Green Buildings: Path Towards Sustainable Development

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ABSTRACT

The goal of this study was to look into the potential benefits and drawbacks of implementing a global green building grading system. Academic studies that address the desire for sustainability through green buildings require a unified future research path. Future topics of green building research, according to the findings, include fully automated BIM rating system integration, collaboration and intellectual property challenges, and the inflexible contractual arrangements required for multiple party engagement. We looked into the necessity for LEED certification, which would compel buildings with higher environmental impacts to achieve higher levels of energy performance depending on those impacts.

KEYWORDS

Green Buildings; Energy Conservation; Sustainable Development

INTRODUCTION AND LITERATURE REVIEW

Owners that are devoted to having green-rated buildings and infrastructure are also helping the sector move toward sustainability. Green buildings and their grading systems, on the other hand, confront a number of challenges and deficiencies that jeopardize their long-term viability. High upfront expenditures and delays, design difficulties and paperwork needs, superior performance improvement requirements, and a skewness toward environmental sustainability are the key challenges and flaws encountered. Green infrastructure has a more significant and far-reaching impact in the context of sustainability since it builds the spatial structure for an area in order to serve a community's requirements while also safeguarding biodiversity and natural value. Several authors have suggested that green built environments do not fully meet societal and financial needs [1].

If poor quality performance occurs during the design phase, modification orders will be issued during the building phase. Because there would be less overall progress, it will have an influence on the construction workforce's productivity. It would also exacerbate hostile relationships among stakeholders, jeopardizing the required linkages for proper synergy among stakeholders to achieve the common aim. The construction industry's traditional procedures are being transformed by the introduction of building information modeling (BIM). It has reaffirmed the importance of the design phase in the whole life-cycle of a construction project. Individual changes were made to the base BIM to comply with local codes, suitable heating and cooling systems, and the Leadership in Energy and Environmental Design guidelines (LEED) [2]. The capacity of BIM to integrate sustainability issues into design (ecological design, energy performance analysis) and construction is a huge benefit (reducing construction waste, tracking construction progress, safety aspects). Cost overruns and schedule delays due to increased design and construction complications were prevalent obstacles, regardless of geographic location.

Because of the difficulties involved in their implementation, green buildings are prone to cost overruns and missed deadlines. To achieve green construction goals, there is a greater need for building professionals to work together more cohesively and in a non-sequential manner, which involves investigating the many delivery systems that govern how various project stakeholders are involved [3]. Recent research has focused on integrated project delivery, design and build, and construction management at-risk, with cost and time performance measures dominating quantitative comparisons.

In order to address pressing environmental issues, life cycle and systems thinking are required [4]. As a result, beginning in 2006, a discussion on Life Cycle Assessment (LCA) integration arose in various USGBC panel discussions and working groups, eventually leading to the 2009 edition. The 2009 edition included significant changes to the way LEED credits were 'weighted.' The weighting was adjusted based on life cycle assessment considerations, with the energy part receiving the most points due to its important environmental and human health consequences. Building impacts are detailed in the new weighting scheme with respect to 13 impact categories, such as greenhouse gas emissions, fossil fuel depletion, water use, and so on. TRACI (Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts) was created exclusively for the United States by the Environmental Protection Agency (EPA). The impact categories are then compared using BEES (Building for Environmental and Economic Sustainability), a methodology created by the National Institute of Standards and Technology (US National Institute of Standards and Technology). Understanding and developing deliberate and meaningful environmental reductions requires applying LCA to building rating systems at a systems level, especially rating systems targeting international markets.

DISCUSSION

Building energy requirements for maintaining indoor comfort conditions (i.e., heating and cooling services) account for more than 30% of global energy consumption [5,6]. Overall, future heating demand is expected to decline (7– 52 %), whereas cooling demand is expected to increase dramatically (up to 1050 %) [7]. The decrease/increase rates varied greatly depending on the climate and case study building(s) under consideration, with buildings and building energy systems in extreme climates being more vulnerable to such changes [8].

Increased energy demands can be satisfied by incorporating renewable energy sources with lesser environmental impacts and lowering tariffs [9–11]. Climate models and forecasted weather data are the main sources of ambiguity in the expected increase/decrease rates. It is necessary to continue developing dynamic large-scale building energy simulation tools, as well as large-scale building renovation strategies and approaches that take into account new factors (such as economic and societal). Furthermore, constant efforts are required to enhance climate models and reduce uncertainty. Green buildings extend compliance to sustainability-related issues to ensure that energy and water consumption are conserved, a healthy indoor environmental quality is promoted, and the negative environmental impacts of construction operations are reduced. The operational stage represents the overall building performance as well as the construction quality and efficacy of the design solution in meeting the sustainability objectives. Building maintenance and overhauling procedures extend the life of structures [12].

CONCLUSION

The contributions of this work emphasize the impact of quality on the sustainability objectives that a green building is envisioned to serve, and the compliance and performance quality components are merged in a more integrated manner by capturing the pre-, during, and post-construction lifespan.

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