

Rereading Contemporary Architecture: Sustainability Approach

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ABSTRACT:

This paper claims that there are three major factors in forming architecture and every one of them had influenced a specific architecture movement. These three major factors are Naturalism, Mechanism and Expressionism, these factors have been formed from advanced scientific theories and philosophy. To achieve the research goals, it tracked contemporary architecture through the 20th century till now through inductive historical study to explore the impact of these three factors in shaping and forming architecture and to categorize these movements due to the impact of these factors, trying to prove its hypothesis. This hypothesis is being proved by analyzing these movements and identifying the distinguish features of each one of them to identify which factor was the contributing factor in shaping and forming a specific architecture movement. Finally, the study concludes that all architecture movements could be categorized under three major labels which are Naturalism, Mechanism and Expressionism. Additionally, these three factors are combined in shaping and forming sustainable architecture, which mean that sustainable architecture is the climax of this combination.

Keywords:

metaphysics; deconstruction; symbols; icons

1. INTRODUCTION

Architecture movements and styles have been changed through years for multiple reasons and due to various factors. The main objective of this research is to explore the reasons that shaped architecture styles, through studying and analyzing previous architecture styles. It is truly obvious that the physical factors are not the only limitations that govern forming architecture but there are different other factors. Therefore, the major idea of this thesis is trying to prove that new scientific theories, change in thoughts and philosophy is influential in shaping architecture, which moves and progresses in parallel paths with science and changing ideals. Additionally, this paper will track the comprehensive changes in architecture to explore and categorize architecture movements through a specific time period starting from the end of the 19th century until now.

This paper will try to analyze the architecture movements showed up in this period to identify the major ideas and philosophy creating these trends, and the research will try also to define the distinguish features of each movement, besides identifying the relationship between architecture movements and the development in scientific and philosophical theories. Through the study the research will explore the major scientific and philosophical theories left its influences on architecture to categorize architectural movements due to change and progress in scientific and intellectual theories.

2. METHODOLOGY

This paper aims to prove its hypothesis through historical study to categorize architecture movements under the three major labels “Naturalism, Mechanism and Expressionism”. The study tries to explore their stimulators and progress due to the design processes, materials, motifs, and basic ordering principles. Movements could be categorized into these various classes regarding to the characteristics they share, so that a comparison can be easily made. Since different styles may share some characteristics, the labels may overlap, and the movement could even be classified into more than one category.

To achieve our goals, the research will identify:

- Different architectural styles.
- Characteristics that distinguish different styles.
- Examples of architects who are associated with each style.
- Examples of different works associated with each style.
- Contributing factors in developing each style.
- The connection between changes in theories and their corresponding changes in architecture.

3. DISCUSSION

At the end of the 19th century and the beginning of the twentieth there were revolutionary theories in science which was dominating all aspects of life. Architecture sequentially was influenced with that scientific revolution which have deviated architecture from classical styles to modern era. The extensive biological research and the evolution of biological science were the contributing factors in the domination of one of these philosophies which are called “Naturalism” (Burckhardt. 2003).

1.1 *Naturalism*

Naturalism is the intellectual tenet that is adopted by the entire universe because of natural reasons, while supernatural or metaphysical demonstrations are not considered. Naturalism is a proponent for affirming that physical laws are the rules that govern the structure and attitude of the universe (Kurtz. 1990). Extensive biological research and the evolution of biological sciences in the end of the 19th century were the contributing factors to the domination of naturalism. The world's first publication about the evolution theory was written by Lamarck. He disagrees with Buffon's theory by stating that the environmental changes cause evolution. In the same year Goethe brings up the term 'morphology', he applies his ideas and theories on art, architecture, active dynamic shaping in all living organisms. Darwinism is one of the most influential theories that shapes the world view. It states that all species of organisms have evolved through natural selection (Coyne. 2009). The Darwinian Theory included the broad concept of evolution and gained general scientific acceptance after Darwin published “On the Origin of Species” in 1859. The evolution theory and modern biological research are the major contributing factors that have deviated architecture from classic to modern, through aspiring to become attached to nature and its forms as well as adapting to it. In the 20th century, naturalism has had a great impact on architecture. It is the stimulator of organic, green, sustainable, and ecological architecture.

Naturalism played a big role in forming and shaping architecture. Architecture has impacted by the Naturalism paradigm that left its impact on its philosophies, ideas and features creating a distinguish architecture movements through three specific phases. The first phase includes the period from 1900 to 1920, that is characterized by inspiring the architectural features from the living organisms like shape, structure and form (Steele.2001). In addition, the use of natural materials that linked the building to the site and surrounding environment and give it a sense of organic consistency and harmony with the surroundings (Harmony with Nature) (Pearson. 2009). We can distinguish these features in the works of Louis Sullivan, Antonio Gaudi and Frank Lloyd Wright Fig1,2,3.



Fig.1- Robie house, Illinois Chicago, USA. frank Lloyd Wright. 1909
<http://jameswoodward.wordpress.com/2008/07/03/frank-lloyd-wright/>



Fig.2- Taliesin west, Scottsdale, Arizona, USA Frank Lloyd Wright 1937
<http://www.flickr.com/photos/sminor/316889177/in/photostream/>



Fig.3- Casa Mila, Barcelona, Spain. Antonio Gaudi, 1910
<http://www.bluffton.edu/~sullivanm/spain/barcelona/gaudimila/whole.jpg>

The second phase includes the period from 1950-1970, so that architecture was influenced by the functional and structural concepts and attitude of the living organisms whether plants or animals. These concepts appeared very clear in the works of Frank Lloyd Wright and his organic theory Fig 5. In this period, architecture was influenced by the objective metaphor of the vital processes needed by the organism that provide vital energy to practice its activity and these ideas had appeared in work of Metabolism movement and others who were influenced by the natural ruling concept (Lipman. 1986).



Fig.4- Nakagin Capsule Tower, Tokyo, Japan. Kisho Kurokawa. 1972
<https://www.google.com/&biw=1034&bih=620#imerc=x6n5ucm9DgX4a>



Fig.5- Guggenheim Museum, New York, USA. frank Lloyd Wright. 1956
<https://www.google.com/search?q=Guggenheim+Museum,+New+York,+USA.+frank+Lloyd+Wright>

The third phase includes the period from 1980 till now. Under the planetary awareness of the negative effects of the global warming and environmental pollution and the problems that

ensued, the natural ruling concept developed and peaked at the end of the 20th century and the first decade of the 21st century. At this period architects created an environment-friendly architecture in order to compensate for the environmental corruption resulting from advanced technology, to create buildings that are friendly to the environment and “more-green” which can be adaptable to the surroundings. In addition, architects need to create energy efficient buildings, like green and sustainable buildings which are designed to minimize the overall negative effects (McGrath. 2013).

At this phase architects were not only inspired by the formal features of the living organism but they were also inspired by the behavior of it, focusing on plants and the way they interact with nature, using the latest technologies to provide the necessary energy for the building and to reduce the energy consumption rates. Metaphors were often limited to the outer envelope that corresponds to the natural environment. These metaphors led to the similarity of buildings with the familiar forms in nature or the universe at direct formal level. Architecture is formed objectively from the influences of natural phenomena including the flow of wind, water, earth energy and magnetic field. These metaphors have appeared in many of architects’ works who were influenced by the natural forms of plants, animals and natural elements of the universe in their designs, one of these examples is Tjibaou Cultural Centre, designed by Renzo Piano, 1998 Fig 6. These features also are shown clearly in the works of Santiago Calatrava, Richard Rogers, Renzo Piano, Nicholas Grimshaw and others.



Fig.6- Tjibaou Cultural Centre, New Caledonia. Renzo Piano 1998

<https://www.google.com/search?q=Tjibaou+Cultural+Centre,+New+Caledonia,+Renzo+Piano1998>



Fig.7- Chinatrust Commercial Bank, Taipei, Taiwan. Nbbj

<https://www.google.com/search?q=Chinatrust+Commercial+Bank,+Taipei,+Taiwan.+Nbbj+2012>

3.2. MECHANISM

Since the industrial revolution in the 19th century, architecture and art were associated with the mechanic world and became more attached to it. Machine became a higher example of the modern era, which caused an intellectual, social and economic revolution. The architecture and the machine have been associated with active discourse in attempt to connect architecture with

machine. The Marinetti's first manifesto of the Futurist movement in 1909 showed how the machine became a symbol for that era. The manifesto of Futurism announced the break from the past and the separation from its roots (Charles Coulston.1960).

Art and architecture tend to link to machines form and forces which were offered as inspiring symbols. For example, Bauhaus was influenced by machines and it has produced art and architecture. Dadaism previously produced absurd machines seeking to mock the science and industrial production, reflecting the contradiction of living life. Prior to that, Russian constructivism was associated with the world of materials, machinery and industry (Russell. 1954). The architects expressed their rejection of the idea of autonomous art through the machine and the materials properties to express their revolutionary philosophy.

The impact of the machine was also demonstrated by the progressing in construction technology and the expansion of iron use in architecture, steel structures, plastic cladding, aluminum and titanium structures and other automatically manufactured materials, which led to the emergence of high-tech architecture. High-tech architecture also benefited from the technological development in the process of industrialization and in the development of construction materials and finishing, which opened new distinctive ways of modern expression away from the traditional expressive features of architecture.

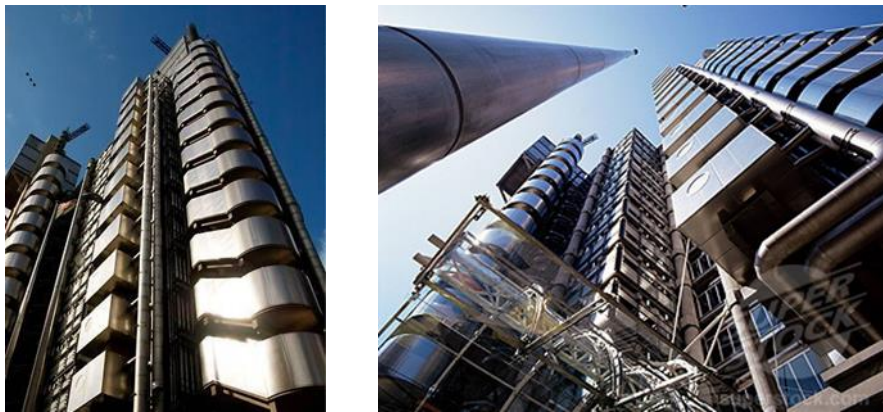


Fig.8- Lloyd's Bank, London, UK. Richard Rogers 1986
<http://www.flickr.com/photos/niktektionik/4090539130/>

High tech architecture has been characterized by the evolution of techniques, technical and structural factors as formal stimulators, and explicit use of structures as formal elements.

One of the earliest examples of high-tech architecture was George Pompidou Center, Paris, 1971-1977, designed by the architects Richard Rogers and Renzo Piano Fig.9, which influenced the public with its technological features and the huge external steel structure, it shows the elements of construction that keeps the viewer away from every familiar thing. The machine is not only the subject of artistic work, but the architectural work has become part of the machine to change the concept of art, architecture, construction and technology as a creative revolution reformulated the expressive features of architecture.



Fig.9- Pompidou Center, Paris, France. Richard Rogers and Renzo Piano 1971-1977
<http://blog.lib.umn.edu/kenne474/architecture>

In addition, the rapid progress that has been witnessed by the end of the twentieth century and the beginning of the twenty-first century in all fields, especially in building technology, new materials and smart technology that dealt with the building automatically away from the interference of humans. Advanced technologies aimed at conserving the environment and providing different techniques to reduce the energy consumption. There have also been some ideas that have linked the building to the machine for example using wind turbines or solar energy to provide the energy needs of buildings and increase their ability to capture or generate their own energy.



Fig.10- European Court, Strasbourg, France. Richard Rogers 1991-1994
<https://www.google.com/search?q=european+court,+strasbourg,+france.+richard+rogers+1991-1994&>



Fig.11- Antwerp Law Courts, Antwerp, Belgium. Richard Rogers 1998-2005
<https://www.google.com/search?q=Antwerp+Law+Courts,+Antwerp,+Belgium.+Richard+Rogers+1998-2005>

3.3. EXPRESSIONISM

Despite the impact of natural and mechanical influences on architecture at the beginning of the 20th century, architects did not abandon their imagination, cultures and metaphysical backgrounds, which produced expressive and visual features influenced by metaphors and philosophies that left their mark on architecture. In the early 20th century, some expressive

influences were manifested in the work of Frank Lloyd Wright Fig.10, which was influenced by the expressive features of the native architecture of North America and the Mayan civilization (Watkins. 1996). Expressive influences have also emerged in the inspiration of many architects of Roman architecture and the revival of historical models to express political ideologies such as socialism, fascism and Nazism.



Fig.12- Hollyhock House, Los Angeles, California, USA. Frank Lloyd Wright 1919-1921

<http://allanellenberger.com/tag/frank-lloyd-wright/>



Fig.13- La Sapienza university, Roma, Italy. Marcello Piacentini 1935-1937

<http://www.hotze.net/Roma/roma125.htm>



Fig.14- Haus der Kunst, Munich, Germany. Frank Paul Troost, 1937-1939

<https://www.google.com/search?q=Haus+der+Kunst,+Munich,+Germany.+frank+Paul+Troost>

The expressive influences appeared again in the post-modern architecture through the revivalism of the former civilizations' architecture, such as the Roman, Pharaonic, Chinese and other civilizations, to enrich the architectural work and link it through the historical and heritage influences. The concepts and content that have been accepted and welcomed throughout human history, which provide the individual and society with the symbols and meanings that have shaped their values, culture and conscience (Jencks.1986). The expressive influences also played a major role in the formation of architecture in deconstructivism that adopted reading of religious texts, heritage and philosophical contexts in a manner aimed at undermining the text, rebuilding it and expressing it through architecture, taking advantage of the spiritual and symbolic connotations of the heavenly books and various mythology in expressive and abstract formulation according to the intellectual and cultural differences and the creative abilities of the architects.



Fig.15- Humana Building, Louisville, Kentucky, USA. Michael Graves, 1984-1986

<http://www.flickr.com/photos/glenhsparky/4265409930/>



Fig.16- Piazza d'Italia, New Orleans, USA. Charles Moore, 1978

<http://www.flickr.com/photos/nicolar/385935112/>



Fig.17- AT&T Building, New York, USA. Philip Johnson, 1984

<http://www.juggle.com/philip-johnson>



Fig.18- Gehry Residence, Los Angeles, USA. Frank Gehry, 1991-1994

<https://www.google.com/search?q=Gehry+Residence,+Los+Angeles,+USA,+Frank+Gehry,+1991-1994&sxsrf=ALeKk016Os>



Despite the great technological progress, the dominance of the scientific connotation and the increase of global environmental awareness, architecture still has an expressive value which could create an emotional response. This expressive value emerged through objective and formalistic metaphors inspired from the natural environment and the Universe. Natural environmental metaphors are inspired from biological forms (human, animal, plant) and ecological forms (mountains, rocks, rivers, Sea, etc.).



Fig.19- Opera Tenerife, Santa Cruz de Tenerife, Spain. Santiago Calatrava, 2003

<https://www.google.com/search?q=Fig.17-+Opera+Tenerife,+Santa+Cruz+de+Tenerife,+Spain,+Santiago+Calatrava,>



4. CONCLUSIONS

The research, through the study traced and monitored the course of architecture in the 20th century till the beginnings of the 21st century. Architecture during this period has been influenced by three major philosophies. The research sees that they are the influential factors in

the formulation and formation of intellect and architecture. Across all stages of history, the architectural trends and movements cannot be identified outside the framework of these three conceptual visions, and each of them has produced specific intellectual visions and architectural features. Architectural trends and movements have been monitored and classified as follows: -

- **Naturalism**

[Art-Nouveau – Organic – Metabolism – Eco – sustainability]

- **Mechanism**

[Constructivism- Functionalism- Archigram- Hi-Tec - Smart Architecture-Sustainability]

- **Expressionism**

[Art-Nouveau- Organic- Brutalism- Postmodernism- Deconstructivism- Sustainability]

Through the study the research found that architecture is a common product of all naturalism, mechanism and expressionism influences. This has given an indication that architecture at this moment, with its multiplicity and diversity, is a direct product of the integration of these three influences, and each one of these influences became a part of the design process of architecture.

The architecture under these concepts has become a mixture of the three natural, mechanical and expressive intellectual influences, so that the distinctive intellectual features of any of them could be easily derived, and its impact in the formulation and formation of architectural output, as the expressive and visual features of the architectural output have become more connected and integrated with the ruling intellectual concepts that always emerge as a result of the process of evolution and transformation of scientific and philosophical visions and theories.

By reviewing the architecture movements in the period that was studied, the research found that sustainable architecture is a perfect combination of the three conceptual visions naturalism, mechanism and expressionism. In addition, the three conceptual visions have met in the expressive, plastic and functional features of sustainable architecture, they have been influenced by the natural conceptual vision in its conservation of physical resources and the formal and environmental harmony with the surrounding environment. In addition, architecture has been influenced by the three conceptual visions using the latest technologies to make use of it to provide the necessary energy for the building and to reduce the energy consumption rates. Sustainable buildings contain many mechanical fittings that contribute to control of environmental and climatic conditions inside and outside the building through technologies and automated control systems. Sustainable architecture also has been influenced by expressive conceptual vision through objective and formalistic metaphors of plants, animals and natural environmental elements such as mountains, rocks, water, etc...

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