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Unifying some variables' effects among different environmental assessment methods of buildings

Amal Kamal Mohamed Shamseldin

Architectural Department, Faculty of Engineering, Ain Shams University, Egypt

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KEYWORDS

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Abstract A number of Environmental Assessment Methods of Buildings (EAMB) had emerged all over the world, and a number of global variables affect the estimation of the assessment item weights in those methods. Unifying the global common variables' effect on estimating the weights of the assessment items of all different methods among the world for different time periods helps saving the duplicated time and effort spent by experts around the world when designing new versions of the EAMBs. Therefore, it is suggested to apply an approach to determine these variables' effect on the estimated weights of the assessment items for the different assessment methods, noting that due to the presence of other private and local variables, the final estimated weights of the items may vary from one method to another, and from one building type to another. Thus, the research aims to spot a light on the possibility and ability of unifying the importance degree and effect of the global common variables on estimating the weights of the assessment items among the EAMBs, which will not lead to unified items' weights, but it ensures their importance degree over the world due to their worldwide concern, and reduces the duplicated effort and time waste of the experts responsible for producing the different environmental methods.

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Introduction

There are many variables controlling the estimated weights of the assessing items in the Environmental Assessment Methods of Buildings (EAMB), so the assessment items' weights differ among different assessment methods and for the same method

over time and different building types and characteristics. Variables affecting the estimated weights of the assessing items can be either global common variables or private and local ones [1,2]. Therefore, the resulted versions of these methods have some common and other different outcomes. Many researches focused on the differences of the EAMBs around the world, and they highlighted the different outcomes, their reasons, and the related advantages and disadvantages. McArthur et al. [1] and Saunders [2] compared a number of environmental assessment methods and reviewed the differences among them. Other researches focused on the disadvantages of using a non-local assessment methods. Seinre et al. [3] compared some indicators from Estonian regulations against LEED and BREEAM

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requirements to help finding their shortcomings in these regions. Roderick et al. [4] compared the building energy performance assessment between LEED, BREEAM and Green Star for a typical open-plan office building in Dubai, and the results were different for the same building that was located out of the borders that they were designed for. Towell [5] compared LEED with the Building and Construction Authority (BCA) method for the South East Asian market, Green Mark. He emphasized that different rating systems will differ in their approach of assessing and scoring buildings. Some methods were adapted for different countries using international versions such as LEED and BREEAM, even though these versions were different from the countries' local methods due to many different concerns. Whistler [6] highlighted the differences between LEED of Emirates and Estidama, the local Emirates Green Building Council (EGBC) method.

Only few researches focused on the common relations among the assessment methods to accelerate their version formation process. Dirlich [7] presented a basic concept for an assessment scheme that could be used on a global scale as a standardized system. This concept was due to his point of view about the insensibility of the assessment methods diversification that took into account local characteristics in the various countries versus the globalizing market for real estates. Drinkwater [8] through a World Green Building Council' report suggested some Key Principles for Collaborative Policy-Making to build better public policy and tools for a sustainable built environment. The report contained principles such as avoiding the overlap with existing works by Knowing what has already being done, and taking an experience from other countries to decide how to best approach an issue, without condoning that the local expertise should lead any action to ensure relevance and stakeholder buy-in.

This research emphasizes the importance of the assessment methods' diversity among countries due to the local and private variables affecting their components and weights, but it also emphasizes the importance of benefiting the unified effect of the global and common variables among them to reduce the duplication in time and effort when producing the methods' versions. So, the research aims to help the producing institutions of the assessment methods to determine and unify the worldwide effect of the global common variables on the assessing items' estimation weights, by using a proposed approach. Thus, it is important to distinguish between the global common variables and the private and local ones, which are both used to determine the assessing items' weights. The research proposal used two chosen variables to unify their importance degree for the EAMBs for the period 2010/2015; then likewise, other existing or future methods or versions can use the unified variables' effect to set their assessing items' estimation weights for the different time periods.

Environmental Assessment Methods of Buildings (EAMBs)

Environmental Assessment Methods of Buildings (EAMBs) emerged across the world to determine the environmental principles and standards for buildings. They are used in issuing assessment certificates to confirm the building commitment to the environment according to specific classifications. The "Building Research Establishment Environmental Assessment Method" (BREEAM) was the first of these methods, which

released in 1990 from the Building Research Establishment (BRE) in the United Kingdom, and then many others appeared. The most well-known and widespread method is "Leadership in Energy and Environmental Design" (LEED), which appeared in 1998 from the US Green Building Council (USGBC) in the United States of America, and was applied in 2000. The Australian method, Green Star, was released from the Green Building Council of Australia (GBCA) in 2003, and the "Comprehensive Assessment System for Building Environmental Efficiency" (CASBEE) appeared in Japan in 2004. There are several clear differences among the different assessment methods due to the different practices, limitations, culture and potentials of each produced country. The assessment items and fields in these methods are used to judge the efficiency of the environmental performance of buildings. It is noted that different methods include environmental issues with different weights that represent the environmental importance of these issues, according to specialized groups of construction specialists and academics [1,2].

Variables affecting the EAMBs

Variables affecting the formation of the Environmental Assessment Methods of Buildings (EAMB) components and their weights can be divided according to their effect among the countries. They can be divided into global variables or private and local ones. The private and local variables vary for each country or region. Different site conditions may lead to fluctuate the importance of the assessed issues, as in the difference between assessing the water consumption efficiency in rainy countries and dry ones [1–3]. Some of the Private and local variables are as follows:

- Spatial natural variables, such as climatic, hydrological, geological, ecological, available energy, geographical, climatic and hydrological variables.
- Spatial humanity variables, such as culture, local laws, population density, social, economic and demographic characteristics.
- Variables associated with the materials and resources properties, such as validity, locality, and safety.
- Variables associated with the urban characteristics of buildings, roads, services, infrastructure. .etc.
- Variables associated with the accustomed practice of each country, and the level of technological development.
- Variables associated with the local environmental awareness degree and practice.
- Variables associated with the local presence and spread of green technologies.
- Variables associated with the presence of local energy and environmental codes.
- Variables associated with the local pollution levels. (Researcher using Refs. [1–4,9–12].)

The global common variables are the ones that have a mutual influence on the assessment items' weights among the world, through the different time periods. Some of these variables are as follows:

- Environmental issues of global interests over the time.
- Environmental value of different resources and pollutants over the time.

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