

Customer-Centric View of Sustainable Buildings: The Case of LEED®

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The number of buildings that employ sustainable design, construction and operating strategies, have been increasing around the world. This increase encourages third party organizations to develop means to certify these buildings and determine their level of sustainability. LEED® rates buildings based on five major categories. This study presents the results of a preliminary and exploratory survey conducted on over 200 university students in an effort to quantify the importance of the five major LEED categories based on an occupant perspective. Respondents were asked to rank LEED categories by level of importance, where Materials and Resources was ranked the most important and Water Efficiency was ranked the least important. The analysis of the results help identify what the building occupants value most, allowing the authors to continue their research toward developing marketing strategies for sustainable buildings. Although LEED has set some category weights based on environmental impacts of its credits, the current marketing and building industry literature lacks research on how to determine the social and economic importance of LEED categories. The authors in this paper present information on how the determination of a customer and occupant centric view of sustainable buildings can help market these buildings and thus increase their numbers in the building industry.

Key Words: LEED, Sustainable Buildings, Customer Value, Criteria Weightings

Introduction

Sustainability has become one of the leading discussion points among many industries. The building industry, consisting of designers, builders, owners, and occupants, is one of the major players in achieving a sustainable way of living, mainly due to its documented contribution to common environmental problems. This study specifically relates to these parties in an effort to generate better marketing strategies for designers and builders to convince the decision makers (owners) to build sustainable buildings for their intended occupants. This paper utilizes five main LEED categories as a starting point for exploring various advantages of sustainable buildings, but the authors aim to explore other advantages of sustainable buildings as recognized by the building occupants. Anink et al. (1995) and the U.S. EIA (n.d.) emphasize the importance of sustainability for the building sector by listing the following facts:

- 50% of material resources taken from nature are building related
- Over 50% of national waste production comes from the building sector
- 40% of the energy consumption in the U.S. is building-related

In order to decrease the ecological footprints of buildings, experts are focusing on designing, building, and operating more environmentally friendly buildings that also aim to create higher occupant satisfaction. During this process in the US, the Leadership in Energy and Environmental Design (LEED®) rating system was developed by United States Green Building Council (USGBC) in order to rate buildings on their level of sustainability. LEED 2009 (latest version of the certification system) aims to achieve this rating process by rating building design and construction under seven categories:

- Sustainable Sites (SS)
- Water Efficiency (WE)
- Indoor Environmental Quality (IEQ)
- Energy and Atmosphere (EA)
- Materials and Resources (MR)
- Innovation in Design (ID)
- Regional Priority (RP)

Although the management of a set of criteria in an effort to determine the shade of “green” in a building is challenging, assuring the occupants about the high value of these buildings can also be a difficult task. Developing marketing strategies for sustainable buildings can be a step towards the solution in which the occupants’ preferences are taken into consideration.

This study focuses on the first five categories of the LEED rating system, and explores their values given by building occupants. This will allow the authors (by a multi-phased research plan) to develop a set of marketing strategies for sustainable buildings. In order to achieve this, this study is utilizing campus environments as its sample. Therefore, the authors selected university students as the initial target group to represent the scheme of building occupants. Upcoming sections discuss the conceptualization and the methodology of this research while presenting and discussing the results of the authors’ first attempt to analyze the subjects’ approach to sustainable buildings.

Conceptualization

Determining the values of each LEED category is a challenging task. The decision to make one category more or less important than the other one can be attempted via different channels or their combinations. These channels can be listed in parallel to the three well-known pillars of sustainable development (United Nations General Assembly, 2005):

- Economic (Constructability, Initial Cost, Life Cycle Cost, etc.)
- Social (Marketability, Knowledge, Beliefs, Attitudes, Habits, etc)
- Environmental (Ecological Impacts, Global Warming Potential, Ozone Depleting Potential, etc.)

LEED 2009 sets the category weightings, via the number of credits available in each category. Although USGBC does not intend to propose the importance of each category, the number of credits indirectly sets the tone about LEED’s take on the value for each of them (table 1).

Table 1

LEED-NC 2009: Categories and associated maximum points (USGBC, n.d.)

Category	Percentage Based on Maximum Points
Energy and Atmosphere	35%
Sustainable Sites	26%
Indoor Environmental Quality	15%
Materials and Resources	14%
Water Efficiency	10%
TOTAL	100

In order to come up with the weightings shown in Table 1, USGBC utilized National Institute of Standards and Technology (NIST) process to compare LEED credits to environmental impact categories defined by the “Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts” (TRACI). TRACI is a computer software tool developed by the U.S. Environmental Protection Agency (US EPA) to assist with impact assessment (US EPA, n.d.). Hence, LEED determines the values of its categories from a mostly environmental perspective.

In addition to the environmental benefits, current literature of sustainable buildings indicates that the sustainability decisions such as the ones described in the LEED system, when applied to buildings, have proven long-term monetary benefits. These include but are not limited to the potential increases in worker productivity, and decrease in employee health care and litigation costs. As an example, Celik (2006) explains that building owners, managers,

occupants, architects and builders can all benefit from the increased IEQ in terms of minimizing the negative health effects, legal liability, and possible remediation cases.

Another strong selling point of sustainable buildings, specifically for organizations, is the positive corporate image obtained by such practices. Eichholtz et al (2009) explain that ecological responsiveness in corporate leasing decisions could potentially help in offsetting a negative corporate image or in improving the reputation of firms in objectionable industries. Turban and Greening (1997) state that a superior reputation may enable corporations to attract and retain a better workforce. If companies position themselves as having corporate social responsibility initiatives, such as operating sustainable buildings, there can be positive effects on key stakeholder groups, including customers. This can suggest a positive relationship between sustainable company action and consumer reaction to the company (Bhattacharya & Sen, 2004). Corporate social responsibility is empirically shown to increase company attractiveness which leads to more than just increased purchase intention, but also higher loyalty and positive word of mouth (Marin & Ruiz, 2007).

This study recognizes that corporate image is an important factor in consumer decision-making, and that consumers value sustainable practices. "Consumers are increasingly expressing the value they attribute to environmental protection through shopping behavior" (Orsato, 2006, p.130). The typology of customer value (Holbrook, 1994b) posits that ethics is one value obtainable in the consumption experience. Notable ethical purchases entail socially responsible consumers who are concerned with not only their own personal satisfaction, but with consideration for the social and environmental well-being of others (Engel & Blackwell, 1982). Since social responsibility is becoming increasingly important for society, consumers value the way organizations manage their production processes and supporting activities (Magretta, 2003).

Within sustainability research, there is a call for more research into how values facilitate sustainable consumption (Peattie, 2010). Research on consumer values relates to consumer choice behavior and includes studies on the process of evaluating and choosing between alternatives. This study takes into account that consumer values may have effects on environmental behavior and intentions to purchase. Previous researchers attempted to measure consumer conservation as something that consumers did or did not engage in, instead of questioning the degree to which they engaged in such behavior, while other research focused on broad environmental concerns instead of specific issues (Peattie, 2010). However, this research goes beyond merely measuring general environmental consumer values, and instead, asks respondents to evaluate the importance of specific LEED categories. This study asks respondents to choose between combinations of two LEED categories at a time in order to determine exactly which one consumers value more. Such measurement aids in establishing a context for respondents. Using the consumers' built environment also establishes relevance to respondents in order to increase their involvement with the topic.

It is now becoming clearer to the researchers of sustainable buildings that determining how much the sustainability of a building is valued by its occupants is as important as knowing the means and methods of designing and constructing a sustainable building. This study acknowledges that determining the occupant value of sustainable practices will allow a greater implementation of sustainable buildings which is a better way of designing and constructing a sustainable environment. Such information can provide sustainable builders the opportunity to expand their marketing efforts.

Methodology

The main goal of this paper is to explore the value of various advantages of sustainable buildings as they relate to the occupants. This is the first phase of a multi-part, multi-methodology study. This study explores a binary comparison matrix, while at the same time analyzing the next phase, which uses a likert scale to measure the same constructs. This will allow authors to determine the reliability of measurement between the two methods.

The first phase of this research project concentrates on preferences of end-users (customers of universities) in an effort to bring a social aspect to criteria weightings. Since all firms have multiple audiences (Brown & Dacin, 1997), this study focuses on the consumer audience and transfers the phenomena to students who occupy campuses.

Previous research studies on sustainable buildings uses samples consisting of those in authority to invest in sustainability. However, since there is a trend towards the building of sustainable buildings on college campuses (i.e., University of Florida, University of Colorado at Boulder, University of Washington in Seattle), such factors have already started to permeate student university decision-making. A recent poll by the Princeton Review states

that two-thirds of college applicants take into account the environmental track record of a university as an increasingly important factor in their search (Princeton Review, 2009). If colleges want to attract the best students and remain competitive they must make sustainability a priority.

The second phase of this research will generate a valuable research study on budget decision makers, or shareholders. A map of the complete research study is shown in Figure 1, which represents the decision making process to determine the value of LEED certified buildings. This process starts with a benefit and sacrifice analysis by the shareholders, which in certain cases takes the end-user satisfaction into account along with the sacrifices that need to be made to achieve these benefits. This study assumes that even in circumstances where the building occupants are not directly involved in the decision of whether a building will be LEED certified or not, their personal, strategic, and product oriented perceptions may increase the benefits, thus the perceived value, of a LEED building by the decision makers.

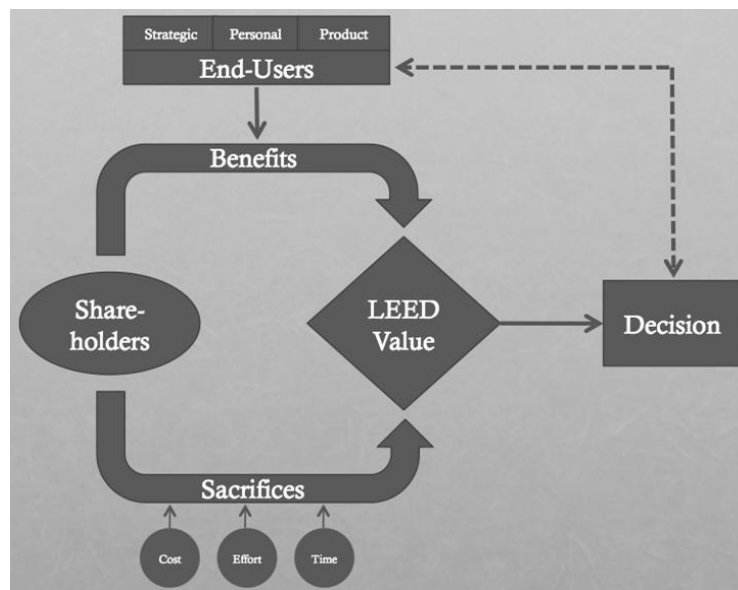


Figure 1: Research Map

For the present study, a survey was distributed in a computer laboratory to 204 undergraduate business students from Bryant University. Subjects were initially provided with information on the five main LEED categories. A decision matrix was designed to allow participants to make choices between couples of LEED criterion (figure 2). For example, subjects were asked to choose whether Energy and Atmosphere is more valuable than Water Efficiency (a sample of this comparison is given in figure 3). Once the matrix was developed based on the responses, a tabulation of the points determined the value given to each characteristic. The validity of the rankings determined by the decision matrix was further evaluated by using yes or no questions, such as “Was sustainability a factor in your choice of university?” Importance weights were established using a comparative matrix, as the current study assumes that a binary comparison among pairs of categories achieves more reliable rankings instead of subjective decisions between a score of 7 or 8 on a Likert scale. Consequently, samples were asked not to grade each category but simply choose the one that they prefer.

These assumptions, and the future research plans, in order to experiment different approaches toward a more comprehensive validity analysis, are discussed in more detail in the “Future Research” section of this paper. The results of the study are discussed below.

Results

Table 2 briefly represents the findings of this phase of the research. The percentages of subjects choosing one category over another were calculated by the help of the decision matrix given in Figure 2. These percentages were

summed for each category and normalized back on a scale of 100. This provided a ranking among the categories from an occupant's perspective.

When compared to the rest of the LEED categories, Materials and Resources was ranked higher, while Water Efficiency was ranked the lowest. The reasoning behind these results are currently being explored by the authors in order to determine correlations among subjects' beliefs, familiarity, decision making process, etc.

Table 2

Comparison Matrix

NEW SCORES UPDATED									
	SS	EA	WE	MR	EQ	TOTAL	Importance Grade	Ranking	Normalized
Sustainable Sites (SS)	0%	45.79%	57.35%	34.76%	43.48%	1.8138	45.3%	4	18%
Energy and Atmosphere (EA)	54.21%	0%	67.94%	46.89%	56.46%	2.255	56.4%	2	23%
Water Efficiency (WE)	42.65%	32.06%	0%	37.50%	50.24%	1.6245	40.6%	5	16%
Materials and Resources (MR)	65.24%	53.11%	62.50%	0%	58.17%	2.3902	59.8%	1	24%
Indoor Environmental Quality (IEQ)	56.52%	43.54%	49.76%	41.83%	0%	1.9165	47.9%	3	19%
						10	250.0%		100%

Figure 2, as seen below, illustrates the importance weight given to Energy and Atmosphere as a percentage, when compared to Water Efficiency. This result can be described as 67.94% of subjects stated that Energy & Atmosphere is more important in their built environment while only 32.06% stated the same for Water Efficiency, in a comparison between the two. Such information can aid in more efficient marketing communication for potential customers. The significance and the contribution of these results will be discussed in the next section.

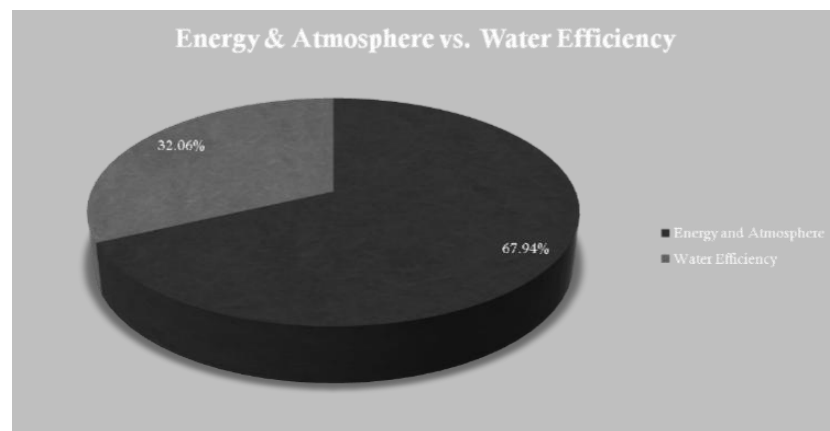


Figure 2::Pairwise Comparison of Energy and Atmosphere to Water Efficiency

Contributions

Based on the extensive literature review conducted, it is observed that no other study has explored the possible value given to each LEED certification system characteristic by building occupants. Such findings can inspire managers and provide insightful implications for architecture and construction companies when promoting sustainable practices. Findings present more viable marketing options and potential strategies, in addition to the current dominant concern of the corporate image, as reasons for demanding certified sustainable buildings. This study is significant in terms of its ability to influence the decisions of consumers in the sustainable building area. Finding the consumer value of each specific LEED® certification characteristic will help architects and builders to better market the long term benefits of sustainable buildings. This will help bring the consumers, and the architecture and construction companies, to a common understanding to increase the demand for higher quality, sustainable, and environmentally sensitive structures in the current building industry.

Future Research

Authors are currently developing a second survey for approximately 300 university students. The new survey intends to target more qualitative aspects of students' preferences. This will allow the authors to analyze qualitative responses from each subject in an effort to identify the factors they consider when determining the value of a certain LEED category. Determination of these decision making criteria/factors will enable researchers do a complete Analytical Hierarchical Process (AHP) study by repeating similar pairwise comparisons under various factors of decision making using a likert scale. Future research ideas also include utilization of various consumption scales measuring decision making, emotions, and behavior to generate more targeted marketing strategies for different groups of individuals. Future phases of this study will extend surveys to university faculty and staff as the occupants of their buildings and ask them to share preferences. The final phase of this study will present the results of previous surveys completed by the students, faculty, and staff to university administrators. University administrators will be asked to determine the value of sustainable practices and willingness to pay for/implement such practices based on the information provided by the occupants' preferences. Such information can be useful in determining the value of implementing sustainable building practices.

Other future study ideas include but are not limited to:

- Including a cost benefit analysis in the survey by using LCC analysis.
- Increasing the number of subjects and the type of subjects.
- Identifying customer perceptions on difference between "sustainable" buildings, and "LEED buildings".
- Utilizing different decision modeling methodologies to identify the rankings of sustainable building characteristics.
- Incorporating various social, economic, and environmental scales in the survey to seek correlations among respondents' choices.

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