

Technological and aesthetic development of modern building materials and its impact on designing organic architecture facades

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- Research Summary:

The global need for environmental sustainability has become a duty for designer and architect, more than just being a "design or desire" option. With the change of civilizations, cultures and a crisis in energy sources and building materials, the need for new types of building that achieve the principle of sustainability and harmony with the environment has increased. Consequently, many laboratories interested on searching for new building materials have high possibilities that take into account the environmental, economic and aesthetic dimension, as well as employing new construction techniques to make the most of it with less consumption in quantities. The organic direction in design is considered one of the architectural schools based on trying to draw inspiration from the construction mechanics present in the elements of nature, so that the design (architectural facades, horizontal planes, and sections) is completely harmonious with the lines of the elements of the natural environment that complements its harmony and balance to achieve the concept of sustainable development, which is intended to achieve compatibility among the design, color, and aesthetic homogeneity with the environment to reduce visual pollution, as well as not depleting natural resources to reduce the negative impact on the components of the environment by saving energy consumption and resource efficiency, taking into account the emergence of modern technology in design, and methods of employing raw materials.

- Based on massive development in building technology, and the accompanying emergence of new building materials, and thus the development of architectural formations, the importance of the decorated designer recognizing how to optimally use building materials according to their capabilities in achieving the organic formation of designing architectural facades in the light of environmental sustainability contexts as well as making use of meanings of suggestive, color effects, and different textures of these materials.

- Research problem:

- The problem of the research is to clarify perfect usage of building materials, especially with the development in their possibilities, which have added new design qualities that did not exist for the same materials in previous eras. Thus, the decorative designer is required to pay attention to study the interrelationship among organic formation, building materials and modern technology to take advantage of their participation to design and implement architectural facades.

- Research Aims:

- 1. Identify the structural and formative characteristics of each building material, as well as the extent of difference between each material in the possibility of achieving the organic formation.
- 2. Study the interrelationship between the technical development of building materials and the development of facades design trends.

- Research hypotheses:

- 1. The development of the design and implementation of the architectural facades came as a reflection of the technical development of building materials and accurate knowledge of their capabilities and good use, which led to an increase in their architectural, aesthetic and functional efficiency.
- 2. A thorough understanding of the properties of building materials by the designer and the architect makes the best use of their capabilities and ensures their proper employment utilization so that the design returns are appropriate to the career goal.
- 3. The technical development of building materials has led to the emergence of many modern architectural and design trends, which created new formative vocabulary, and allowed the implementation of design ideas that were difficult to achieve in the past
- 4. Studying the principles of designing the elements of nature is one of the most important means to reach principles that can be used to produce organic interfaces that merge and are compatible with the natural environment and enjoy structural and formative efficiency.

- Research themes:

- 1. Organic Design.
- 2. Technical development of building materials and their impact on the design of organic architectural facades;
 - - Natural materials
 - - Mixed Materials
 - - Fabricated Materials

- Research Methodology:

- The researcher will follow the descriptive and analytical approach.
- 1. Definition of Organic Design.
- 2. Technical development of building materials and their impact on the design of organic architectural facades; Natural materials
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Research Methodology:

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1. Definition of Organic Design.

2. Technical development of building materials and their impact on the design of organic architectural facades;

- Natural materials.



Using stones to implement an organic design



Using wood to carry out organic design

- Mixed Materials



Using clay to carry out an organic design



Using concrete to implement an organic design

- Fabricated Materials



Using Fabricated Materials to implement an organic design

Research Results:

1. To design a sustainable building, nature must be seen as a metaphor for making it a problem for the designer to reach the ideal state and to an environmentally reactive architecture by simulating the shapes, functions, and systems of environmental elements.
2. The process of selecting building materials has become a complex process, especially with the diversity of alternatives in a single material. To ensure the optimal selection and use of materials, the decorative and architectural designer must be aware of the characteristics of the chosen material
3. Each building material has achieved a clear imprint in the design of the facades of organic architecture according to its various characteristics, and the introduction of computer science in the design and implementation processes has helped the emergence of new organic formations that were difficult to obtain by traditional methods



4. The technological development and the entry of nanotechnology helped in the production of new materials characterized by architectural and plastic efficiency, and therefore employed in new ways and in a manner appropriate to the development of design thought.

Research Recommendations:

1. The necessity of informing the permanent ornate designer about the modern building materials and identifying their structural and environmental properties and capabilities for designing and implementing an architecture that takes into account all environmental aspects.
2. The necessity of being constantly acquainted with architectural ideas and trends through pioneering works and delving deeper into their study and adaptation to serve local architecture.
3. Attention to developing educational curricula and directing learners to invent designs taken from natural elements and employing building materials in unconventional ways to contribute to solving environmental and visual pollution problems.

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