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Dilemma of green and pseudo green architecture based on LEED norms in case of developing countries

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Abstract

Achieving sustainable and eco-friendly architecture is one of the main objectives that humans for creating a better life have made as the ultimate model for all their professional activities. For this reason, moving towards a greener architecture is considered the main goal of the contemporary architecture of our time. The goal of this study is to analyse architectural projects that have been already performed in the Middle East countries in terms of their compatibility with actual concepts of sustainability and their required green criteria. Therefore, for the sake of review and study, this paper is intended to discover up to what level the sustainability rating system such as LEED (Leadership in Energy and Environmental Design) can be effective in rating contemporary architectural projects. Studies indicate three concepts for analysing contemporary architecture and have found to be descriptive: (1) green, (2) pseudo green and (3) energy-monger. The studies have also shown that some of the projects, although trying to display sustainable architecture concepts in appearance, in reality they turned out not to be sustainable enough. In latter steps, this paper intends to evaluate and examine the effectiveness of the LEED rating system. In evaluating LEED rating system, the results inferred indicate that the system is intended more for programming than actual designing purposes and is not an efficient instrument for analysing architectural design process. Analysis based on this study suggests that, for moving from pseudo green to green architecture, it is necessary to use design-oriented patterns.

Keywords: Sustainable built environment; Green architecture; Pseudo green; LEED

1. Introduction

Green building (also known as green construction or sustainable building) refers to a structure and usage processes that are environmentally responsible and resource-efficient throughout the building's life-cycle: from design to construction, operation, maintenance, renovation,

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and demolition. This requires close cooperation of the design team, the architects, the engineers, and the client at all project stages (Ji and Plainiotis, 2006). In general, green buildings conserve resources by using energy, water, and materials more efficiently during the entire life of the building, including the initial construction phase (LOHAS Dictionary, 2010). Green buildings utilize techniques, materials, and methods aimed at reducing the building's negative impact on the environment, while increasing the level of comfort, health, and productivity of its occupants (Sussman, 2008). The term green building may also refer to a sustainable or high performance building; these terms are often used interchangeably although differences do exist. Currently, green and sustainable building philosophies are merging into what may best be described as a movement founded upon "creating a healthy built environment based on ecologically sound principles" while considering the "entire life cycle of the built environment" (Montez and Olsen, 2005 and Elmualim et al., 2012). Although new technologies are constantly being developed to complement current practices in creating greener structures, the common objective is that green buildings are designed to reduce the overall impact of the built environment on human health and the natural environment (U.S. Environmental Protection Agency, 2009). Nowadays, to determine the amount of being green in the green buildings, there are some global standards and rating systems. LEED (Leadership in Energy and Environmental Design) is the most popular sustainability rating system used in the United States (Cryer et al., 2006). The Green Globes system is also popular for smaller projects because it provides online guidance with an affordable third-party verification process. Another standard less commonly used in the United States is the Building Research Establishment Energy and Environmental Assessment Model (BREEAM) (Morrison, 2012). Some cities, such as Seattle, and many countries, such as Canada, Australia, and Japan, have established their own standards. All of these systems are similar to the U.S. LEED and BREEAM ratings in that they have a certified point system for rating various sustainable features, as well as a mechanism for certifying the building (Mahdavinejad, 1998). For the purpose of this paper, developing countries' approach to green buildings was selected, so a case study on ten green buildings in the Middle Eastern countries is considered and the rate of how green these buildings are is calculated. To achieve this purpose, a checklist of eight items of green architecture is designed by us and in each item the amount of being green, pseudo green and energy-monger is recorded. On the other hand, the LEED rating system as a globally recognized standard system has been selected and based on the items on this standard, the amount of being green is calculated. Then, the obtained survey by our checklist is compared with the resulting survey from the LEED norms and the correlation between them is calculated.

2. Methodology

2.1. Conceptual framework

Climatic conditions in the Middle East, particularly in predominant desert areas of Gulf States where the temperature difference between day and night is significantly wider, and thus requiring a great deal of energy consumption to make conditions livable, together with the sharp increase in the utilization of fossil fuels which greatly contribute to air pollution and raising the air temperature have compelled the natives to find a solution to this grave problem. Luckily, the sudden surge of oil revenue has made it possible to come up with the best suitable solution of moving towards green building construction which has shown a considerable growth in combatting these unfriendly environmental conditions. But this paper assesses that the majority of these buildings can actually be categorized as pseudo-green rather than to be effectively called green constructions. To gain an understanding of how green the buildings are, a checklist consisting of eight items relating to green buildings is prepared by us in a table. This checklist is called "Designer" and is set based on design criteria. On the other hand, at the end of the case study survey, a checklist of LEED norms is also provided by which the green rating is calculated for each building. This checklist is called "Programming". This study indicates three concepts in analysing contemporary architecture that have found to be descriptive: (1) green, (2) pseudo green and (3) energy-monger. In the Designer checklist for each of the eight items the rating of being green, pseudo green and energy-monger are evaluated. "Green" signifies something that is completely natural. For example, whenever natural plants are used whether on roof, walls or structure of a building as a live organ, or natural ventilation and natural lighting are being utilized in the building, these buildings can be called green. "Pseudo green" signifies something that is artificially green and is not completely natural. For example, when the wall structure is made of lumbers cut from trees or for ventilation purposes the appearance of a funnel is used in the building, these items can be called pseudo green. "Energy-monger" refers to something that is not green and something that consumes energy. For example, when the ventilation or lighting system is used in a building without utilization of natural forces and with a greater consumption of energy, these items can be called energy-monger.

2.2. Tools

The Designer checklist instrument involved eight items: roof, wall, structure, materials, ventilation, lighting, heating/cooling and water management. These eight items for each of the ten buildings have been prepared on a separate table. Moreover, to identify the rate of being green, pseudo green and energy-monger for each item, the data were collected from the websites of each building or the architects of those buildings. These data have been recorded