IEREK PRESS Academic Research Community

http://www.press.ierek.com

ARChive

CrossMark

ISSN (Print: 2537-0154, online: 2537-0162)

International Journal on:

The Academic Research Community Publication

DOI: 10.21625/archive.v2i3.345

Creativity in Sustainable Redesign for Existing Buildings by Using Green Architecture as a Contemporary Trend

Faysal Mahmoud Abu Alazm[1], Asmaa Soliman Mansour El-khalidi[1]

[1] *Department of Architecture and Urban Planning Suez Canal University Faculty of Engineering, Ismailia, Egypt*

Abstract

With rapid climate changes in recent years, it has become important as it is necessary to think about a new concept of architecture that respects and considers the environment. To counter these changes, the concept of environmental and green architecture starters' theory has appeared as one of the applications of creative solutions in buildings.
Architects then began turning it from a theoretical study on the method of the design of buildings and making them environment-friendly by reducing the consumption of resources to run the building and reduce damage to the environment due to Alanbosat and waste resulting from construction work.
Environmental and green architecture does not just reduce the impact on the environment but also supports energy-efficient buildings, which achieves self-sufficiency within the building. It also provides energy production and exploits the optimal way efficiently and with equanimity.
This paper aims to:
-Highlight the importance of green architecture and sustainability in shape.
-Reach a methodology to convert existing buildings into green buildings.

Keywords

Green architecture; Redesigns; Existing building; Architecture contemporary trend; Sustainable architecture

1. Main Text

Sustainability is a general principle in the eco-design which is one of the main objectives in contemporary design as one of the methods of protection for our environment and protect it from climatic repercussions which causes a non-environmentally friendly and considerate of others have construction and architecture.

Green architecture trend as one of the sustainability applications in architecture has emerged and is designed to reduce energy consumption both in the stage of implementation or operation of the building later considering the lack of prejudice to the social and functional to needs, and green buildings take into account the full life cycle of the building since design began to implementation, operation and demolition and the mechanism to get rid and recycling of components.

Green architecture is: an approach to building that minimizes harmful effects on human health and the environment.

The "green" architect or designer attempts to safeguard air, water, and earth by choosing eco-friendly building materials and construction practices

Structure

- First point: Green design components
- Second point: Principles of green building design
- Third Point: Guideline for sustainable design in existing building
- Fourth Point: Green building benefits
- Five Point: Ecosystem assessment of green architecture systems
- Sixth Point: Case Study

Methodology

To reach the desired objective of the research follows the researcher following methodologies:

1. General definition of green building through described as one of the sustainability applications in architecture, as well as clarification of the green design elements.
   (Inductive "approach to collecting information" theoretical conceptual entrance method)
2. Conclusion methods for the application of these items on the already existing buildings.
   (The analytical method deductive)
3. The application of green solutions on a building already exists and draw conclusions.
   (Applied method)

   Apply the theoretical study on the building's main administration of Suez Canal University as a model case study.

1.1. Green Design Components

Green architecture sensitive a range of basics to protect the environment, be it by applying some new solutions in the design, such as:

• Ventilation systems designed for efficient heating and cooling
• Energy-efficient lighting and appliances
• Water-saving plumbing fixtures
• Landscapes planned to maximize passive solar energy
• Minimal harm to the natural habitat
• Alternate power sources such as solar power or wind power
• Non-synthetic, non-toxic materials
• Locally-obtained woods and stone
• Responsibly-harvested woods
• Adaptive reuse of older buildings
• Use of recycled architectural salvage
• Efficient use of space (LEED — USGBC)

Green buildings do not contain these solutions but the designers trying to consider some of them at least, while the goal. Building industry environmentally friendly and considerate her up to the production of energy for the operation to relieve pressure on it.

1.2. Principles of Green Building Design

- Study a detailed analysis of the site in order to benefit the environment and ecosystems site and achieve sustainability.

- Water conservation and efficient use without wasting.
- Energy efficiency without affecting the environment and without extinguished
- Achieve adequate and sufficiently in the internal environment as one of the sustainable design requirements
- The optimum use of materials and resources that used in building.
- Innovation in Design.

Figure 1. Six Major Elements of Green Building Design

1.3. Guideline for Sustainable Design in Existing Building

To achieve sustainability in existing facilities must achieve a minimum level of environmental solutions to the building's existing shunt based consumer and harmful to the environment to a building follows the green architecture and environment-friendly:

-The use of natural ventilation through the application of the ventilation holes in the ceilings and directing the openings in the direction of the wind granulocytes.

-Energy savings using natural lighting and the use of Alcasrat to achieve the highest benefit.

-Use water-saving health systems and water recycling - exchange Ramadi in watering plants in front of the building and then after treatment.

-The introduction of green elements to minimize the impact of the rise in temperatures and reduce humidity near the building.

-The use of a sustainable energy generation such as solar panels, pipes, generators, and wind power generators powered kinetic energy elements.

-Reduce the use of synthetic materials and chemical processing direct impact on the environment and the use of environmentally friendly materials as an alternative to it.

-Reduce the use of wood and address what has been used Bdhanat protection to reduce the likelihood of corruption and Batalli loss of a significant nature resources.

-Adapting internally with the surrounding natural environmental factors.

-Adapting with the surrounding installations and buildings list.

-Optimal utilization of space so as not to lose the architectural spaces in spaces irrelevant.

-Thinking about the recycling of materials and components origin spoil Rtoterha to reduce the risk to the environment.

1.4. Green Building Benefits

Green building is not a simple development trend; it is an approach to building suited to the demands of its time.
• Environmentally responsible: Passive solar homes can significantly cut use of heating fuel and electricity used for lighting. If passive cooling strategies are used in the design, summer air conditioning costs can be reduced as well. (Kats, 2006)
• Comfort: Because a well-designed passive solar home or building is highly energy efficient, it is free of drafts. Extra sunlight from the south windows makes it more cheerful and pleasant in the winter than a conventional house. (Kats, 2003)
• Aesthetics: Passive solar buildings can have a conventional appearance on the outside, and the passive solar features make them bright and pleasant inside.
• Economy: If addressed at the design stage, passive solar construction doesn't have to cost more than conventional construction, and it can save money on fuel bills (Woolley, 2008).

1.5. Ecosystem Assessment of Green Architecture Systems

Buildings went toward environmental approach by achieving sustainability in the site and the human health and environmental protection and the provision of water and materials selection and indoor environmental quality, and social and economic aspects. It was necessary to systems to evaluate the success of environmentally based and grant certification per the standards be updated assessment of aphid to achieve transparency in the evaluation and development in accordance with the requirements that continues to grow. (Bauer, Schwarz, & Mosle, 2010)

A) BREEAM – BRE Environmental Assessment Method (1990): Building Research Establishment in 1990 established a system of pre-valuation method to ensure environmentally based and evaluate quality, The primary goal of this system ease the effects on the environment and resulting from the ongoing developments, the professionals wanted to integrate details that Therm environment in design (Breeam).
The Evaluation Program Is Available for Offices, Industry, Schools, Courts, Prisons, Multiple Purpose Dwellings, Hospitals, Private Homes, And Neighborhoods.
The Versions of Assessment Essentially Look at The Same Broad Range of Environmental Impacts: Management, Health and Well-Being, Energy, Transport, Water, Material and Waste, Land Use and Ecology and Pollution (Housing Standards Review).
Loans granted for the construction of buildings according to performance-based environmentally According to BREEAM system through the core elements of the system, a management 12%, health & wellbeing 14%, energy 18%, transport 8%, water 6%, material 13%, waste 7%, pollution 12% , land use & ecology 10% (How to obtain a BREEAM Rating).
Then descent gathered and evaluated per the good and very good and excellent.

B) LEED – Leadership in Energy and Environmental Design (1998):

The LEED Is an evaluation system for green buildings and the basic aim to encourage designers and building owners and workers to convert the real estate domain environment construction of an integrated sustainable environment (LEED is green building).
Green Building practices can substantially reduce or eliminate negative environmental impact and improve existing unsustainable design.
Is an evaluation system for green buildings and the basic aim to encourage designers and building owners and workers to convert the real estate domain environment construction of an integrated sustainable Specialists put these standards to try to adjust the negative effects on the environment and to reduce potential liability resulting

from indoor air quality problems. The rating systems developed for the different uses of buildings. The rating is always based on the same method, but the measures differentiate between the uses (Building Design Construction Guide).

New construction as well as modernization of homes and non-residential buildings are assessed. Beyond single and complete buildings, there are assessments for neighborhoods, commercial interiors and core and shell. The rating system is organized into five different environmental categories: Sustainable, Sites, Water Efficiency, Energy, and Atmosphere, Material and Resources and Innovation. It gives the LEED four categories to evaluate the building certificated, gold, silver and platinum (LEED v4 for BUILDING DESIGN AND CONSTRUCTION).

C) DGNB – German Sustainable Building Certificate-GeSBC-(2007):

GeSBC system differs from other systems in the sustainability it is based on the structure is divided into basic elements, a study of the economic social, environmental, and cultural.

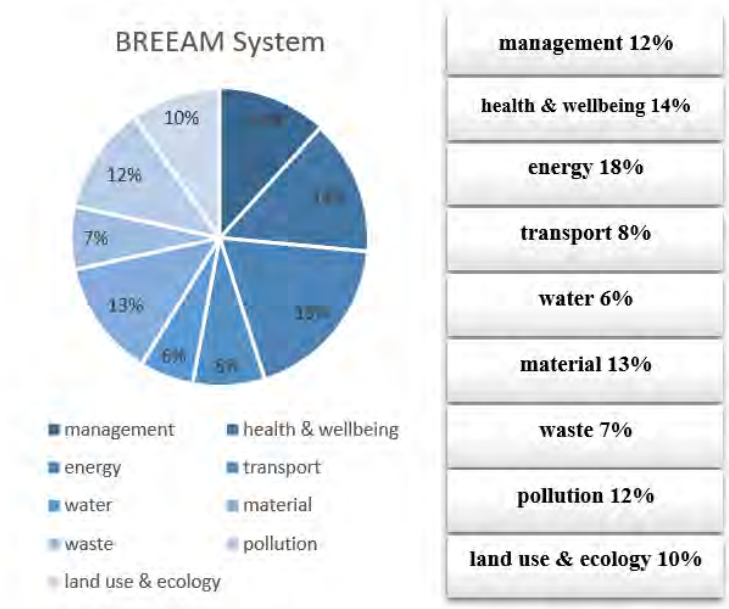

Figure 2. Breeam System

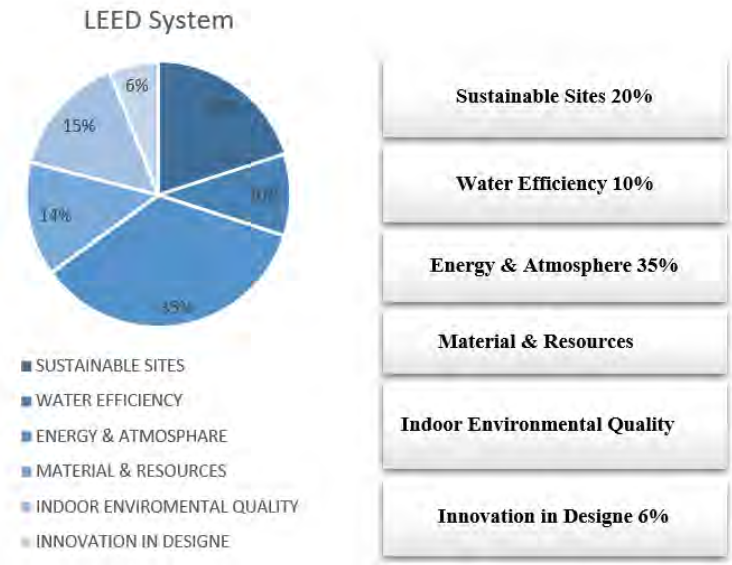

Figure 3. LEED System

The development of the German real estate market and developed elements of this system was a response to the requirements (German Sustainable Building Council (DGNB)).

The German Sustainable Building Council (DGNB) was founded in June 2007 and created the German Sustainable Building Certificate together with the German Federal Ministry of Transport, Construction and Urban Development.

The goal is to create living environments that are environmentally compatible, resource-friendly and economical and that safeguard the health, comfort and performance of their users (The DGNB System: Global Benchmark for Sustainability). The certification was introduced to the real estate market in January 2009. It is now possible to certify at three different levels, “Bronze”, “Silver” and “Gold”, site quality will be addressed, but a separate mark will be given for this, since the boundary for the overall assessment is defined as the building itself (German Sustainable Building Council (DGNB) General Terms).

Figure 4. DGNB System

2. Case study

2.1. Main administration building of the Suez Canal University: Historical background

The first step was the establishment of the university by the President Mohamed Anwar Sadat, President of the Arab Republic of Egypt laid the foundation stone for the establishment of the Suez Canal University, in the October 4 1975, the total land area of 1300 acres within the boundaries of the city of Ismailia, then issued Law No. 93 of 1976.

And in the establishment of 08/14/1976 Suez Canal University and it is based in Ismailia Hosted by the Suez Canal Authority in Ismailia, the first meeting of the fledgling University, headed by Prof. Dr. Abdul Majid Othman, building the first president of the University of the Suez Canal (Suez Canal University).

2.2. Building Description

It built a two-story mediates based VIP lounge topped with major meetings of the University Hall, on the ground floor there is the public administration of the university security offices and the Office of the main hall VIP, while the first floor and agent’s university offices and the main office of the university president and the main meeting

room. Building has a main staircase adjoins a special entrance Prime university, agents and VIP him both sides of the special branch personnel. Based hill height of 4 meters from the level of the university buildings and the main entrance to the building is located on the eastern facade and is located university president's office on the southern facade of the building.

Figure 5. main entrance south elevations

Figure 6. main entrance east elevations

Figure 7. building description plans

Environmentally Rating: assessment of the buildings systems on the collection of items that are reviewed to assess environmentally based:

Table 1: Environmental Rating

Elements of the environmental assessment of the building	Valuation levels				Notes
	Very good (A)	Good (B)	Average (C)	Outstanding (D)	
Integrative thinking 				√	The involvement of users in the design decisions are not due to the culture of the community.
Energy 			√		The building did not provide solutions designed capacity is good for more efficient use of energy was not continuing solar radiation exploits most times of the year as one of the most important elements of energy-saving lighting as one of the most important applications.
Water 			√		Use of water in the building of traditional and non-efficient method.
Waste 				√	Didn't care about the hierarchy of waste management and utilization of recycling
Materials 			√		Traditional material
Location & transportation 		√			Good selection of a building site where he sees in the face of the university entrance on a hill rises 4 meters and mediates university buildings
Sustainable site 			√		It is not considerate to sustainability in Origin
Health and human experience 				√	Is not considering the humanitarian needs in the design
Regional impacts 		√			Buildings influenced by surroundings
Innovation 				√	No innovation for sustainable solutions
Global, Regional, Local 			√		Not affected
Total					C (POOR)

2.3. Proposed Amendments

Add items to achieve environmental requirements in both southern and eastern façades, as well as addressing the inconsistencies of the elements of the building to be more than one architectural direction, as well as adding elements to generate renewable energy to increase the efficiency of operation in the building.

Figure 8. Proposed amendments

Figure 9. A-south east shot

Figure 10. B-south east shot

Figure 11. C-west south shot

Figure 12. D-North west shot

3. Conclusion

- The need to follow the approach of sustainability in the design, considering the environmental aspect in all phases of the projects.
- The need to reduce energy consumption in all cases and stages of projects.
- Represent existing buildings side toughest in sustainable design where it lies in transforming and re-built to suit the design considerations of sustainability.
- Re environmentally project design does not affect the formation of the building negatively, but makes it the best in the performance of his job.
- Economic return that is provided to convert the building into a sustainable be more economical than the survival of the building as it is.

4. Recommendation

From the above recommends a range of considerations during the re-design of existing buildings to be converted from ¬an ordinary building to building a sustainable:

- The need to reduce energy consumption in existing buildings
- The need to achieve thermal and optical comfort factors and appropriate guidance in existing buildings.
- Support integration of sustainability elements in buildings such as solar cells and modules and piping energy and facades cultivated and other support elements of sustainability in buildings
- The need to update the list of supporting sustainability in buildings and integrating all that is suitable for buildings per environmental, social, economic, and functional arts and construction factors, as well as elements of technology available.

5. References

1. LEED — USGBC. (n.d.). Retrieved from https://new.usgbc.org/leed
2. Kats, G. (2003). *Green building costs and financial benefits*. Boston: Massachusetts Technology Collaborative.
3. Woolley, T. (2008). *Natural building: A guide to materials and techniques*. Ramsbury: Crowood Press.
4. Bauer, M., Schwarz, M., & Mosle, P. (2010). *Green building: Guidebook for sustainable architecture*. Heidelberg: Springer.
5. Breeam. (n.d.). Retrieved from http://www.breeam.org/
6. Housing Standards Review. (n.d.). Retrieved from http://www.bre.co.uk
7. *How to obtain a BREEAM Rating (BREEAM UK)*[PDF]. (n.d.). Breeam.
8. LEED is green building. (n.d.). Retrieved from https://new.usgbc.org
9. Building Design Construction Guide. (n.d.). Retrieved from https://www.usgbc.org
10. German Sustainable Building Council (DGNB). (n.d.). Retrieved from https://www.dgnb.de

11. The DGNB System: Global Benchmark for Sustainability. (n.d.). Retrieved from https://www.dgnb-system.de

12. German Sustainable Building Council (DGNB) General Terms [PDF]. (n.d.). DGNB.

13. Suez Canal University. (n.d.). Retrieved from http://www.sourwebsite.com/www.scuegypt.edu.eg

14. Kats, G. (2006, October 1). *Greening America's Schools: Costs and Benefits*[PDF]. Capital E.

15. *LEED v4 for BUILDING DESIGN AND CONSTRUCTION*[PDF]. (2016, April 5). LEED.