

The Utility of Environmentally Friendly Architectural Design Techniques in Minimizing Adverse Effects on The Urban Scene

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Abstract—In recent years, environmental risks have increased worldwide, raising awareness to solve it. The construction and building sector consume many natural resources, including land, materials, water, and energy. Still, it also generates a lot of noise, pollution, and solid waste from its numerous and complicated processes. The issue of energy and water waste resulted in ecological problems and the structures' economic development due to its enduring nature during their operation. From this, new ideas and approaches to project design and execution that were unfamiliar before emerged in the developed industrialized nations., and the ideas of "sustainable design," "green architecture," and "sustainable building" all symbolize the growing interest in urban economic development issues related to environmental protection, energy conservation, making the best use of natural resources, and a greater reliance on renewable energy sources: Thus, among other goals, policies, and plans, the construction industry must act quickly to address environmental issues that have emerged in recent years. This industry has become increasingly important in the real world, demanding the adoption of "green architecture" and "environmentally friendly buildings" orientations more than ever in order to transform the country and promote development. and "environmentally friendly buildings" to turn the country's development around and fulfill its duties to save the environment, conserve natural resources, and advance economic growth. In order to derive indicators for the designer to limit negative impacts in the design and application of the perpetrator of the sample and extract results, this research intends to highlight the role of sustainable design in reducing impacts on the physical environment and afflicting the target.

Keywords: Sustainable Building, environmentally friendly, urban environment, green buildings, Urban Scene

INTRODUCTION:

The problem of this study is the lack of awareness regarding the role played by sustainable design strategies to reduce those impacts. Several studies have studied sustainability issues in architecture generally, but they did not investigate the important role played by these issues to minimize the impacts on the physical environment. In order to create a thorough theoretical framework for sustainability, sustainable design, and sustainability strategies, the research looked at some of the architectural literature that addressed the topic.

1-1 The concept of environmentally friendly In order to maintain sustainability without squandering the benefits of future generations, the best use of all available resources—

human, physical, or natural—must be made in an economical, balanced, and environmentally sustainable manner. This is the definition of being environmentally friendly. Meeting current demands without compromising the ability of future generations to satisfy their own needs has been addressed at the World Conference on Environment and Development. A few definitions regarding sustainability were agreed upon within the summit, including: Sustain: Support prolongs, maintains, or keeps order to maintain sustainability without squandering the benefits of future generations, the best use of all available resources—human, physical, or natural—must be made in an economical, balanced, and environmentally sustainable manner. This is the definition of being environmentally friendly. There was mention of it in the World(1)

According to the World Commission on Sustainable Development, sustainability is defined as development that satisfies present demands without compromising the ability of future generations to satisfy their own needs. This method was first presented in 1987. It is critical to acknowledge that the overall environmental system's resources and the quality of human existence must be enhanced.

The Organization for Economic Co-operation and Development (OECD) has established four sustainability goals: resource and energy efficiency, complementarity with the environment, compatibility with the environment, and curriculum organization (including environmental management) The terms "sustainable design," "green architecture," "sustainable construction," and "green building" refer to innovative approaches to design and construction that reflect the financial and environmental difficulties that have obscured many industries in this day and age. The new buildings' cutting-edge methods and technology in their design, construction, and operation help to minimize their negative effects on the environment while cutting expenses., (Running Costs), a great deal as they do in supplying a comfortable and safe urban setting. The reasons behind the urban sector's adoption of the idea of sustainability are similar to those that led to The environmental aspects of the notion of sustainable development are explained. social and economic problems.

Idea of architectural and strategic strategy.3-1

The general definition of a strategy is an overall plan to accomplish a task. It is described as the overarching foundation for design that makes architectural dreams a reality through technology and design. The goal is to create architectural

applications, but the architectural strategy helps designers create complete conceptual blueprints for the types of buildings, sites, and building features that they want to design. The components of the design strategy are Application, Content, Enforcement, Update, and Awareness. Models
There are six strategy :

1. Passive Sustainable Design. Passive strategies, such as considering sun orientation and climate when siting and being thoughtful about window placement and operation, are used to best manage daylighting and natural ventilation and go a long way in reducing energy requirements for the building. In certain climates, thermal mass techniques can be used to harness solar energy. In such cases, thick walls absorb heat from the sun during the day and release it into the building at night.

2. Active Sustainable Design. Architects consult with mechanical and electrical engineers to implement high-efficiency electrical, plumbing, HVAC, and other systems, which are designed to have small environmental footprints.

3. Renewable Energy Systems. Renewable energy systems, including those that harness solar and wind energy, are also great options for some buildings. These systems are often used in conjunction with passive design strategies.

4. Green Building Materials and Finishes. By making it a priority to purchase steel, lumber, concrete, and finishing materials, such as carpet and furnishings, from companies that use environmentally responsible manufacturing techniques or recycled materials, architects up the ante on sustainability.

5. Native Landscaping. Landscaping choices can make a big impact in civic building water consumption. By using trees, plants, and grasses that are native to the area, architects can greatly reduce irrigation needs. Landscaping can also be used as part of a passive energy strategy. By planting trees that shade the roof and windows during the hottest time of the day, solar heat gain inside the building can be reduced.

6. Storm water Management. When rain falls on an untouched site, the water that doesn't evaporate absorbs back into the ground, replenishing the natural water table. However, when a building is placed on the site, along with parking lots, sidewalks, access roads, and other hardscaping, rainfall behaves differently. The water runs off these surfaces and into storm drains. By implementing storm water management strategies, such as pervious pavement that helps to reduce runoff and retention ponds that capture runoff and slowly release water back into the ground, the negative environmental impact of buildings can be reduced.

4-1 sustainable urban design : The study of RFQ(Requester For architecture Qualifications) indicated that sustainable urban design is not a new style and style of building to represent a revolution in how to think about the design, construction and operation of buildings spontaneously. This study focused on the philosophy of sustainable design through coordination between open spaces and landscapes and the surrounding environment by:

- 1-Less energy consumption and provision of quality of natural and artificial lighting
- 2-Conservation of natural materials and resources and improvement of internal environmental quality.
- 3-Protection of internal and external water sources
- 4-The ultimate goal of sustainable design is to use the old buildings approach in the synthesis of modern technologies.

5-1 Review in Sustainability Architectural studies

Architectural studies indicate a close relationship between sustainability, architectural design and the urban environment, and the research will point out some Architectural propositions to illustrate this relationship:

5-1-1 (Yeang, 1995) study (The Ecological basis for architectural design)

The architect (Ken Yeang) believes that green or sustainable architecture must meet the needs of those present without ignoring the field of future generations to meet their needs as well, and the proposals of this architect to follow the approaches to achieve sustainable urbanization

First, simulate nature in design by learning from nature: nature is a pattern and a system that can be used in architecture

Second: Using Nature for Ecological Considerations

All ecosystems have a biological base because of the pressure generated by global heat (global warming)(3)

Thirdly: all items you work as designer (every species designer) Keep track of living organisms, all designs or shapes that meet their commitment to the organisms of the genetic system, which gives them their own pattern, giving the result the overall design of nature.

Fourth: the use of autonomous systems in self-cooling processes

The purpose of cooling is to create a more comfortable indoor environment achieved by reducing the intense heat and entering solar radiation through the outer shell and creating natural ventilation to achieve comfort through the techniques used.

5-1-2 Architectural Proposals (Abel, 1997) from his book Architecture & Identity

The designs of this architect represent a model of modern architecture compatible with nature based on the technological aspects to respond to the architectural form of nature and can be identified from existing buildings depending on the technical systems used.

Abel (1997) also pointed to the foundations of eco-based architecture in balancing natural and manufactured through technologies where a sustainable urban environment can be achieved using ecosystems and relying on smart buildings that can perform their own work without relying on the inhabitants. And heating and running elevators and others.

5-1-3 Foster Proposals from his book (NORMANFOSTER WORK), in 1999

These proposals pointed to the creation of an architecture in line with the spirit of the modern intellectual trends stemming from the use of self-systems in the architecture (Passive architecture), which uses the least energy in the process of building and sustaining the building during his life in the energy economy and the promise of using mechanical systems that consume pulsed energy and result in environmental pollutants. To create modern cities emanating from their place emulate the environment, the use of modern technological means, including the emergence of green architecture, which uses the least energy possible in the process of construction and sustainability of the building and operation, the building must make its own energy from renewable energies to solar energy. The structure has its flexibility to allow for a longer life, as achieved in the idea of the project of the German parliament building in Berlin (Fig. 1&2), in the restoration of the building, added by a dome

in the form of a glass dome, with a spiral passage through a conical structure, facades reflecting sunlight and spread inside the building, moreover, this is an environmentally friendly building, its energy-efficient universe

5-1-4 Proposals of Adam Ritchie, Randall Thomas 2009 from his book Sustainable Urban Design: An Environmental Approach(7)

The design of buildings is closely related to the surrounding environment of temperature, wind speed, air quality, noise levels, energy sources ... all of which help to communicate the design between building and urban design, and we can design an ecological building with environmental friendly specifications such as natural ventilation Natural lighting, the introduction of high technology to reduce the heat load of the building, the city and other things to follow when designing buildings to be environmentally friendly.

6-1 Sustainable Architectural Design Indicators

Proponents of green sustainable architecture are betting on the benefits of the many benefits of this trend. It reduces construction costs and maintenance costs, creates a pleasant and comfortable working environment, improves the health of users and increases their productivity rates, reduces the legal liability that may arise due to building diseases, increases the value of ownership of the building and rental income, thus the green current in the construction sector In a field survey of 99 green buildings in the United States, they found that they consume 30% less energy compared to similar conventional buildings, so any additional costs paid in the design and construction phases can be quickly recovered. The traditional view of trying to reduce initial construction costs can lead to wasted materials and higher energy bills continuously. But the benefits of green buildings are not limited to direct environmental and economic aspects. In addition to reducing operational energy costs, it also makes workers more productive. A study by the University of Michigan Environmental Psychologist (Rachel Kaplan) found that employees with a view of the natural areas of their offices showed greater satisfaction with work, less stress or exposure to disease, and less. Martin Locke found that absenteeism fell by 15% after relocating 2,500 employees to a newly built green building in California. Similarly, the use of natural daylight in shopping malls is driving sales volumes

7-1 The delicate design: A method of sustainable design is one of the methods used to describe sustainable design by comparing it with other forms as follow .

1-Restoring the connection between man and environment and benefiting in nature

2-Promoting new values and methods of human life to achieve a more harmonious relationship with local, regional and global sources and environments.

3-To provide public awareness on appropriate technologies.

4-the emergence of living culture to perpetuate the natural response and natural harmony with local environmental factors.

5-Respect the natural and cultural resources of the site and minimize the negative effects of any design.

From that review, general indicators of sustainable design can be included as follows:

1-Appropriate design of the ecosystem and cultural context

2-Environmentally friendly response.

3-Improved assessment of the natural environment

4-Use of specialized technology and appropriate to the need for functional as a strategy to conserve energy and others.

5-Use of renewable building materials to the maximum extent possible

6-Avoid the use of energy intensively because of the environment and wasteful waste.

7-Flexibility of the use of space and reduce the sources used.

8-Create opportunities for reuse of construction and recycling of construction debris.

9-future expansion and adaptation of use with the least possible waste,

2- 1 Applied Study

Research is done using an analytical and descriptive methodology An intentional sample of three architectural projects was identified and selected taking into account the differences between the designers and the functional differences between the projects:

1-1-The **Capital Market Authority Tower(CMA)** of the architect HOK /omraina

In Riyadh, Saudi Arabia, there is a 385 m (1,263 ft.) skyscraper called the Capital Market Authority Tower.[3] Work on the project began in 2010 and was completed in 2014. When the structure was eventually finished in 2021, it surpassed Burj Rafal to become the highest structure in Riyadh and the second-tallest in all of Saudi Arabia. One of the world's most advanced skyscrapers, the 76-story PIF Tower was designed by HOK and Omrania and serves as the focal point of the King Abdullah Financial District.

Aiming for LEED Gold accreditation, the tower will have an observation deck, a two-story atrium, double-height sky lobbies, an inventive Twin elevator system that moves two cabs in a single shaft, and other elements like a café, fitness center, and pool. The design of the building is designed to increase the use of natural daylight, reduce the need for artificial lighting, and allows to see the external landscape even for those who are deep inside the building fig(3)(4).

2-1-2 Sluishuis Tower Building by Architect :Bjarke Ingles Groups

It is one of the most environmentally friendly structures that was finished recently. Triple glazing, good insulation techniques, and heat recovery from shower and ventilation systems have all been combined to lower the building's heating needs. Heat pumps are used for both water heating and cooling, in addition to energy-efficient district heating, to provide warmth for the building. Approximately 2,200 square meters of solar panels provide all of the building's energy needs for lighting, ventilation, heat pumps, and heating. Along with these technical details, the building's development placed a great deal of emphasis on green areas and water collecting

The Round House building) - Abu Dhabi - U A E, Architects: MZ Architects-(2-1-3

The Dar building is considered one of a kind due to its unique design. The distinguished engineering, as it is the first in the Arabian Peninsula and the East The middle part is round in shape, and the building consists of 23 floors, And its height is 110 meters. The facility has been designed in compliance with the Green Building Council's LEED certification program.

This is a significant issue. One of the first environmentally conscious structures in Abu Dhabi, it has a station and is

constructed from recyclable materials like steel, concrete, and glass

The company prioritizes efficient HVAC systems, lighting, and heating as well. The light was enhanced by the architecture, The state of medicine has reached its pinnacle, with offices and conference rooms proliferating everywhere. To enable the repurposing of gathered materials, a subterranean garbage collection system has also been included trash pertaining to the structure. Designed to absorb pollution, the device is regarded as the first of its sort in Abu Dhabi. (9)

2-2 Results of the questionnaire

A questionnaire was prepared to introduce the indicators that were extracted from the theoretical framework and the questionnaire forms were distributed from the 30 specialists of the architects who gave us a grade for each person on his preferred building: The **Capital Market Authority Tower(CMA) Sluishuis Tower Building** &(The Round House building) - Abu Dhabi as in Table (1)

CONCLUSIONS

1-The promotion of sustainable architecture and the rationalization of construction methods and energy consumption is one of the pillars on which the success of sustainable development in any society depends.

2-The major challenge facing architects and planners now is to select and modify high-end technology so as not to adversely affect the environment, while improving the performance and comfort requirements of the environmentally friendly building.

3-The environment around buildings and the building's relevance should be taken into account by developing solutions that achieve environmental and economic sustainability.

4-Buildings should be well insulated, tightly sealed with reduced energy demand

5-There are many ways to design sustainable urban communities that need to be balanced.

Linking human, environment and technology, Reduce the environmental impact and create a comfortable environment enjoyable for humans to achieve comfort at various levels.

6-The analysis of the results of the questionnaire found a classification of factors according to their role in reducing the negative environmental impacts on the building sequence as follows: There are a range of factors that have a significant role in minimizing negative environmental impacts on the building:

1-A factor for using seasonal colors in playing the biggest role
2-Site simulation factor3-Multilayer factor in form Medium-impact factors4-factor to reduce the depth ratios of radiation5-Rationalizing factor exposing the building to radiation6-The factor of adopting the principle of breakers7-the use of the principle of (High-Tec. 8-The factor of adoption of mass collision

RECOMMENDATIONS

There are a range of factors that have a significant role in minimizing negative environmental impacts on the building:

1-Design of the building to be environmentally friendly.

2-The research recommends the adoption of ten indicators of sustainable design to reduce environmental impacts in hot regions such as our Arab countries, where the research shows

the possibility of reducing them significantly as well as the expansion of the remaining indicators, which were not addressed in future research.

3-Urging designers to consider reducing the use of new resources in the buildings they design, and inviting them to design and construct buildings in a way that makes them themselves or some of their elements at the end of their lifetime. Interest in the application of this principle in different and innovative methods and ideas at the same time, taking into account the use of construction materials and products to lead to the conservation of the environment globally, where wood can be used, for example, provided that the forest, as taken Consider other substances on the basis of non-toxicity of the elements that produce zero or low emission of harmful elements or gases.

•4-Recycling of materials, waste and building residues is one of the most important ways to reduce the use of new resources and materials because they include non-active materials in terms of the absence of chemical reactions.

5-Another way to reduce the use of new resources is to reuse spaces and buildings for other functions and activities .

6-The design of buildings must respond to environmental design and adapt to the local climate and materials available to that city or region, it must reduce its impact on the environment.

7-Buildings are designed from the inside out and vice versa at a time.

So what can be provided by the environmentally friendly building is comfort, fresh air, natural light and everything that contributes to human health and well-being.

Use of glazing materials to provide more natural light and take advantage of the heat gained or lost according to the seasons of the year.

Allow in the future to adapt and accommodate changes in usage and technological advances.

8-Environmental control is the key factor in the success of buildings, especially homes that are easier to compare with offices that require mechanical cooling and air conditioning systems

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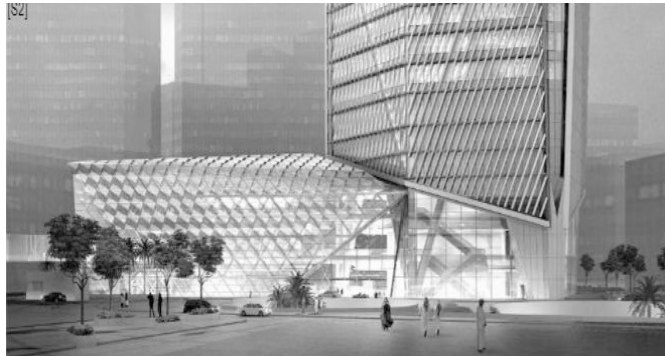


Figure (1) Front of Capital Market Authority Tower (CMA) the German Parliament Building



Figure (2): The Capital Market Authority Tower (CMA)

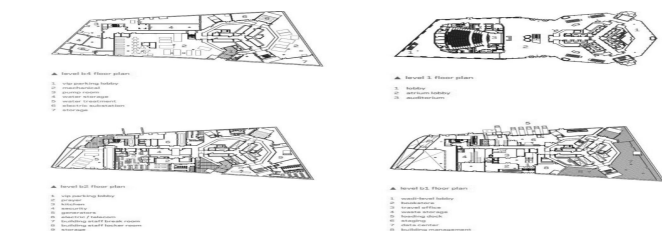


Figure (3): floor. Plans



Figure (5) it appears different from every observation point. Towards the water, the mass has been raised to create a large opening that brings water



Figure (6) The classic courtyard building was constructed through two transformations; it perfectly embodies the idea of living on water

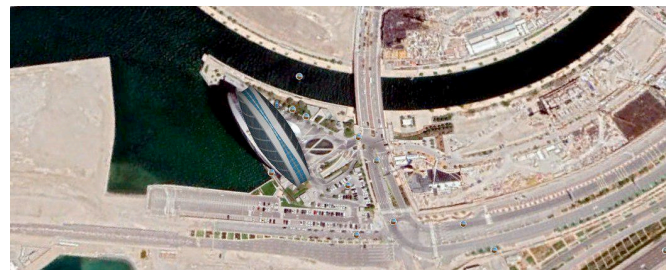
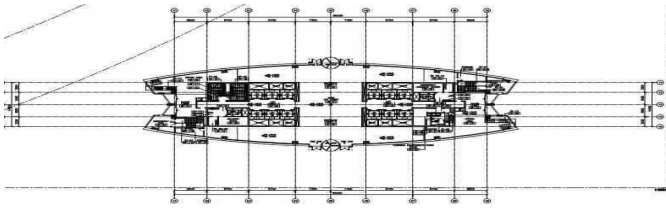


Figure (7) showing the location and site of the building



Figure (8) showing the elevation of the building



Figure(9) plan of 3rd Building

Table (1)

The final indicators	The Capital Market Authority Tower(CMA)	Shuishuis Tower Building	The Round House building) - Abu Dhabi
Use seasonal colors and reflective materials on morphological surfaces to minimize heat gain and loss	6	6	6
Simulate the shape of the topography of the site and its impact on its shape and boundaries	5	10	5
Multilayer in the building to be invested in achieving the principle of ceilings, walls and thermal insulation to increase the efficiency of ventilation	10	5	5
Reduce the depth of the building to deliver the largest natural lighting	10	5	5
Rationalize the exposure of the building to solar radiation and wind	8	7	7
Adopt the principle of crushers and mobile shading systems to reduce thermal gain	6	6	9
The use of the principle (High-tech) in the maintenance of the building	8	8	2
Adopt mass collisions to minimize environmental exposure and materials	8	7	5
Use smart glass on surfaces	10	6	4
Adopt the principle of self-support of the form by using the technique of self-systems	8	7	5
Total values	79	67	53