TOWARDS THE DEFINITION OF NEW TOOLS OF DESIGN AND ENVIRONMENTAL ASSESMENTS PERFORMANCE IN BUILT ENVIRONMENT

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ABSTRACT

Sustainability applied to the built environment has been basically understood as a strategy to improve the efficiency. The evolution into ecology closer visions is becoming more intense. The paradigm of regeneration is presented as a complementary alternative to sustainability, emphasizing the association with nature, adaptation, recovery and resilience. New design tools and performance evaluation of built environment incorporating this strategy, are necessary. In this sense, how could the concept of regereneration improve tools of design and environmental assessments performance? This paper, through a literature review defines the main limitations of environmental assessment tool in the built environment; moreover analyzes incorporating regeneration paradigm to their evolution and challenges.

Keywords: sustainability, regereneration, environmental assessment tools

1.1.- Introduction

It is recognized as a result of today's environmental problems, the need of reducing the impacts produced on the environment by the construction field, measures such as emissions control, efficiency and savings in consumption resources [1]. For more than 20 years, environmental assessment tools and methods (EATM) has been a response to these complex environmental issues [2]; as well as a framework for decision making.

Cole [3] defines these tools and methods as techniques developed to evaluate the performance of a building designed and built by a wide range of environmental considerations. The act of assessment is to establish a bridge between environmental objectives and strategies for building performance [4]. Several authors emphasize their role as guides in design processes, making decision in defining effective strategies for environmental design and providing information during phases of design, construction and use of the building [5], [4], [6]. These tools area a group of criteria and indicators that seek to adapt the paradigm of sustainability to the construction field.

EATM has been growing in recent years, coupled with worsening environmental problems and the existing urgency in seeking answers from various sectors, it becomes increasingly necessary to develop more comprehensive methods that expand the range of considerations environment [4]. In this sense studies have recognized the existence of about 600 methods and tools to evaluate different extent and intensity social, economic and environmental aspects related to the construction sector [7].

Literature defines them as frames of reference to the implementation of measures to minimize the impact of construction sector in the environment, while recognizing some of its limitations in operational terms and their application [3], [8], [9], [10], [11], [12].

1.2.- Objectives

This paper aims to identify, through literature review, the main limitations of the tools design and evaluation of environmental performance of built space; moreover seeks to analyze the potential of incorporating regeneration paradigm to their evolution.

While the field of action and application of these tools of design and environmental assessment of built environment is extremely large, the literature review and analysis will be focus on the called "Rating Systems or tools" or "credit-weighting scale".

2.- Reviews, limitations and weaknesses

In recent years the discussion and publication of works that addressed the issue in question have increased. Some of them developpes the subject from different approaches: comparison of tools, analysis of evaluation criteria and defining recommendations.

Environmental assessments tools and methods are based on the application of criteria and measures necessary to reduce the impact of buildings on the environment, also called “environmental best practices”. Its main roles are to establish a framework with a view to assessing the environmental performance of buildings, as well as make a tool to guide decision-making [13].

Table 1 ("Summary of criticisms and contributions defined by reference literature") collects the main ideas in literature consulted: the methodology used in each, tools evaluated and a summary of the main conclusions and contributions to their evolution.

Source	Methodology	Tools evaluated	Main conclusions and aportanciones about the subject
Cole, 2012 [10]	Bibliographic Revison, analysis, discussion of results	LEED, BREEAM, CASBEE, SpeAR SBAT, iiSBE's German Sustainable Building Council's Certificate Programme, REGEN tool, LENSES, Perkins Will framework, Eco-Balance planning and design	- Definition of limitations and establishing framework regenerative design tools.
Berardi, 2011 [11]	Literature review, analysis, comparison discussion of results	BREEAM, CASBEE, GBTOOL, ITACA, LEED, SB TOOL, GREEN GLOBES,	-Defining Trends and limitations.
Monterotti, 2012 [14]	Literature review Polls, analysis, discussion of results	CASBEE, GBTOOL, ITACA, LEED	-Defining set of recommended and not recommended features.
Sev, 2011 [9]	Literature review, analysis, and discussion of results	BREEAM, CASBEE,CEEQUAL GBTOOL, ITACA, LEED, SB TOOL, GREEN GLOBES	-Definition of limitations from the socio-cultural and economic point of view
Haapio & Viitaniemi (2008) [12]	Classification and definition of tools	ATHENATM Environmental Impact Estimator, BEAT 2002, BeCost, BEES 4.0, BREEAM, EcoEffect, Eco-Profile, Eco Quantum, Envest 2, Environmental Status Model, EQUER, ESCALE, LEGEP, LEED et PAPOOSE, TEAM	-Classification and definition of tools.
Ding, 2008 [8]	Literature review, classification, analysis, discussion of results	AccuRate, ABGR, BREEAM, CASBEE, BEPAC, EMGB, NABERS and BASIX, CPA, DQIEco-Quantum, EMGB, EPGB, GBTool, GHEM, GreenStar, HKBEAM, LEED. NABERS, NatHERS. SBAT, SpeAR,	Definition of limitations of assesment criteria and dimensions.

Table 1 "Summary criticisms and contributions defined by reference literature".

According to Berardi [11] these tools have limitations when addressing complex and multidimensional issues such as sustainability, in that case are more appropriated muiticriteria systems which are capable of addressing the complexity of environmental

problems. Furthermore is shown that the most important criteria of evaluation is the energy performance.
Haapio & Viitaniemi [12] focus on the role of these tools as tools for assessing sustainability, as well as challenge their ability of updating the frameworks in which they are based.
Monterotti [14] defines some key limitations about operational issues: concerns about resource efficiency is demonstrated, as well as the lack of relationship between the built environment and context, and the lack of assessment in the medium and long term.
Ding [8] considers that these tools are still inflexible and complex, which should manage the complexity of environmental issues in a multi-dimensional way.
For Cole [10] shiffing towards regeneration, raises to reconcile the relationship between systems thinking and reductionist thinking, in other words ithe need is to stop to evaluate the performance of the built environment isolated and start to undissociate it from the context.
The results shown the need of reformulate analyzed tools. In this sense it is understood that new generations of tools and assessment methods aims to be able to address complex aspects that compose the buildings.

3.- Contributions from the paradigm of regeneration

The result of this review reveal some of the key factors which should be directed towards the development of new generations of instruments design and environmental assessment of buildings. In this sense becomes increasingly necessary to redirect the objectives and goals of these tools, to a change into its focus, a paradigm shift and vision towards environmental issues [15].
From the 70s some of the main references have warned about environmental problems, in response it has been proposed setting the "Limits to Growth" [16], the "effectiveness" versus efficiency [17] or "Ecological Design" [18]. All of them have generally been guided by the idea of making things “less bad” in environmental terms [19].
In this context regenerative design emerges as another response to the complexity of environmental problems. One of the largest reference was the landscape architect Lyle; his book Regenerative Design for Sustainable Development [20] raises the keys that define this concept. Reference literature recognizes the wide field of application of this [21], [22], [23].
The concept of regenerative design has been taken more importance in recent years; reference literature shows that regenerative design is a more comprehensive response to the environmental problems which confluence society-culture and ecology [24]. In this sense the answer to environmental problems from sustainability point or view is focuses on achieving human needs while the paradigm of regeneration goes beyond raising the co-existence and co-evolution of human and nature [25].
In that sense, one of the greatest contributions that regeneration paradigm confers to environmental assessment tools is to design the built space undissociated from its geographic and socio-economic context.
Mang & Reed [26] claim that these new models of understanding and design will be able to address the new challenges of rehabilitation and restoration, whose methodological bases are defined by Mang & Reed [26], Du Pliess [27] and Cole [10].
Moreover, the evolution towards regeneration paradigm increasingly emphasizes the potential of these tools as tools to "help thinking", to educate, to generate greater awareness and motivation in this field. An example of this is the REGEN tool is called "tool for thinking", which has been developed by the (USGBC), and seeks to "promote and make more robust dialogue" between actions and solutions to rehabilitation and regeneration [28].
Other examples are Living Building Challenge, Lenses, Perkins+Will framework, Eco-Balance planning and design, some of them are in the early stages of development [10].
Living Building Challenge [29] continues defining measures based on the fulfillment of the "environmental best practices" that developed earlier generations of methods and tools objectives, although defined objectives and more rigorous reference frames from environmental point of view such as energy self-sufficiency, water self-management, limitation into the use of some materials. Notably, one of the developments that tooks into account this new generation of EATM is the incorporation of temporal variable, by extending the evaluation process until a year after the building use starts.

This let many of these measures go beyond the limits of efficiency but define consumer trends, behaviors and build a relationship with the environment of co-evolution between man and nature.

4.- Conclusions

This work underlines the importance of shifting paradigm, addresed by the new generation of tools of design and environmental assesments performance, especially because of their focus on efficiency and the building context.

The basis and framework provided by the paradigm of regeneration seems to be more appropriated towards reducing environmental impacts by facing complex environmental problems from a holistic and integrated perspective.

Substantial progress of this new generation is the Implementation of frameworks and objectives that go beyond improvements in the efficiency and management of resources that make up the building.

There is still a long way to go in the implementation and enforcement of these new tools. New doors that this new generation opens recognize the co-evolution of human being-nature as fundamental to the development of both, where political, social and cultural issues plays a crucial role. Although it seems that this type of methods and tools is a breakthrough in environmental assessment tools and methods in built environment, its implementation continues to pose new challenges especially to actors involved,“changing responsibilities and skills of designers”, and it requires a greater understanding of the context in social and ecological terms [10].

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