Avoiding Pitfalls in Calculating Green Building Incremental Cost (Postprint)

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Abstract

Since the promulgation and implementation of the "Green Building Evaluation Standard" GB/T 50378, green building has experienced rapid development in China. Nowadays, with the continuous updating of the standard, new technologies, new products, and new applications are emerging incessantly, making the practical implementation of green building increasingly feasible. During the vigorous development of green building, development enterprises pay close attention to incremental costs; however, due to limitations in expertise and biases in understanding, certain misconceptions regarding green building incremental costs exist among stakeholders. This paper analyzes how to accurately calculate green building incremental costs from the perspective of green building certification application, thereby promoting an objective understanding of the green building incremental cost issue and facilitating the healthy development of green building.

Full Text

Out of the Misconceptions in Calculating Green Building Incremental Costs

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Abstract

Since the implementation of the Green Building Evaluation Standard GB/T 50378, green building has developed rapidly in China. Nowadays, with continuous updates to the standards, new technologies, products, and applications are emerging endlessly, making the practical implementation of green buildings

increasingly robust. In the process of vigorously developing green buildings, developers pay close attention to incremental costs. However, due to professional limitations and understanding biases, there are certain misconceptions about green building incremental costs. This paper analyzes how to correctly calculate green building incremental costs from the perspective of green building certification application, thereby guiding an objective view of the incremental cost issue and promoting the healthy development of green building.

Keywords: Green Building; Incremental Cost; Control Strategy

In recent years, driven by green building development policies and the green transformation of real estate development enterprises, green building has gradually entered the public consciousness and achieved rapid and effective development. By December 2017, a total of 10,927 green building certification projects had been evaluated nationwide, with total floor area exceeding one billion square meters [1]. Evidently, the healthy development of green building represents an overarching trend. According to current green building policies and evaluation standard requirements, applications for one-star, two-star, and three-star green building certifications must achieve 50, 60, and 80 points respectively [2]. Obviously, higher star ratings require more points, which necessitates the adoption of more green technical measures and naturally results in higher incremental costs. For applicants, achieving the target star rating while controlling minimum costs is particularly important. This requires consulting organizations to carefully analyze project conditions, systematically screen economical and applicable technical measures, and provide owners with an objective incremental cost analysis report to facilitate informed decision-making.

Three Common Misconceptions About Green Building Incremental Costs

First, vague understanding of green building concepts and technical indicators leads to conventional construction and installation costs being mistakenly counted as part of green building incremental costs. Compared with non-green buildings, green buildings have higher requirements for resource conservation and environmental protection indicators. This demands professional analytical capability to accurately identify which technical indicators arise specifically from green building certification application, avoiding confusion with other expenses.

Second, unfamiliarity with the green building certification process results in unclear understanding of the types of incremental costs involved, mistakenly believing that green building incremental costs consist solely of consulting fees paid to third-party advisors. The certification process comprises six stages: preliminary feasibility analysis, technical system confirmation, application material preparation, project registration and submission, project review, and certification acquisition. Throughout these six stages, green building incremental costs involve both technical and non-technical costs. Technical costs primarily refer to

expenses for green building technical measures, while non-technical costs mainly include consulting and review fees. Thus, familiarity with the certification process is a prerequisite for accurately understanding green building incremental costs.

Third, lack of awareness regarding the cost ranges for different star-rated green buildings leads to the assumption that green buildings are inherently high-cost constructions. Green building incremental costs are closely related to the target star rating, regional economic conditions, and maturity of technology application. Through scientific design of technical pathways, green building incremental costs can be controlled within reasonable ranges.

1. Definition of Green Building Incremental Cost [3]

As the term suggests, the fundamental principle for calculating green building incremental cost is that the expense must represent additional expenditure specifically for constructing or certifying a green building. Technical measures already considered in the original construction scheme or energy-saving design clauses implemented in architectural design should not be included, even if they benefit green building certification application.

2. Classification of Green Building Incremental Costs

According to current green building review regulations in China, incremental costs involved in certification applications mainly fall into three categories: technical incremental costs, commissioned consulting costs, and application review fees. Technical incremental costs refer to expenses arising from additional technical measures or enhanced technical performance for certification application. Consulting costs primarily refer to advisory fees paid by applicants to third-party consulting organizations. Application review fees cover registration fees, expert fees, and conference expenses during the certification process, paid directly by applicants to review institutions or through consulting organizations.

3. Green Building Technical Incremental Costs

These costs constitute the primary component of green building incremental costs. According to the green building evaluation system, they can be further categorized into land-saving, energy-saving, water-saving, material-saving, indoor environmental quality, and innovation measures. The total green building technical incremental cost is obtained by summing all individual technical measure costs.

Taking a three-star green building design certification project for a research and development office building in Beijing (total floor area: 70,000 m^2) as an example, the project is located in Haidian District and implements both the national Green Building Evaluation Standard GB/T 50378-2014 and the Beijing Green Building Evaluation Standard DB11/T 825-2015. Based on evaluation

standard requirements, the project' s technical incremental costs are analyzed across six categories: land saving, energy saving, water saving, material saving, indoor environment, and innovation items, as shown in .

Technical Incremental Cost Analysis for a Three-Star Green Building Design Certification Project (Beijing R&D Office Building)

Key considerations for this incremental cost analysis:

1) The prerequisite for this analysis is a thorough understanding of the 参评建筑' s basic conditions (i.e., original conditions). Technical measures already considered in the original construction scheme should not be double-counted as green building incremental costs.

2) For technical measures that definitively generate green building incremental costs, they can be divided into two types. The first type can be called "new additions" —for example, "roof greening" in land-saving measures. If the original design scheme did not include this item and it was added specifically for certification application, its cost represents a from-scratch addition. The second type can be called "enhancements" —for example, "Grade 1 water-saving fixtures" in water-saving measures. If the original design used "Grade 3 water-saving fixtures" and was upgraded to "Grade 1" to earn more points, the cost represents the price difference from performance improvement.

3) When calculating incremental costs for each technical measure, careful attention must be paid to corresponding units. Even when the unit is area, some refer to floor area while others refer to site area or green space area, requiring careful differentiation.

4. Green Building Consulting Costs

These costs represent technical consulting fees incurred when applicants commission third-party consulting organizations for certification services. If applicants have the capability to apply independently, these costs are not incurred. The amount is directly related to building scale, star rating, building type, and certification type. Generally, larger floor area, higher star rating, and longer project cycles correspond to higher consulting fees. [Figure 1: see original paper] shows an excerpt from a notice issued by the Guangdong Building Energy Conservation Association regarding the Trial Standards for Green Building Engineering Consulting, Design, and Construction Drawing Review Fees [4], providing guidance on consulting fee standards for reference.

5. Green Building Application and Review Fees

Green building application and review fees are generally charged by review institutions to cover expert payments and venue costs during review. However, as these fees vary across regions nationwide—some higher, some lower, some

existing, some not—this paper does not focus extensively on this cost category. [Figure 2: see original paper] presents the current fee standards used by the China Green Building Research Center of the Chinese Society for Urban Studies for reference.

6. Statistics of Green Building Incremental Costs

The total green building incremental cost is obtained by summing technical incremental costs, consulting costs, and review fees, as illustrated in .

Green Building Incremental Cost Statistics Table

Note: The costs listed in this table do not represent actual project costs and are provided only for reader understanding.

[Figure 3: see original paper] Proportional Distribution of Green Building Incremental Cost Categories

7. Analysis of Factors Influencing Green Building Incremental Costs

As demonstrated above, green building incremental costs primarily comprise technical incremental costs, commissioned consulting costs, and application review fees. and [Figure 1: see original paper] clearly show that technical incremental costs account for over 90% of total incremental costs, making scientific design of green building technical pathways the key to cost control. Additionally, developers should not blindly pursue high-star ratings. Reasonable positioning based on project characteristics is essential, and green building technology selection should follow three principles: rationality, economy, and applicability. Only through accurate positioning, scientific analysis, and meticulous management can truly high-quality green buildings be created.

presents reference indicators for unit incremental costs of different star-rated green buildings from the *Green Building Engineering Consumption Quota* issued by the Ministry of Housing and Urban-Rural Development in January 2017 [5], provided for reference and study.

Comprehensive Reference Indicators for Green Building Engineering Incremental Costs

Conclusions

1) Green building is a comprehensive and complex discipline involving planning, architecture, structure, water supply and drainage, electrical, HVAC, landscape, and intelligent systems. Accurately understanding and calculating green building incremental costs requires not only familiarity with China' s green building policies but also rich design theory and practical experience. This demands that green building practitioners continuously update their knowledge systems and improve industry cognition.

2) Green buildings are not inherently high-cost constructions. Through scientific technical and management approaches, incremental costs can be controlled within reasonable ranges. Green building technical pathways should be rationally designed, with adopted technical measures being economical and applicable. Star rating positioning should comprehensively consider policy requirements, project characteristics, and user demographics, without blindly pursuing high star ratings. When selecting consulting organizations, integrated design and consulting capabilities should be prioritized.

3) With social development and scientific progress, green building technology application methods will become increasingly mature, inevitably leading to gradually decreasing incremental costs. From an input-output perspective, this will become more advantageous for developers.

4) This paper focuses on analyzing green building incremental cost calculation methods from the certification application perspective and does not comprehensively consider all costs involved throughout the entire building life cycle. Readers should take note of this limitation.

5) Scientific and objective calculation of green building incremental costs helps guide development enterprises to correctly understand green building and promotes the healthy development of green building.

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Note: Figure translations are in progress. See original paper for figures.