design optimization is scale innovation and targeted innovation. The uncertainty of input and output leads to the lack of innovative transaction content, and the contract governance path using contract incentives and contract control as means fails. Out of customer opportunism and cross-organization coordination cost concerns, designers are lazy in innovation. Due to the market-oriented reality of engineering construction technology services, innovation laziness cannot be resolved through "integrated" bureaucratic control methods.
3. Green building operation management solutions

(1) The absence of design contracts for green building optimization and its innovations implies that the green building design innovation endogenous to green building design optimization is a role behavior outside the contract. There are two theoretical approaches to coping with it: 1. In order to make up for the shortcomings of contract governance, relationship governance proposes the overall control direction of opportunistic behaviors such as trust, commitment, communication, and cooperation, but it still needs a contextual approach in the sense of management. 2. From the perspective of organizational citizenship behavior theory, organizational citizenship behavior (OCB, Organizational Citizenship Behavior) is the behavior that is outside the contractual role, including innovation, is freely disposable, and positively affects organizational performance.

The OCB research carried out on projects in recent years shows that compared with the lasting and stable intra-organization or inter-organizational groups, in the temporary transient project inter-organizational groups, members are affected by the social network embedded in the project more significantly. Project-oriented citizenship behavior including active innovation, namely: PCB (Project Citizenship Behavior). The discovery of PCB indicates that there may be undiscovered means of relationship governance, which can stimulate designers' off-contract role behavior and improve green design innovation performance. Furthermore, "justice" is currently considered to be the main source of the PCB, including four subsystems: procedural justice, distribution justice, information justice, and interpersonal justice, which shows that in the relationship governance path, contract governance represented by procedural justice and distribution justice The impact remains.

In addition, in different documents, there are not only differences in the incentive and control priorities of PCBs, but also interactivity. The controversy in the literature reflects that "justice" is the main excitation source of PCB, and its excitation path needs to be combined with project characteristics to carry out contextualized intermediary and external environmental interference research. The latest research shows that consistent cognition has an important impact on the performance of collaborative innovation in the supply chain; while organizational support, leadership style and other elements have an impact on OCB through the perception of employees. Collaborative innovation and OCB research results show that under the design contract relationship, the impartial coordination mechanism supported or even led by the design customer is the management and research gap that stimulates the designer's PCB. In the spirit of green building design optimization innovation is the cognitive prerequisite for role work outside the contract, the designer’s project citizenship behavior in the context of green design innovation is called "Green Citizenship Behavior" (GCB).

The complexity of construction projects has led to the diversity of innovation scenarios in the optimization of green building design. In addition, the complexity of construction project sponsors and supply chains have led to the optimization of the environment for green building design innovation, that is, the diversity of project network forms. Therefore, aiming at the problem of innovation laziness in green design optimization and the dual failure dilemma of market system and integrated governance, construct a model of the synergy mechanism between customer fairness and designer's green citizenship behavior (GCB), and explore the synergy effect of project network on customer fairness. The adjustment mechanism generates a customer-controllable and fair coordination strategy that matches the boundary conditions of the project network, stimulates designers' green citizenship behavior, solves the problem of insufficient green design optimization, and increases the market value of green buildings and the policy value of green building actions.

(2) A reasonable and complete green management system is the basis and prerequisite for obtaining a good operational effect, and a good property management system is also an important guarantee for ensuring the operational management effect. The application of new informatization and intelligent technology is an important method to improve the effect of operation and management. Because the intelligent system can meet the high-level needs of users, it has a wide range and direct application in green main buildings. A management method that is compatible with the planning structure should be adopted, and green integrated design combining green technology and architectural design should be introduced as early as possible. At the same time, green building operation management should implement life-
cycle management, and operation management activities should be in-depth including preliminary planning, design and planning, construction and operation.

In addition, the operation and maintenance management of green buildings has a large time span, a long cycle, a large amount of content, and complex personnel involved. If the new BIM technology is introduced during the operation period, it will not only meet the basic activity needs of users, increase investment income, but also realize design and construction. Share information with operation and maintenance, improve the accuracy of information, and provide a convenient management platform for all parties, thereby improving the efficiency of building operation and maintenance management.

(3) Operation management must be implemented in accordance with the latest officially promulgated "Technical Specifications for Operation and Maintenance of Green Buildings". The code proposes a green building comprehensive efficiency debugging system to ensure that the green building system can achieve different load conditions and the actual use of the user's requirements; based on low-consumption or no-consumption operation and maintenance management technology, the green building operation and maintenance core technology implementation path; the establishment of an evaluation index system related to the operation and management of green buildings is conducive to optimizing the operation of green buildings and truly achieving the purpose of "green" building design.

Green building operations require that the operation and management personnel have corresponding green professional technical knowledge and qualified energy conservation and environmental protection awareness. This requires that the operation and management personnel must be trained on the latest green operation management knowledge and the professional use of related green technology equipment. They are qualified for the current job position. In addition, colleges and universities should also pay attention to relevant majors to carry out green building-related courses, cultivate students' awareness of green environmental protection, and further reserve green high-level talents for the development of national green buildings. For example, the forward-looking Singapore has made predictions before the implementation of green buildings. In the next 10 years, the demand for professionals such as professional green architects, green engineers, and green equipment managers may reach tens of thousands of people, so in 2009 began to establish a special green technology research—the built environment professional college to accelerate the comprehensive promotion of national green technology, fully guarantee the supply of professional green construction talents. The situation of green building promotion agencies in some developed countries is shown in Table 1.

| Country | Organization name | Founding time | Number of members |
|---------|-------------------|---------------|------------------|
| U.S.    | U.S. Green Building Council(USGBC) | 1993          | 20000            |
| Japan   | Japan Sustainable Building Consortium(JSBC) | 2001          |                  |
| Australia | Green Building Council Australia(GBCA) | 2002          | 900              |
| UK      | UK Green Building Council(UKGC) | 2007          | 330              |
| Singapore | Singapore Green Building Council(SGBC) | 2009          | 210              |

4. Conclusion

Green building operation management will be the focus of future development in the field of green buildings. However, due to insufficient design optimization, green building operation management has not achieved the expected benefits, solve the problems in green operation management, find breakthroughs in green operation management dilemmas, and study appropriate Green building operation and management mode and strategy. In addition, we must pay attention to the operation and management processes of green buildings, scientifically evaluate the operation and management level of green buildings, accurately identify the green level of green buildings, and ensure various green technical performances after green buildings are put into operation. Can give full play to realizing the purpose of energy saving,
emission reduction, environmental protection, and providing consumers with comfortable space, improve the green level of green buildings, improve the efficiency of green building operations, point out the way forward for green operation management, and formulate green buildings for government departments. Related policies provide relevant reference.

Acknowledgments

This work was financially supported by Philosophy and Social Science Planning Research Key Project of Tianjin.

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