Bridging the gap between sustainable architecture design principles and elements defining art of sustainability

Ayman A. Farid¹, Weaam M. Zaghloul², Khaled M. Dewidar³

1. Teaching assistant at the Architecture Department, faculty of Engineering, Ain Shams University, Cairo, Egypt
2. Teaching assistant at the Institute of Environmental studies and Research- Environmental Engineering Sciences department, Ain Shams University, Cairo, Egypt
3. Professor of Architecture and Vice Dean for Teaching and Learning. British University, Egypt.

Abstract: In 2004, Jason F. McLennan in his remarkable book The Philosophy of Sustainable Design stated that "Sustainable design is the philosophy that simply asks, what is the most we can do on a given project to enhance the quality of the built environment" or in his other statement "Sustainable design is a design philosophy that seeks to maximize the quality of the built environment, while minimizing or eliminating negative impact to the natural environment". Such philosophy is a simple translation to "Sustainable Design" in terms of "Sustainable Development". In 2013 in SudBE international conference held in Chongqing, China; our research team coined the term "Art of Sustainability" as the key element for sustainable design development. It is a term linking the concept of sustainable development to sustainable design principles. The aim of this research work is to establish a new model that link the six major sustainable design principles (The respect for: 1- The wisdom of natural systems, 2- The human vitality principle, 3- The ecosystem principle, 4- Cycle of Life 5- Energy and Natural resources, 6- And finally the Process – Holistic Thinking Principle) To the elements defining the art of sustainability which are: (1- The meaning of space, 2- The innovative structures, 3- The innovation in construction and building material, and 4- the contextual and cultural values). In the field of architecture design, such model can define the state of paradigm shift in sustainable design in architecture, where sustainable design seeks better building performance in terms of sustainability while art of sustainable design model would seek better sustainable design performance, which means a step forward toward more sustainable practice.

Key words: Sustainable design - Sustainable performance - Sustainable value - Art of sustainable design

1 Introduction

The middle of the twentieth century represents the start for modern movement toward sustainability as a philosophy. Many of thoughtful individuals recognized that there is a serious threat to the global finite resources on earth represented in the massive consumption of resources and environmental degradation. [1] In 1965 Kenneth Bounding wrote "Earth space ship" where he stated that man should treat earth's resources just like when people are in spaceship. [2] They have to manage their resources carefully in order to survive. Two remarkable writings had the greatest effect on the movement toward sustainability, the "Zero Growth Formula" in 1970 and "Limits to Growth" in 1972. Both pointed on the philosophy of limits and growth; in another meaning, needs and resources. Such warnings showed that our life style and practice in all means should change, or otherwise we are in a real danger.

The "World Commission on Environment and Development" was established in 1983 to unit countries to pursue sustainable development together; In 1987 Gro Harlem Brundtland - as a head of the commission - was able to produce the remarked Brundtland report "Our Common Future". Through this report the term
Sustainable development was defined as follow:

"Sustainable development is the development that meets the needs of the present without compromising the ability of the future generations to meet their own needs"[3]

Many Philosophers, writers and scientists criticized the definition of sustainable development. For example, Prof. Albert A. Bartlett in 2012 stated that the definition for sustainable development has both virtue, and vagueness. [4] He and others argued that the term definition is not quite clear and does not give any hints or definitions to the meaning of needs for future generation in addition to neglecting the population growth problem. So it can be considered as general and unclear [5].

However, the ultimate goal of sustainability is to ensure that actions and decisions that people take in the present will not affect in a negative way the life of the future generations. As a result, design - as an action taken by designers in order to create innovative products - should be a sustainable responsible one. [6] Such design is known as sustainable design. According to Jason F. McLennan Sustainable design as a philosophy means a design that can maximize the quality of the built environment and minimize or eliminate negative impact to the natural environment [6].

Architecture work represents one of most significant elements defining the built environment. Architectural buildings define cities, culture and the built environment context. Through skillful sustainable design, people can reduce the impact of buildings on natural environment. As a philosophy, sustainable design seeks the best solution that can balance the environmental concerns with comfort aesthetics, cost, and social aspects. [6]

As a movement, sustainable design is in its adolescence one. Its philosophy and principles are being understood, defined and refined. It is still in its First Paradigm. Based on John Stuart Mill philosophy for great movements three stages (ridicule, discussion, adaptation) [7]. Sustainable design movement can be considered in its early transition phase between discussion and adaptation. [6]

Sustainable design as a process is respectful inclusive one if compared to other processes of thinking. In architecture, sustainable design building's parameters encompass sets of complex criteria’s. It requires a holistic perspective that assures a thoughtful integration of different disciplines. [8] The role of the architect - as a team leader - is central [9] as he is responsible for guiding the whole team for achieving best possible solutions. Generally architecture design represents the cooperation between art and science. Art seeks the uniqueness of aesthetic values, while science is rationality seeks the general. So architect in another way is responsible for the co-operation between the rational thinking and the aesthetic values. [10] [11]

Sustainable design is the action taken in order to design sustainably, while art of sustainable design is the action taken by architect in a process of holistic thinking to manage the whole process. Sustainable design seeks the enhancement of building's sustainable performance; while Art of Sustainable Design seeks the enhancement of the process of sustainable design itself. That means a shift for sustainable design movement itself to another paradigm See fig1&2 [12].

This research represents the link between the six sustainable design principles introduced by Jason F. McLennan and Art of sustainable design elements and principles proposed by our research team. Through the research the holistic thinking principles can be translated into process of holism defined in terms of Art of Sustainability. This would be through a model that links both together. Through this process, the architect can understand the nature of his role as being central among different disciplines. In addition it defines how the movement of sustainable design can be shifted to another paradigm through certain actions.
2 The research hypothesis

The research proposes that in sustainable design, as a holistic approach, the nature of the architect roles - as a central one among different disciplines - can be defined through linking sustainable design principles to the Art of Sustainability. As mentioned before, Art of Sustainable design is a complete process of holistic thinking that is recognized as a generative one. Through defining a model that bridges the gap between Art of sustainable design and sustainable design principles. The role of the architect can be interpreted, understood, and defined. This will help in better enhancement for the sustainable design process itself. In another meaning, a shifting toward a more sustainable built environment.

3 The research problem

The research problem is how to link both Sustainable Architecture Design Principles to Art of Sustainable Design elements and process. Is there a model that can define the process of holism? And what would be the components of such model?

4 The research objectives

The research main objective is to introduce, study, and interpret the mutual relation between Sustainable Architecture Design Principles to Art of Sustainable Design through the creation of a generative model that defines the elements and the process of holism.

5 The research method and design

The research is a non-experimental one as it seeks to define a philosophical meaning for a process. So it is an interpretive, explanatory and descriptive one. It interprets the mutual relationship between both variables sustainable architecture design principles and Art of sustainable design through a model that describes and defines their mutual relationship. Such model is explained through its component inspired from both principles and elements of the process of holism.

1. Research variables

- Sustainable architecture design principles: the six major principles introduced by Jason F.
Mclennan which are: (The respect for: 1- The wisdom of natural systems. 2- The human vitality principle. 3- The ecosystem principle. 4- Cycle of Life 5- Energy and Natural resources. 6- finally the Process – Holistic Thinking Principle.)

- Art of sustainable design: Art of Sustainable design is a generative process. It is defined in terms of innovation, and it seeks a shift for sustainable design movement. In another meaning, it is the art of the choice for techniques and technologies to sustainably design innovative architecture form the state of revolution to evolution in terms of Aesthetics and Rationality co-existence.

II. Data gathering method

The data gathering method is based on skilful Archival data analyses and collection. The aim of the analysis is to interpret and to find the links between different principles and philosophies of architecture sustainable design and Art of sustainability.

6 The six governing principles of sustainable design

Sustainable design is a component of sustainable philosophy, so it has to undergo the basic conceptual principles of sustainable philosophy. In 2004, Jason F. McLennan introduced six major principles that overlap in a way or another with principles of sustainability. Those principles were published in his important book "Philosophy of Sustainable Design". The Principles are as follow:

1. The Respect for the Wisdom of Natural Systems - the Bio-mimicry principle: This principle can be described as "re-emerging" for people practice and behavior in design before the industrial age. Where, nature was treated as a mentor and model. [6] Pedersen Zari divided bio-mimicry levels of design into three levels (Organism Level - Behavior Level - Ecosystem Level) [13]. On the other hand, Franco Lodato classified types of mimicking nature into five basic categories, the classification was based on how nature is being mimicked. It can be Total, partial, functional, abstraction or inspirational type of mimicry. [14]

2. The Respect for People - The human vitality principle: This principle represents a respect for people's unique needs. It means honoring the diversity found in individuals. This can be achieved by giving control back to people for their environments and personal comfort. [6]

3. The Respect for Place - The ecosystem principle: This principle seeks a responsible long-term planned design that respects the concept of regionalism. In addition, it respects all aspects of place (geographical aspects - land value - culture of place). [6]

4. Respect for the Cycle of Life – The “Seven Generations” principle: This principle deals with the fact that we - as a mankind - are just a part of a greater cycle in which we are playing a role that can disturb its balance. Everything human creates will have a sort of impact on the cycle of life balance. So it means to create things that have a life expectancy fitting with the needed time for its usage. Also it assure on the product safety. For architecture, it is about the safety of the buildings in all means. [6]

5. Respect for Energy and Natural Resources – The Conservation Principle: This principle focuses on both energy and natural resources as two complimentary elements. It assures that energy is precious which means that it should be used wisely and with responsibility. Technologies should maintain the little use for natural resources as much as possible. [6]

6. Respect for Process – The Holistic Thinking Principle: means change, and to change a result, the process by which such result was produced should be first changed. The change will take place
in behavior, practice and response to problems. This principle is classified into sub-principles as follow: [6]

- A commitment to Collaboration and interdisciplinary communication
- A commitment to holistic thinking
- A commitment to Life-long learning and continual improvement
- A commitment to Challenging rules of thumb
- A commitment to Allowing for time to make good decisions
- A commitment to Rewarding innovation

As a new interpretation to the principles, the research has integrated such principles in process called "The Process of Holism" based on the Holistic thinking Principle and sub-Principles

7 Architect's role in sustainable design

As mentioned before, the architect's role is central in building's design process. He is the one responsible for managing all design team of different disciplines. In sustainable design, the commitment to collaboration and interdisciplinary communication assures that architects with the help of engineers, builders and developers, all together should learn how to increase their communication and to improve the integration between different disciplines [9] [12]. See fig 3.

8 The Nature of the Art of Sustainable design (AST)

Art of sustainable design is a generative process defined in terms of Innovation and responsibility. It is the technique for the use of technology in innovative designs. As mentioned before it seeks the enhancement of sustainable design process and responsible for its shift. Art of sustainable design in architecture - as having Art, sustainability and design as elements defining its dimension - classifies the architecture design according to the level and scale of innovation as follow See fig 4:

1. **Evolutionary Innovative design**: It is the dynamic continual development in concepts and ideas. It is characterized by being defined within the same paradigm of the sustainable movement

2. **Revolutionary Innovative design**: It is a discontinuous disruptive one. It is characterized by being the initial outcome defining a new paradigm for the sustainable movement

Both types of Innovation are defined within the hill-climbing paradigm as two complimentary types of innovation where the first is an in criminal one while the other is radical.

![Figure 3](image1.png)

*Figure 3* The role of architect is central in sustainable design process

![Figure 4](image2.png)

*Figure 4* Art of sustainable Design Nature based on the hill-climbing paradigm

Ref: By the researcher
9 Art of sustainable design process in architecture

AST It is a continual generative process based on holistic thinking it is defined on tow scales as follow:

1. The scale of the elements defining the process of holism
2. The scale of the elements defining dimensions of the design

9.1 Elements defining the process of holism

Through the interpretation of principles of sustainable oriented design, the research has established a model to explain the process of "holism". Through this model, the interaction of different principles is defined.

The process of holism is defined in terms of Eco-system Balance through the respect for four elements as follow:

1. **Nature** (Taking nature as a mentor and model)
2. **Human** (Design with respect for Human- design by people for people)
3. **Place** (Design with respect for place)
4. **Energy and Resources** (Design with respect for Energy and natural resources)
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9.2 Elements defining the dimension of design

As mentioned before, in SudBE2013 International conference held in Chongqing, China, our research team coined the term "Art of Sustainability" as the key element for sustainable design development. It introduced dimensions defining art of sustainability as four elements. Those four elements represent a translation of the process of "Holism" from the theory into actions represented in terms of architectural work as follow [12]:

1. The innovation in the meaning of space
2. The innovation in structure concept
3. The innovation in construction and building materials
4. The contextual and cultural values

10 The integration between the processes of holism and elements defining the dimension of AST

The figure below shows the integration between the elements and the process of Art of Sustainable Design "The Process of Holism". The main diagram is divided into sub-diagrams. Each explains one of the process components in details, where each component is described through different sets of variables. The variables defining each component are driven from the six principles defining sustainable design in addition to different principles for architecture sustainable, green and ecological design. At the same time it represents a new contribution to different rating systems for sustainable architecture design like USGBC LEED Green Building Rating system. Five elements are (Sustainable Site - Water Conservation and Quality Energy and Environment - Indoor Environmental Quality and Conservation of Materials and Resources). It is recommended to study in detail each component through further research. 1151

Figure 5 The ASD as a process of Holism

The diagram shown above represents an interactive model for the process of Art of Sustainable Design "The Process of Holism". The main diagram is divided into sub-diagrams. Each explains one of the process components in details, where each component is described through different sets of variables. The variables defining each component are driven from the six principles defining sustainable design in addition to different principles for architecture sustainable, green and ecological design. At the same time it represents a new contribution to different rating systems for sustainable architecture design like USGBC LEED Green Building Rating system. Five elements are (Sustainable Site - Water Conservation and Quality Energy and Environment - Indoor Environmental Quality and Conservation of Materials and Resources). It is recommended to study in detail each component through further research. 1151

Ref.:
The model is developed by the researcher
11 Results and discussion

Art of sustainable design as a process of holism is a generative process that seeks to enhance architecture sustainable design process. It is recommended to do further studies in details for each component defining the process through future researches.

12 Conclusions

Art of sustainable design is defined through the process of holism which encompass both revolutionary and evolutionary sorts of innovation. Through this process architecture sustainable design principles are transformed from the phase of theory into actions through the respect of its components (Nature-human-place-energy and natural resources) with regard to the eco-system balance and life cycle. The elements of art of sustainable design are those which can reflect the components of the process into actions represented in the innovation of space, structure, construction and building materials then design with the respect to the surrounding context from the degree of space to the degree of place.

References


Figure 6 The integration between ASD elements and process

Ref.: The model is developed by the researcher