

Article

Sustainable Building without Certification: An Exploration of Implications and Trends

Yewande Abraham *, Lisa Greenwood *, Nana-Yaw Andoh,
Jennifer Schneider

Rochester Institute of Technology, 78 Lomb Memorial Drive, Rochester, NY 14623,
USA

* Correspondence: Yewande Abraham, Email: ysaite@rit.edu;
Tel.: +1-585-475-6214; Lisa Greenwood, Email: llgcem@rit.edu;
Tel.: +1-585-475-2026.

ABSTRACT

Background: Sustainable buildings play a pivotal role in meeting the United Nations Sustainable Development Goals (UN SDGs). However, the criteria and process for certification associated with sustainable building rating systems have been seen by many as either cumbersome or too expensive. As a result, some buildings are constructed following sustainable building guidelines without necessarily pursuing external certification. This paper takes a critical look at sustainable building without certification in the US and addresses 3 questions: (1) What is the rationale behind not pursuing certification? (2) When certification is not part of the objective, how are particular sustainability criteria selected? (3) To what extent do sustainable building projects that undergo certification differ from those that do not, and what are the potential implications for building performance?

Methods: The study is based on a survey of thirty-two professionals in the building, engineering, and construction industries, followed by semi-structured interviews with nine participants about their experience with sustainable building certification.

Results: The main rationale for not pursuing certification was associated with cost. The results also suggest that while buildings that have been formally certified may have higher capital costs, they are perceived more favorably with regard to brand reputation, marketability, credibility, meeting sustainability goals, building performance, and value to occupants than buildings without certification.

Conclusions: This study provides insights into the implications of assessment-related decisions in building design and construction as we look to transform our societies into more sustainable, healthier, and livable places, and support global goals for sustainable development.

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KEYWORDS: sustainable building rating systems; sustainable buildings; certification; decision-making; sustainable development

ABBREVIATIONS

BREEAM, building research establishment environmental assessment method; GBI, green building index; LEED, leadership in energy and environmental design; UN SDG, United Nations Sustainable Development Goals; USGBC, United States Green Building Council

INTRODUCTION

Approximately two-thirds of the global population is expected to reside in urban areas by the year 2050, according to the United Nations Department of Economic and Social Affairs [1], and there is mounting pressure to provide healthy and livable urban environments that meet the needs of increasingly populous communities while mitigating the effects of climate change. Sustainable and resilient infrastructure plays a pivotal role in meeting the United Nations Sustainable Development Goals (UN SDGs). Buildings account for approximately 40% of total energy consumption in the United States and worldwide, which leads to about 48% of greenhouse gas emissions from the building sector alone [2]. The built environment comprises the totality of man-made construction projects to sustain our way of life, and the process has significantly contributed to the depletion of natural resources, environmental decline, and climate change [3].

To mitigate these issues, various industries related to the built environment have initiated sustainable practices to be more mindful of their impact on the environment. The objective of sustainable building rating systems is to develop a set of guidelines and practices that would seek to mitigate the negative impacts of buildings on the environment, economy, and people [4]. One of the most widely used sustainable building schemes used in the US and globally is the Leadership in Energy and Environmental Design (LEED) rating system administered by the United States Green Building Council (USGBC). In addition to LEED, popular schemes include Passive House (Passivhaus), a voluntary standard for energy-efficient buildings adopted predominantly in colder climates [5]; Green Globes, a green rating assessment, guidance, and certification program administered by the Green Building Initiative used primarily in the United States [6]; Green Building Index (GBI) and Green Star, national rating certificates adopted by Malaysia and Australia, respectively [4]; and Building Research Establishment Environmental Assessment Method (BREEAM), the world's longest established method of assessing, rating, and certifying building sustainability [7]. Some other systems, such as the independent energy performance certification systems and ENERGY STAR, focus on improving building energy efficiency [8,9]. While studies suggest more than 70 green or sustainable building ratings systems in operation [10], regardless of any differences, these share the overarching goal of

reducing the ecological footprint of buildings through sustainable practices.

Amidst the growth of building rating systems, there have been concerns regarding the certification process, including the expense associated with certification, the justification for some of the criteria, and the rationale of the rating systems. As a result, some project teams are deciding to forego sustainable building certification in their efforts to transform societies to be more sustainable. This study explored the voluntary implementation of sustainable building rating systems in the U.S., with consideration of the certification process. Due to its dominance as a sustainable building rating system in North America [11], the authors focused on LEED. The central research questions are: (1) What is the rationale behind not pursuing sustainable building certification? (2) When certification is not part of the objectives, how are particular sustainability criteria selected? (3) With regards to criteria selection and performance evaluation, to what extent do projects that undergo certification differ from those that do not, and what are the potential implications for building performance? The study draws from and analyzes a survey and interviews of relevant decision-makers in building design and construction projects in the United States, including developers, architects, construction managers, and facilities managers. Furthermore, it provides insights into the implications of assessment-related decisions in building design and construction as we look to transform our societies into more sustainable, healthier, and livable places and support global goals for sustainable development.

BACKGROUND

Green Building Certification Schemes

Certification schemes codify a set of standard practices and provide a means for organizations to provide information on and authenticate their adoption of these practices [12,13]. An organization seeking recognition of its sustainable building can choose to undergo verification of their implementation of green building standards through third-party assessment and certification. Certification does not fully ensure optimal or sustainable performance, but the objectivity, expertise, and credentials of the assessor combined with the rigor of the assessment provide external credibility for the organization's claims [14] and provide customers and investors with assurance about the organization's practices [12]. Sustainable building standards include mandatory and voluntary codes and conventions. A number of organizations have established standards as model codes that local communities in the U.S. can adopt as requirements for building construction and modification [15]. Building codes include criteria that address sustainable and energy efficient buildings [16]. Building owners and developers must follow applicable local building codes, and may also choose to adopt voluntary standards and certification schemes. The 2018 World Green Building Trends report

indicated that the main driver for green building in the U.S. was client demands while the 2021 report indicated that reducing operating costs was the main driver for owners [17].

Table 1 provides examples of sustainable building standards applied in the United States, including those with certification schemes. Model codes are generally intended for adoption as mandatory standards, e.g., at state or local levels, and voluntary standards are generally intended for voluntary adoption by building owners. However, any standard can be adopted as mandatory or voluntary [15]. For example, while LEED is considered voluntary, some states have adopted one or more of its standards as mandatory for projects that meet a certain set of criteria.

Table 1. Sustainable building standards in the US—select examples, adapted from [15].

| Standard | Organization | Description | Type |
|--|---------------------------------------|--|---|
| IgCC International Green Construction Code | International Code Council | Describes the minimum requirements to enhance the environmental and health performance of buildings, sites and structures Applies to new construction, additions, and alterations, except in single or two-family residential structures, multi-family structures with less than four stories, and temporary structures | Model Code—Mandatory |
| ASHRAE 189.1 Design of High-Performance Green Buildings | ASHRAE | Includes the minimum requirements to improve the environmental and health performance of buildings, sites and structures Suitable for the design and construction of all buildings except single-family homes, multi-family homes with 3 or fewer stories, and modular and mobile homes | Model Code—Mandatory |
| ICC 700 National Green Building Standard | International Code Council | Encourages increased environmental and health performance in residences and residential portions of buildings Applies to the design and construction of homes and subdivisions | Voluntary Rating and Certification System |
| Green Globes | Green Building Initiative | Includes rating systems that encourage improved environmental and health performance Applies to new and existing buildings except residential structures | Voluntary Rating and Certification System |
| LEED Leadership in Energy and Environmental Design | US Green Building Council | Includes rating systems focused on improving the environmental and health performance of buildings, sites, structures, and neighborhoods Suitable for the design, construction, and operation phases of new and existing buildings | Voluntary Rating and Certification System |
| Living Building Challenge | International Living Future Institute | Proponent for transformation in building design, construction, and operation Encourages improved environmental and health performance and supports restorative, regenerative building structures that are an integral component of local ecology and culture | Voluntary Certification System |

The USGBC was founded in 1993 to address the contributions of the building and construction industry and its impact on the built environment [18]. By bringing together non-profit organizations, government agencies, architects, engineers, developers, builders, product manufacturers, and other industry leaders, a committee was formed under the guidance of the USGBC to develop a set of sustainable building standards for new construction [19]. The new comprehensive system provides interrelated standards that cover the various stages of the building process, from design through construction and the operation and maintenance of buildings [3]. It also includes rating systems for existing buildings and neighborhoods. Projects certified under LEED are rated certified, silver, gold, or platinum according to the number of points achieved. Over the years, LEED has evolved to be the standard-bearer in the United States with regard to sustainable building practices and has resulted in a surge in the construction of sustainable buildings [19]. In 2006, the United States saw 26 new buildings pursue and receive LEED certification. That number grew to 67,200 in 2018, showing the increase in demand and revealing the green building market as one of the fastest-growing industries [19]. A study conducted by researchers at Maastricht University looked at the 30 largest metro areas in the United States and found that green-certified office spaces comprised 41% of market totals in 2018. In the same study, the city of Chicago led the way with almost 70% of its office buildings certified as green, followed by San Francisco at 64%. The researchers noted that building certification had become a more recognized and essential aspect of a building's profile [19].

Trends in the Adoption of Sustainable Building Rating Systems

Sustainable building certification such as LEED has a lot of proven benefits and required policies have increased its adoption while recommended policies encourage LEED certification but these projects tend to get registered without pursuing certification [11]. Beyond the benefits of reduced utility bills, there are intangible benefits such as improved thermal comfort, better air quality, and reduced vacancy rates [20,21]. However, the sustainable building certification process has been criticized as being confusing, costly, inequitable, and inadequate as an indicator of sustainable performance. Sanchez Cordero et al. [10] maintain that the differences in rating system structure, approach, and indicators presents a confusing scenario that can be difficult for stakeholders to manage. With regard to LEED, Boschmann and Gabriel [22] state that the system is backward and counterproductive to sustainability. It rewards technology-focused efforts more than projects that employ an adaptive approach focusing on local natural systems and does not encourage life cycle thinking. Chen et al. [3] note that limited credits are available for passive design approaches, while energy and atmosphere carry extensive weight. Studies on certification in various domains suggest that the driving force for achieving it may be the desire to present a particular outward

image or pressure from customers rather than a genuine desire to improve [23]. A study of green building standards adoption in Canada identified policy as a driving factor in the use of standards and the type of building certified while economics was a motivating factor for the type of standard adopted [24]. While LEED certification can offer minimum assurances associated with sustainable development and discourages greenwashing, it offers no guarantee of exemplary or transformational behavior.

A case study of two LEED gold and platinum certified buildings found that additional construction costs were 7.43% and 9.43% respectively, 31% and 40% annual energy costs reduction was realized, and the payback period was 0.41 and 2.56 years [9]. They concluded that the higher the level of certification the higher the cost but the higher the operational benefits. However, LEED project construction can be expensive, adding an estimated 10–30 percent to the total project cost, and certification fees can account for an estimated 5–15 percent of these expenses [25]. According to the USGBC [26] fee schedule for LEED building design and construction, the per-building registration and pre-certification fees are approximately \$6500. Certification fees are a factor of building gross floor area, with a minimum of \$3400 for buildings under 250,000 square feet and a minimum of \$33,000 for those between 500,000 and 800,000 square feet. Fees and rates for larger buildings are not indicated in the schedule and require an individual quote. Added cost may also be attributed to higher rates for green design from architecture and engineering firms and the cost of expertise from LEED-accredited professionals and consultants [25]. Andaloro et al. [20] note that given the potential gap between expected energy performance and actual energy consumption, stakeholders may question the benefits associated with additional costs, and opt for lower cost, less intensive approaches. Yet their study suggested that measures such as LEED certification may serve to mitigate technical risk, resulting in lower annual energy cost and a shorter payback period [20]. The 2021 and study of green building trends based on a survey of building design and construction professionals and other stakeholders indicated initial cost and affordability concerns as the top barriers to green building. Compared to an earlier study in 2018, the authors noted a significant increase in the number of respondents who eschewed third-party rating systems due to cost and an increasing share of projects forgoing certification [17].

Going forward, firms may become less dependent on certification to demonstrate sustainable development. While Sanchez Cordero et al. [5] focused on sustainable building rating system implementation in the European Union, they noted a significant gap between buildings that were registered and buildings that followed through with certification. The LEED rating system provides an “organized, consensus benchmark”, developed by a vast network of industry professionals [18], that can be directly applied by architects, builders, and building managers in the design and construction process to improve energy and environmental

management. In the case that the primary goal of an organization is to improve its performance in support of sustainable development, the standard can be implemented just as effectively without certification, providing facilities managers possess or can acquire the necessary competence for implementation. Some organizations may thus consider the additional steps and costs associated with certification to be superfluous.

MATERIALS AND METHODS

Survey Data Collection and Analysis

In order to address the research objectives, surveys and semi-structured interviews were conducted with professionals that have worked with or managed green buildings in the U.S. A purposive convenience sample was used to select potential participants in the survey for this study, based on the authors' professional networks in sustainable construction, architecture, and environmental management. Although there might be potential biases using this expert sampling approach, care was taken to include participants with the necessary background or experience in sustainable building design, construction, operation and management [27]. A literature review was utilized to identify related studies and the research gaps to identify criteria for developing the survey instrument. Institutional review board approval was obtained from the human subjects research office at the authors' institution. The questionnaire was administered through the Qualtrics survey development platform and contained 16 research questions and 6 background and demographic questions. The research questions branched out such that the maximum number of questions a participant encountered through the longest route was 11. The instrument included primarily closed-ended questions with pre-determined response choices stemming from the literature review to increase response consistency and enable quantitative analysis; however, some were formulated to allow participants to provide additional comments if they wanted to explain their responses. Open-ended questions were also included to allow participants to provide more depth in their responses concerning the rationale for certification decisions and the selection of criteria, metrics, and performance indicators for their projects. The questionnaire was pilot-tested by a selection of five professionals that have worked with sustainable buildings after several rounds of testing by the research team for content validity, and final adjustments were incorporated into the instrument based on their comments.

Survey participants' demographic information

Professionals working with sustainable buildings selected from industry and academia were invited to participate in the study and there were 32 complete responses to the survey. All the participants were based

in the U.S. except one that was based in Canada but had prior U.S. experience. Incomplete responses were not included in the analysis since the main research questions within the survey were not answered. Background information was collected from the respondents, including information about the organization they work for (Figure 1), their current role (Figure 2), and their years of experience in their role (Figure 3).

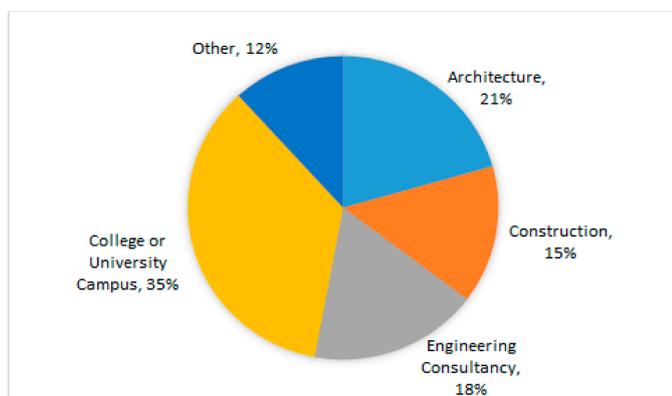


Figure 1. Organization type of respondents.

Participants in the survey represented a range of organizations. 35% worked in a college or university campus, while 21% worked in architecture firms, 18% were from engineering consultancies, and 15% worked for construction firms (Figure 1). They held different roles such as owner (9%), architect (18%), and consultant (12%), yet a significant percentage of participants selected the “other” category, and mentioned their roles as faculty, project manager, sustainability analyst, and sustainability officer (Figure 2).

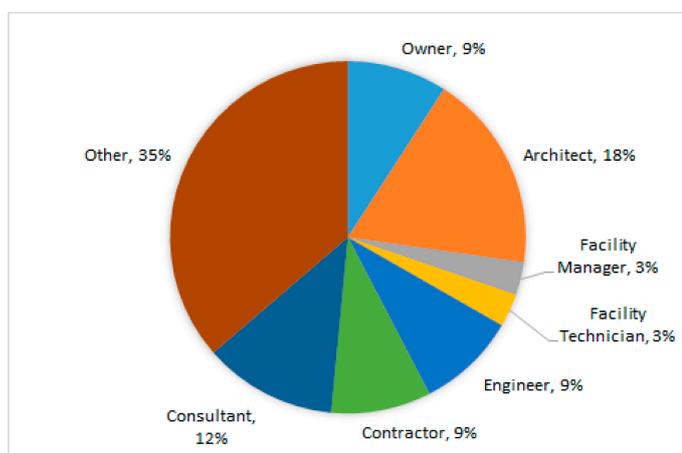


Figure 2. Current role of respondents.

The respondents had varying years of experience in their current roles, and only two of the respondents (about 6%) had less than 1 year of experience. 50% of the respondents have a sustainable building credential and 74.2% of all the respondents have designed, constructed, or managed at least one LEED project (Figure 3).

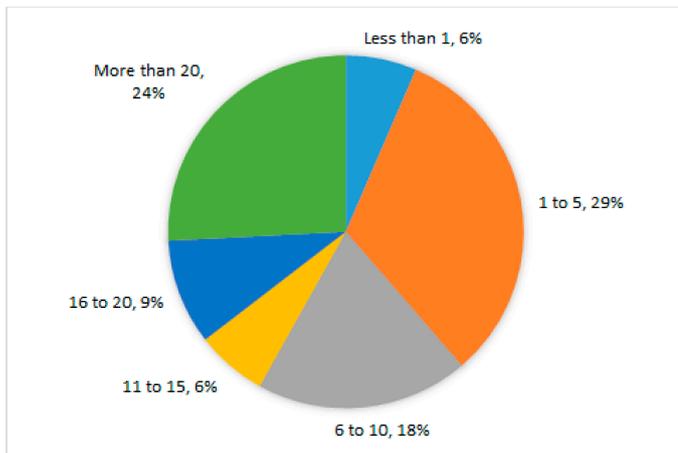


Figure 3. Respondents' number of years in their role.

Survey data analysis

Descriptive statistics were computed to analyze the data. Qualitative data was analyzed with NVivo software, and quantitative responses to the survey were analyzed using Microsoft Excel and SPSS version 26. The survey had a relatively small number of responses and the results are not generalizable but suggest potential trends in the use of sustainable building rating systems. A Monte Carlo estimate and Fishers Exact Test were computed to evaluate the relationship between respondents' perception of certified and non-certified buildings and twelve selected criteria based on the literature review: capital costs, life cycle costs, return on investment, quality of construction, risk, property value, value to occupants, building performance, meeting sustainability goals, marketability, credibility, and brand reputation [28].

The hypotheses on the perception of the value of certification in relation to the criteria included:

H_0 : There is no association between perceived building certification status and the selected criteria.

H_a : There is some association between perceived building certification status and the selected criteria.

The results gathered from the analysis of the survey data and the hypothesis testing are presented in the results section.

Interview Data Collection and Analysis

In order to gain deeper insights into the survey responses, follow-up interviews were conducted with nine professionals with experience working with sustainable buildings. Four worked in a college or university, two were architects, and others held roles as construction consultant, real estate sustainability professional, and engineering consultant. Four of the interviewees indicated 1–5 years of experience in their role, one had 6–10 years, one had 11–15 years, and three had more than 20 years of experience. All were familiar with sustainable building certification

systems and five were LEED Accredited Professionals. The interviews included eight questions focused on their experience with sustainable building certification, the value of sustainable buildings, the decision-making process for building certification and their opinions on buildings considered sustainable, but not certified. The responses were analyzed to identify key underlying themes.

RESULTS

Participants' Perception of the Value of Certification for Sustainable Buildings

The criteria identified from the literature were analyzed based on the responses of the 32 participants for whether they perceived that certified buildings were better, there was no difference, non-certified is better, or they were unsure. The breakdown of their responses is presented in Figure 4. The Chi-square test of independence performed to evaluate the relationship between respondents' perception of certified and non-certified buildings and the twelve criteria yielded a p -value of 0.00, $X^2(33, N = 32) = 152.42, p = 0.00$. However, 50% of the cells had an expected count of less than 5, so Monte Carlo analysis was computed, since the Fisher's Exact Test could not be directly calculated, yielding a p -value of 0.00 at a 95% confidence interval. It has been proven that the Monte Carlo analysis provides a good approximation of the Fisher's exact test [29]. We conclude that there is enough evidence from the data to reject the null hypothesis, supporting that there is some association between perceived building certification status and the selected criteria.

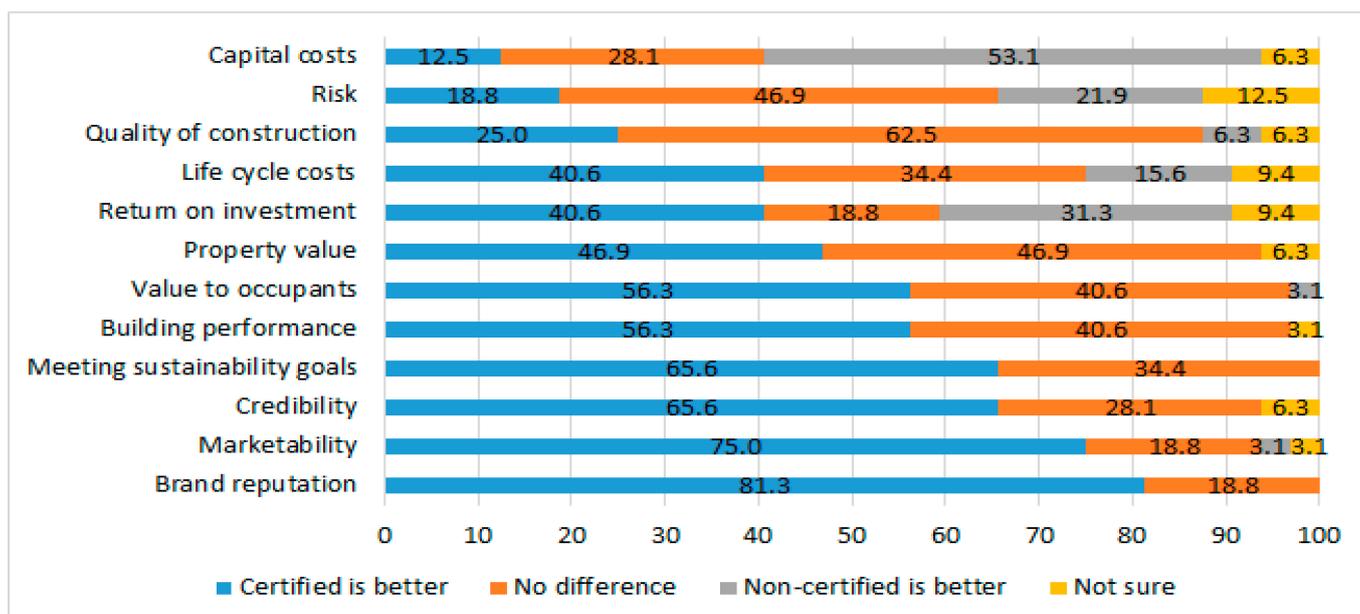


Figure 4. Perceptions on the Value of Certified Buildings.

In terms of capital costs, 53.1% felt that the costs for non-certified buildings are better than for certified buildings. Certified buildings were

considered to be better than non-certified buildings in relation to brand reputation, marketability, credibility, meeting sustainability goals, building performance, value to occupants, return on investments, and life cycle costs. The majority of respondents indicated no difference between certified and non-certified buildings when considering the quality of construction (62.5%) and risk (46.9%). For the criteria property value, 46.9% of the respondents felt that certified buildings are better, the same percentage of respondents indicated that there was no difference between certified and non-certified buildings when considering property value.

Certifications Pursued for Building Projects

The sustainable building certifications that respondents are currently pursuing or have pursued in the past are presented in Figure 5. 29 of the respondents' organizations had pursued a sustainable building certification in the past, and 2 had never pursued a sustainable building certification. The most common certification pursued in the past and presently is LEED. The "Other" category included certifications such as Enterprise Green Communities, Passive House, Austin Energy Green Building (AEGB), Fitwel, WELL, Building Owners and Managers Association (BOMA) International. Based on the data collected, those that indicated that their organizations had pursued LEED or any sustainable building certification in the past were asked if they were currently pursuing certification. 23 indicated that their organization was currently pursuing certification and the majority of them use the LEED rating system.

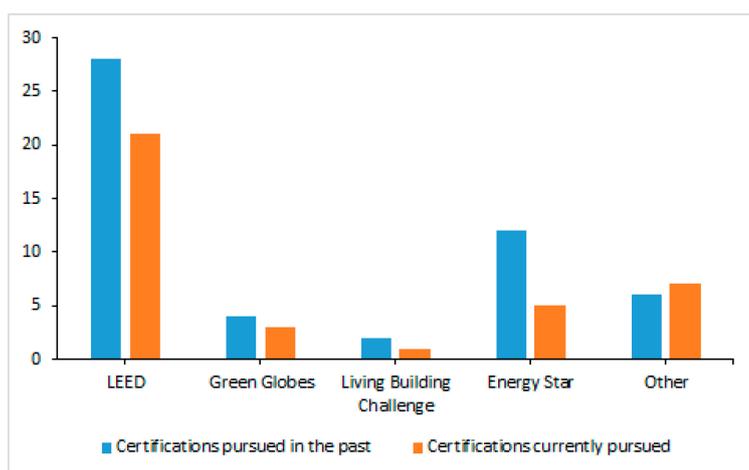


Figure 5. Certifications pursued for building projects.

Factors Involved in the Decision to Pursue Sustainable Building Certification

To determine the factors responsible for the decision to pursue or not pursue a sustainable building certification, the most common reason given was a leadership decision to pursue it, and some respondents specifically mentioned the owner's decision was the driving force to pursue certification (Figure 6). Financial benefits were the most common factor in

the decision not to pursue certification. Responses indicated that most projects in this category were deterred by the financial constraints of sustainable building certification. For those that were pursuing certification, other factors that were mentioned included owner/client requirement, when the building typology lends itself to sustainable learning opportunities (e.g., university science buildings), environmental responsibility, meeting requirements, providing a LEED laboratory for certification of buildings and experience for students, and operational benefits.

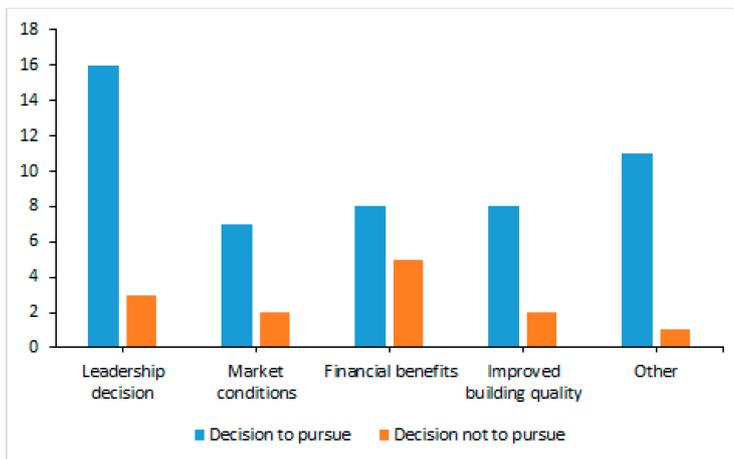


Figure 6. Factors that informed the decision for sustainable building certification.

Concerning the parties involved in the decision to pursue certification, 19 of the respondents indicated that the building owner is mainly involved, followed by the facilities management team and the architect (Figure 7). Other individuals that were identified are the sustainable design consultant, LEED-certified designer, sustainability director, and the sustainability team. The leadership team was identified as the party most responsible for the decision not to pursue certification.

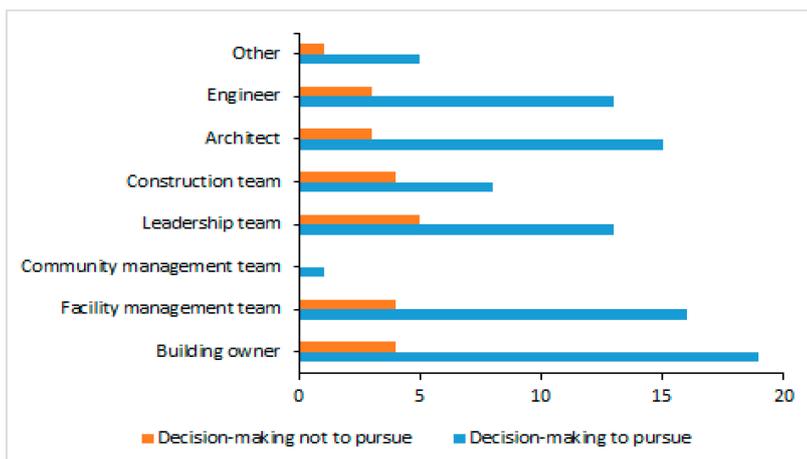


Figure 7. Parties involved in the decision-making process for sustainable building certifications.

Parameters Tracked in Relation to Sustainable Building Performance Goals

Ten of the respondents considered or tracked several parameters relating to sustainable building performance goals, namely, post-occupancy evaluations to monitor occupant satisfaction, energy use, water use, building commissioning, operational care performance, indoor air quality, rainwater capture, sustainable landscapes, daylight, views, district energy usage and efficiency, interior materials, access to transit, renewables (on-site and off), innovation, waste management and landfill diversion, data sharing and access, access relating to the Americans with Disabilities Act (ADA), acoustics, thermal comfort and ventilation, green vehicle, and space utilization. Tracking these helps manage the buildings, monitor costs and is beneficial for decision-making for future projects. In contrast, 11 respondents indicated that they do not specifically measure anything in relation to sustainability for buildings that are sustainable but not certified.

The most common standards or guidelines followed by respondents who measured or tracked building performance parameters to indicate a measure of success were LEED, ENERGY STAR, American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) standards, and others including Sustainability Tracking, Assessment & Rating System (STARS), 2030 Challenge, carbon measures (operational & embodied), sustainability Key Performance Indicators (KPIs), and Guiding Principles for Sustainable Federal Buildings.

Some respondents explained that sustainable but not certified buildings were viewed with skepticism since there is no evidence of sustainability, except when some metrics are deliberately tracked. Also, certification provides some accountability and credibility that would otherwise be difficult to demonstrate. While some owners are committed to sustainability and are persuaded about the benefits of certification, the costs involved are frequently a turnoff. The perceived value of certified buildings is also a subject that is up for discussion, and the true value of certification to the building owner should be further explored.

DISCUSSION

As we look to transform societies sustainably, the cumulative decisions for each building project become much more critical and require justification. Yet some organizations are deciding to implement sustainable building standards and are forgoing the typical third-party certification process.

With regard to question 1, What is the rationale behind not pursuing sustainable building certification? The building owner was identified as the main party involved in the decision-making process to pursue or not to pursue certification. In most cases, the building owner initiates and pays for the project. The project architect is involved at an early stage of the

design process and plays an essential role in determining if the building pursues certification or not. The owner determines the involvement of other parties in the decision-making process and some project delivery types allow for a collaborative approach to making such decisions. For example, in educational settings, the facilities manager may be invited early on in the design process to provide input on the design. However, for newer facilities, the facilities manager may not have been selected during the planning and design phases but may be involved during the commissioning and operations phase of the building. Studies have indicated that early stage decisions and early involvement of key parties for sustainable buildings provide the most significant benefits and improve project success [30].

The decision regarding certification is largely economic, but can be policy-driven or owner/client-driven. All interviewees indicated that cost was a main factor in the decision. However, several also noted that from a business perspective, the interests and perceptions of building occupants were a critical strategic consideration. In the case of residential buildings, sustainable design may be attractive to tenants, while in commercial real estate, design should be consistent with top tenant commitments and initiatives. In colleges and universities, sustainable design may attract prospective students who “may want to attend a progressive school” [LEED AP]. The question is whether the actual certification is necessary to attract building occupants and meets the building owner’s needs. Four interviewees indicated that they were moving away from certification in some cases. One of the significant challenges of developing sustainable building assessment systems is ensuring they are adaptable and can meet the needs of different users [16]. Decision makers play an important role in sustainability certification and Bartke and Schwarze [31] suggest that in the design of sustainability assessment tools, the requirements of the decision makers should be prioritized over those of other stakeholders.

One of the interviewees speculated on the motive for getting a building certified. The concern was that most occupants don't know what LEED is [Real Estate Developer].

Another respondent shared that “it’s the same construction we would have done either way. There really isn’t a delta there. I don’t know that it impacts our property value whatsoever because we’re not really in a market situation where we’re buying and selling in these buildings. The real question that it comes down to is—is there a marketing component? and that is to say, do our students that we look to attract- is that a significant factor in their decision-making processes for whether or not to attend the institution?” [University Facilities Manager].

From a policy perspective, there may be state mandates, incentives, or corporate directives related to certification. Three interviewees indicated that certain entities in their states required LEED certification as evidence of achieving a particular level within the standard, and others mentioned subsidies or incentives tied to certification. One respondent shared

regarding sustainable building certification that “occasionally, we’ll see people pursuing it because there are subsidies involved from the governmental level that are offsetting the costs or even providing people with additional money for the project it tends to boil down to marketability and potential tax rebates, and things like that to offset the cost” [Architect].

With regard to question 2, when certification is not part of the objectives, how are particular sustainability criteria selected? The survey and interview results suggest that energy is almost always part of the criteria, but it depends on the context and the owner/client’s interests. For example, physical criteria like temperature, humidity levels, occupant comfort perspective in these spaces, energy, etc., may be easily tracked and compared to other buildings in a portfolio and region of similar size and use. One LEED-accredited professional suggested that the criteria may not change much compared to those applied in certified buildings due to advances in the general building codes. One of the interviewees shared that “green building certification systems are not as aggressive pushing the boundary anymore compared with ten years ago—general code caught up and so now non-certified buildings are probably getting the same performance and quality as a certified building” [LEED AP].

Others mentioned institutional or corporate standard practices or initiatives that dictate the selection of criteria in the design process. For large institutions, there are construction standards and standardized approach to constructing buildings and there are sustainability aspects automatically incorporated [LEED AP]. Another respondent shared that an integrated design process is where building sustainability criteria are determined/implemented—one must look at all aspects and weigh them at the beginning of the process—consider materials, lighting, energy efficiency, etc., and impact on the environment [LEED AP].

Further, building owners that forgo certification but still want to promote sustainability may fully implement a sustainable building standard in every way and essentially select criteria in accordance with the standard in question.

On question 3, With regard to criteria selection and performance evaluation, to what extent do projects that undergo certification differ from those that do not, and what are the potential implications for building performance? the responses varied. On criteria such as brand reputation, credibility, and marketability, certified buildings were perceived by most survey participants to be better than non-certified buildings. Conversely, some interviewees believed non-certified buildings to be of lower quality. “Less quality is likely when a third party verification process is not included in non-certified projects. Third-party certification is not the only way to achieve these things, but just creates an actionable management process within the team, more formally than when not pursuing certification” [LEED AP].

While one LEED AP interviewee noted that a “certification level is just a snapshot in time”, another expressed concern that the “frequency of data collection in an accurate manner is typically not likely to be part of non-certified projects—and is sometimes not installed fully in a LEED building”.

Other participants suggested that owner or client sustainability objectives could be met more efficiently without pursuing certification. Some saw certification requirements and criteria as stifling innovation and creativity, potentially focusing on energy at the expense of other factors. Others mentioned “point chasing”, where standards like LEED are seen as mere checkboxes to reach certification. Further, challenges were mentioned in relation to communication and lag times in getting a response from a LEED coach. One interviewee shared that “so we’re not going through the certification process. It’s based on the pride and understanding of the design team, knowing that we did everything that we could based on our expertise and ultimately the satisfaction of the inhabitants of whatever that building might be on the client-side” [Architect, LEED AP]. Another stated that “most of these scoring systems are missing what we consider to be one of our primary criteria for sustainability and that’s an enduring, easy to maintain building. That’s a very hard thing to quantify and they typically don’t do that for us to be able to produce a building that we’re not going to need to renovate in the next 20 or 30 years or that it can last 50 years without a renovation—That’s a big deal that really truly is something that is more sustainable for us” [LEED AP].

The focus of this study has been on sustainable buildings, however, Erten and Kilkis [32] suggest that the green concept should extend beyond green buildings alone but focus on larger impacts including cities and communities.

CONCLUSIONS

This paper has looked at perspectives on sustainable building certification and the implications for different stakeholders. The article discussed the emerging challenges of certification for building construction and management and the decisions to certify or not to certify, addressing the following questions: (1) What is the rationale behind not pursuing sustainable building certification? (2) When certification is not part of the objectives, how are particular sustainability criteria selected? (3) With regard to criteria selection and performance evaluation, to what extent do projects that undergo certification differ from those that do not, and what are the potential implications for building performance?

Regarding the rationale, the study indicated that the building owner is a major driving force in the decision to pursue, or not to pursue, sustainable building certification. This is consistent with the literature in the sense that certification is market-driven, and building owners consider customer expectations. Based on the responses collected, cost is a crucial factor in pursuing sustainable building certification. Involving key parties

at an early stage of the design and assessing technical risk and associated costs with and without certification can maximize the benefits accrued from sustainable building and help the owner make a better informed decision on whether or not to pursue certification. When certification is not part of the objectives, sustainability criteria and indicators depended on the context and the owner/client's interests, yet energy was almost always part of the criteria. Further, the criteria selected may not necessarily be different from those applied in a certified building due to advances in the general building codes, and in cases where sustainable building standards still guide the design. Although the results suggest that third-party certification may offer notable advantages in relation to brand reputation, credibility, and marketability, and certified buildings were perceived to be better than non-certified buildings in relation to those factors, they are not necessarily perceived to be better in relation to the quality of construction, risk, and capital cost. Going forward, firms that move away from certification may need to address stakeholder concerns related to these perceptions through identification, monitoring, and reporting of key performance criteria and indicators consistent with sustainable building standards, as a means to demonstrate progress towards achieving sustainable development goals.

One of the limitations of this study is the low number of responses, and facility-based personnel represented a small percentage of the responses. Future work will involve an analysis of current trends in sustainable building certification through a quantitative exploration of data from green building certification bodies.

DATA AVAILABILITY

The dataset of the study is available from the authors upon reasonable request.

AUTHOR CONTRIBUTIONS

YA, LG, NA and JS designed the study. YA, LG and NA administered the surveys and supervised the interviews. YA and LG analyzed the data. YA, LG and NA wrote the paper with input from all authors.

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CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest.

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