IMPACT OF THE ORGANIC NATURAL FORM ON THE SUSTAINABILITY OF THE HIGH-RISE BUILDING

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ABSTRACT

The nature is one of the most important sources of inspiration for those who study, analyse and imitated by meditating the architectural forms with substance of the colors, formations and mechanisms of their components and elements. Designers inspired symbols and elements of nature are mostly regulated their design by those elements in the light of what is owned by nature. The various forms features, diversity, balance, adaptation and analogy. The designers involve finding design solutions by mimicking nature through imitation of forms in nature, functions and environmental systems which are learning from the genius balanced and aesthetic. The nature of the systems, materials and processes, structures, are the best way to inspire solutions to reach sustainability desired and more effectively. Literature review mentions the role of nature form Biomimicry strategy in generating sustainable form, and its applications in the design of high-rise buildings to make it sustainable. In addition, these characteristic effects on the building efficiency, provide comfort to its users. therefore the research objective is how the natural form achieve to sustainability in high-rise building, the methodolgy is qulititive by using the stratagy of investigation through use the method of observation by selection of two organic form projects, the first one is (Al-Bahar tower) in Abu-Dhabi, and the second is (Cactus building) in Dhoha.

Keywords: Natural Biomimicry, Sustainable Form Design, Organic Form, High Rise Building.

INTRODUCTION

The idea of sustainability in early seventies, appeared where multiple terms of sustainable design, green design, environmental design, eco-design, involving all of these terms are to take into consideration in the building design influence from the natural environment (Majed, 2000). Sustainability means the integration of natural systems to fit with human comforts of giving continuity and uniqueness of the place-making (Tom, Bashir, 2005). Sustainability also refers to the exploitation of natural resources in a way which does not reduce the usefulness of renewable energy

to the future generations, to provide expendable natural resources as cooling, water and living organisms (Wrid, 1992). Sustainability includes the potential generated by itself and use the resources somehow to lead to resource consumption or depleting resources, as they represent a reasonable investment for the nature and placed in the potential position (Paehlke, 2001).

SUSTAINABILITY STRATEGIES

Sustainability study is searching the elements of the ecosystem, as it focuses the concept of sustainability in relations to on elements, which combines natural and human environments between sustainability and culture, with five strategies as follows (Paola Sassi, 2006):

2-1 Biomimicry in design.
2-2 diversity in design processes.
2-3 to maintain the totalitarian point of view.
2-4 The use of self-organization in the self- adaptation operations.
2-5 thinking within the local scale.

STRATEGY BIOMIMICRY OF NATURE

It means the concept of imitation in general build and re-installation, as based on the appearance and the essence in order to create a product of a good architecture. It also means re-installing and building the form of the original source for the production of creative works and authentic (Tuncbas, 2006).

Nature biomimicry strategy consists of several methods based on natural forms and concepts and principles that formed, and structural systems which they are located, and designers deal with nature in different ways are starting from the systems to the future trends of ecosystems and methods of self- adaptation (Ken, 1995). Nature biomimicry can be defined, that the human deal with nature in various ways are starting from the systems to the future Trends ecosystems and methods of self- adaptation, with regard to nature as a source of metaphor, and the exploitation of all Sources of solar and wind energy materials and metals.

FORM

Form comes multiple formats including shape, image, style and structure, so the form is a heterogeneous structure in which the number of elements perceived is linked by the suitable

relationships for realizing personal characteristics of the mind that produced, And those relationships are the (construction and composition, arranging and organization) (DK Ching, 2014).

All definitions included which dealt form two main sides essence and appearance, has explained the proposals of Aristotle in the fact that the first side (form is material thing) down to the proposals in Aosowski (that form is only the material).

Pointed each of (Schulz and Klein and Bearsle and Beecher) to that form is the phenomenon of sensory system of relations between the parts of the lines, surfaces and colors.

FORMS AND NATURE

Include forms of living and non-living nature, natural scientists have noted that Form influenced by the development of a continuous dynamic operation, because the organism cannot live alone, it is within the environment it affects and affected by it (L Mcharg, 1965).

Forms Living Nature

Include all of the forms that are an organic nature as forms of plants and animals, where Albiologin defines as organic form The interact outcome of the internal and external forces and when the impact forces up to a state of balance, form is integrated and Internal and external contradictions in the case of balance (Whyte, 1968).

Form with Plant Design Concept

(Whyte) showed that what distinguishes organic forms is a growing phenomenon. The appearance of the form of the plant expresses the state of balance between the total constituent powers (Whyte, 1968).

One of the important factors to adapt the plant to the environment as well as the growth factor is a clear Independence of the constituent parts of the plant, Where that part of the plant may not affect the deduction, it also cut some parts the ability to grow to become like plant Original.

Form with Animal Design Concept

Form in an animal is more complicated than in the plant, animal form cannot be traced back to the primitive pattern specified. The form of the animal can be classified into three main of the concepts are, disappearances and denies and appearances (Whyte, 1968). These three aspects represent the relationship between the form of an animal and the environment.

The relationship of the form by the animal takes two levels:

First: in parts (form in the same animal).

Second: In whole (form in animal and the environment).

Form with Non-Living Nature's Concept

Formations forms of non-living nature and Constitute a rich source of thinkers and designers throughout the ages, where reveal the richness and beauty of the forms non-living compound in the mechanism of the same nature. It is also there forms ice crystals and the amazing diversity in their patterns, all based on the hexagon, where, according to a study (W.A.Bently) entitled (Snow Crystals) to multiple types of floc snow. And often inspired, designers' ideas of floc snow index (Arslan, 2014). As well as looking at the forms of the mountains or the desert sands, the Form in the top be small loads and be a small horizontal section, and at the bottom, where large loads have a large horizontal section, then be meted forces in all parts of the Form balanced, equivalent the form of a pyramid.

TOWARDS SUSTAINABLE ARCHITECTURE

To make Nature is the road that follows the production of architecture interact with it, there are five important strategies must be taken into consideration are: (Edwards, 2001 and Ken, 1995).

Learning Form Nature

Nature has models and internal systems can be used in the design of buildings and that's what put (LAN Mc Harg) in his book of the same name (Learning from Nature), which was released a year (1970), where the environmental design is an attempt to put these systems within the balances of linear functional used and which is required in the design. The way in which interconnect to the life cycle allows the buildings to take natural systems property, Learning from Nature works to encourage interaction between

Resource such as energy, water and materials used in the structure or waste such as pollution and the resulting posed building abroad (Van der Ryn, Calthorpe, 2008 and Edwards, 2001).

Natural Models

All the structures used in buildings, taken from nature have been subject to experiment, where the forms and constructions and formations and used materials in the nature are continuous and endless (Edwards, 2001).

The adoption of nature morphology as a formal model enriches the design process, Nature is not only an environmental system, but rather as a system inspired as a formality at the level of compositions or configurations or materials, All those possibilities enduring and sustainable in nature. Tower building for architect Foster is a biological clear example and Sainsbury center building is Image reflect crustaceans, fish and trees that architect metaphor freely and directly. The chameleon building that was an example of the hidden architecture that changes its skin, which follow the light and environmental conditions.

Pointed Kaplicky That use nature as a model of formation may take the structure of the elements of nature, Ant nests built two layers of crust for ventilation, Natural structures have lightness and agility not found in the manufacturer's facilities, Cobwebs stronger than the iron rods are lighter in weight but more power.

The use of natural models by imitation forms and configurations and patterns in high-rise buildings are working on the sustainability of the building as these natural forms its integration with the surrounding environment, the most important characteristics of these forms:

1- Curved and concave forms to resist loads.

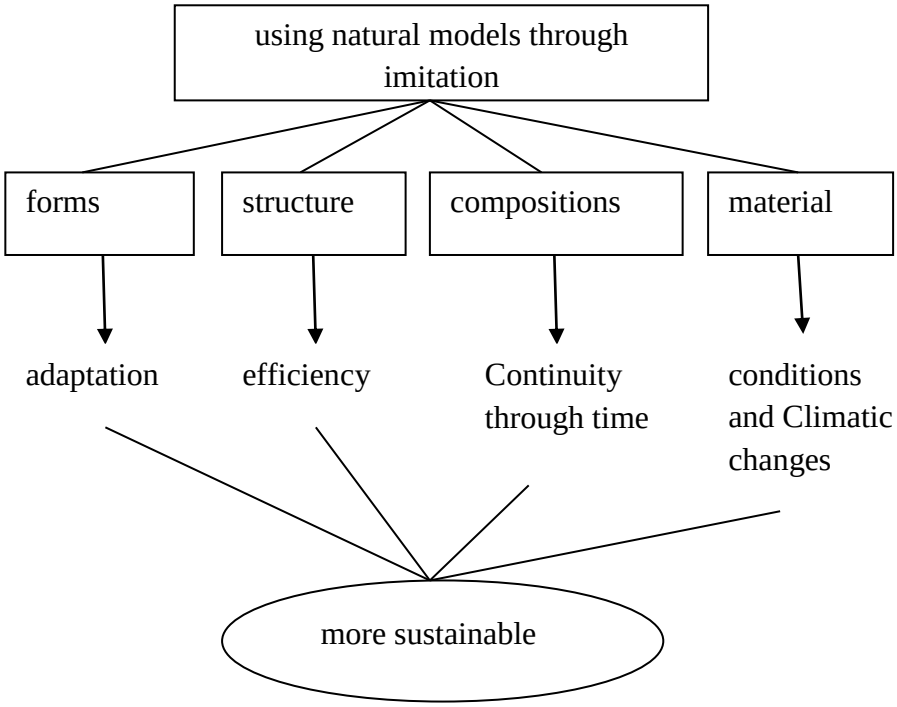
2-Metaphor natural formations as anthill.

3-Metaphor Cones and cylindrical and spherical forms to consistency with high stability.

4- Metaphor forms of living organisms as the Butterfly and cactus to achieve high-performing.

5- Metaphor dynamic forms and aerodynamics to achieve self-adaptable and reducing the impact of the wind as sea waves.

It is clear that the architecture is generally treated with nature as formation model took multiple pictures adopted of the exterior morphology or structure of the elements of nature or natural raw materials directly.



Expression of Form with Nature

In this strategy an architect brings the nature to the vision field, whether at inside or outside, or directly in used Structure, where the nature is the source of audio and visual comfort.

Pointed Richard Rogers repeatedly to paragraph (Making Nature Explicit) in all projects designed by and also in the planning of the city, he used frequently plants as a layer during modified environmental business and it was cooling, through energy conservation (Van der Ryn, Calthorpe, 2008 and Edwards, 2001).

Using Nature's Model

The all environmental evaluation systems have an ecological base (environmental) so, because of the regional warming pressure has become the subject of energy is dominant in this direction. The buildings were treated as a home, depending on this trend by both Building Research Establishment & Assessment Method. And that everything, whether water, or material or energy resource, which is the measured value depending on the rarity or the effects of the damage resulting from it (Ken, 1995 and Edwards, 2001).

CONCLUSIONS

The study shows that biomimicry design represents the concept of creating a unified design solutions and the link between the natures and human, where is the nature rich by forms and system and components and resources that could be used in architecture. Also, the shapes found in nature, and its structural system has proven efficiency by thousands of the years to the face and withstand the surrounding environmental conditions and resistance to the loads they are similar in the structural system with a difference in form.

The advantage of the harmony shown by the organic natural structures like the (Al-bahar), resulting from the integration of form with structural function can be employed in the forms and structures of high-rise building.

The form of the tower was optimized to complement the shading system. The design began with two simple cylinder, the circular plan giving the most efficient shape, the circular form helps to reduce solar exposure, and began to generate a natural orientation.

The use of natural organic forms mimic living organisms in high-rise buildings like (Cactus building) give solutions or special features adapted to the environment and effective in resisting the surrounding circumstances design, these forms curved, concave, cylindrical and spherical and dynamic whole gives more flexibility and self-adaptation and a resistance loads as well as the persistence and stability offered for high-rise buildings. In addition to that the skin of one of the hardiest plants of the desert is applied to the design of the facade of a desert building with hundreds of smart shades that open and close depending on the strength of the sun.

The Biomimicry design is one of the fundamentals of sustainability by integration between the shapes and structural systems to create a highly efficient building and to achieve a more comfortable indoor environment for users of these buildings.

DECLARATION

An earlier version of this paper was blind reviewed by two referees and presented in the **3rd ICABE** Conference held in Kuala Lumpur, Malaysia, 5-6 October, 2016.

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