

Planning and designing sustainable external spaces for the teaching hospital building in Basra City, Iraq

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(Received 10 October, 2019; accepted 18 November, 2019)

ABSTRACT

This research dealt with the issue of sustainability and its impact in providing a healthy environment for patients and their families from visitors and staff, through achieving the design of Biophilia with its elements of roofs and green walls where the research dealt with the concept of sustainability of hospital buildings and then to apply the concept of Biophilia which is an important aspect that we have not paid attention to it in our designs for these buildings. Although its importance in adding aesthetic to the building while providing a constructional structure for interacting the building with green walls or roofs to provide psychological comfort to users and to highlight the role of nature in the formation of the link between external spaces, facades, and roofs of buildings in hiding cracks and staying away from industrial covering. The importance of green walls or roofs in regulating temperatures, increasing shading, eliminating pollutants and reducing noise, thus increasing the energy efficiency of the building was reached. The results of the study explain to us the need of patients for nature through the landscapes to reduce stress and pain, helping him to breathe properly and creating an environment of relaxation and positively affect on the treatment. There was a desire to cultivate the walls of gardens and external spaces with flowering climbing plants, which is the most favored which agreed upon by most users and then followed by cultivating with aromatic flowering climbing plants. The researcher concluded to the necessity of integrating the building blocks with the open spaces through establishing the sustainable gardens to increase the appropriate space for Healing gardens, which has a key role in healing, bring natural light and fresh air to places of patient rest and ease of communication with nature, which helps to improve the status of patients. The researcher also emphasizes that the plans included in the appendices are designed in light of the wishes of the respondents for the purpose of reaching the best design decision.

Key words : Environmental sustainability, Green walls, Green roofs.

Introduction

Hospital buildings are considered one of the most important buildings due it serving all categories of society where we find in it a sadness and joy at the same time, so it must respond in its design to the human and emotional aspects on the one hand and the functional requirements for treating and healing on the other hand. Many modern architectural de-

signs have emerged, integrating nature with the building or the external environment. where the nature has introduced in the design to activate the role of sustainability in order to reduce the air pollution and effects of noise to make the building better through a lot of solutions and treatments through the design of sustainable external spaces through the design of Biophilia and their elements from green roofs and green walls to show the build-

ing blocks in its real scale which are interconnected with natural elements that address the severity of architectural lines and harsh texture to improve the climatic and environmental factors of the building while providing less energy consumption.

Sustainability

It is a concept called on the diverse biological environment (organisms) and all-natural factors that maintain its existence for as long as possible, it is also defined as the preservation for the environment through adaptation with the environment by exploiting the natural resources for the longest possible time can lead to the preservation of life. Or it is a group of bio-processes that provide the means of life for organisms with various kinds, which helps them maintain the succession of generations and developing their means of growth over time. However, sustainability is not a new term, but the concept embodied in traditional architecture since ancient times through interdependence with the natural environment. However, it has gained great international attention to preserve the environment from pollution and sustainable use of natural resources, which encouraged many designers to find renewable solutions for the design of hospital buildings in accordance with the concepts of sustainability (Alan, 1998).

Environmental sustainability

It is a term that describes how biological systems remain diverse and productive over time, thus the ability to preserve the quality of life that human lives for a long time through the preservation of nature and existed resources with the possibility of maintaining the integrity of ecosystems, including the fulfillment of the human requirements for future generations.

www.maan-ctr.org/magazine/article/1085

Sustainability in Hospital Buildings

Sustainability and hospital buildings are a very important topic because they are very complex buildings and to achieve sustainability passes through the environmental, economic and social topic. Sustainability is a thought and term aimed to achieve compatibility and harmony between the requirements, the needs of the human, the surrounding environment data and how to use them appropriately taking into account the constants and changes in climate, economic and technological de-

velopments. While the wards and spaces of the hospital need to interact with the external environment to achieve a more healthy, aesthetic and humane environment. Hence the idea of integrating the building with nature in the health care buildings through the restoration of natural resources and increase the areas of vegetation to reduce air pollution and rising temperatures within the limits of sustainability. It is necessary to address in the chapter on the importance of sustainable external spaces for hospital buildings and their role in creating green walls on the facades of the building where many studies have shown the importance of the environment and maintain its durability in light of the technical development from the study of the environment and its relationship with the external spaces and building facades on the other hand (Wittmann, 2009).

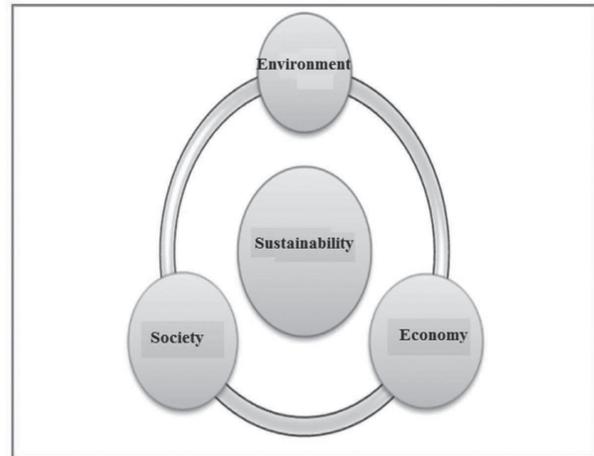


Fig. 1. Illustrates the pivotal dimensions of sustainability (prepared by the researcher).

The aims of Sustainability for Hospital Buildings

- 1) Protect the health of building occupants.
- 2) The patients of hospital buildings which are based on sustainable design standards are more comfortable than their counterparts that do not use those standards associated with improving the quality of internal air, correlating with the natural environment and arriving the sunlight.
- 3) Protecting the health of the surrounding community.
- 4) Protecting global health and natural resources.
- 5) Basic determinants for the design of sustainable external spaces for hospital buildings:

The quality of design

Innovation and creativity in design in terms of choosing a renewable developed and effective design idea in a way that is harmonious and balanced with the climate and the local environment to be low-cost and visually enjoyable and require minimum resources.

Selecting constructional materials and resources

It is preferable to choose environmentally friendly materials for the floors should be high permeability for the water so that rainwater can be used as groundwater, sand or grass to give a sense of freedom and comforts for patients. As for the shading roofs and sitting seats are selected compatible with the climate and the environment to generate a sense of harmony with the environment, such as constructed roofs or made of wood.

Choosing vegetation

- Cultivating local plants, which are very popular because they are less susceptible to diseases and pests and require little care.
- Cultivating flowering plants with aromatic scents such as Shrub roses flowers, mint, and rosemary, which help to relax patients with the use of mobile water features to reduce tension and relieving nerves while avoiding the cultivation of plants with a bad strong smell especially for patients of chemotherapy to prevent allergies.
- Cultivating climbing plants on the walls for external open spaces to connecting them with external spaces, to changing the local climate and for health ventilation (enhancing the quality of internal air for the building).
- Afforestation of the outer circumference (the outer wall of the building) with trees to repelling wind, dust and volatile soil to prevent allergy in patients in addition to reducing noise.

Prevent environmental pollution to create a healthy environment

Procedures to control agricultural pests by avoiding the use of chemicals and pesticides to prevent pollution of air, water, and soil while reducing the use of chemical fertilizers through the use of the appropriate plant in the right place and adapting them with the climatic and environmental conditions for the location.

Using sawdust to reduce water loss due to

evaporation instead of organic fertilizers as nutrients during decomposition.

Respecting the nature of the location

- Environmental elevation for the location by increasing the open green areas to depend on natural sources of lighting instead of building lighting.
- Compatibility with the circumference by the design and using it within the building to increase the efficiency of the internal environment from ventilation and natural lighting to create a healthy environment.

Water efficiency in coordinating the location

- Reduce using water by using modern irrigation technology with high efficiency in plant irrigation.
- Quantitative control in rainwater to benefit them as groundwater or conservating them in concrete slabs for using it in the process of irrigation gardens instead of runoff as surface water.

https://ar-wikipedia.org/wiki/ĖäÓíĎ_ÇáĬÇÆĎ_ÇáãÓĖĬÇãã

Sustainability Applications

Biophilia design concept

The role of sustainability can be activated in hospital buildings and the possibility of involving them into the urban design and designing the external spaces to enhancing the relationship between nature and users in the simulation of nature represented by applying Green Roofs design or Green Walls as elements of the Biophilia design to access therapeutic environments (healing) with high performance, which depends on the used design criteria to integrate between nature on the one hand and technology on the other hand to the building's interaction with the circumference and living nature to reach patients to the utmost luxury and satisfaction. Biophilia is a Latin word consisting of two syllables (Bio) from Biology, and Philia, which means love, thus the term means love of nature. Diana (2009, Dana) mentioned that biophilia is a design strategy that involves simulating nature and its forms to generate a sense of satisfaction with life that includes nature through developing the external spaces design and increasing green spaces. Diana, (2008) indicated in her study on the importance of Biophilia design in achieving a set of principles and values to

reaching a positive experience in integrating nature with the Physical environment through achieving a deep connection and interaction for human with nature while creating a spirit of responsibility and respect towards nature and providing a variety of scenes on the elements of the natural environment using the eco-friendly natural resources, Controlling the amount of lighting, ventilation and natural temperatures to designing spaces that achieve safety, protection and relaxation.

The most important elements of biophilia

Green roofs

Green roofs classify under the gardens buildings types, which described as the area that is cultivated on the roofs of buildings, and different types of plants, flowers, and weeds can be cultivated on the green roof, depending on the thickness of the substrate (growth media). Which vary in depth depending on the type of plant. The green roof consists of a layer of vegetation, the growth media and the drainage layer (disposal of excess water). It has a variety of benefits such as reducing the thermal negligence of buildings by preventing high heat from entering the buildings and reducing the flow of water through the retention of rainwater and absorption of carbon dioxide. Providing a balance between constructed areas and green areas in the case of difficult to provide on the ground, due to urbanization in the cities and the absence of planning standards for the construction of green spaces in cities and the history of green roofs for buildings dating back thousands of years, including the hanging gardens in ancient Mesopotamia, which remained until about 600 BC.

http://www.docstoc.com/docs/107750367/Green_roofs_report_20705_Green_roofs_benefils_and_cost_implications.

Green walls

It is a term refers to all forms of vertical surfaces coated with plants. These surfaces are either part of the building or independent and It works to cover the building in whole or in part with a Vegetation that grows in the germination media from the soil, water, and organic matter. The idea of green walls was first proposed by the French (Partrick Balance) as consisting of a system of panels carrying plants and an irrigation system to deliver water to those plants. These walls are used in the exterior design and include many benefits that are related to the

aesthetic aspects and re-ventilate the building and purify the air. It is necessary to study the concept of green walls as an application for biophilia design to activating the role of sustainability for the external spaces for hospital buildings because of its green environment simulates nature and helps to create natural external living spaces in the building and find interaction between green spaces and the building, which works to give a sense of satisfaction and feelings of psychological comfort to users, especially patients.

<http://www.verticalgardenpatrickblanc.com/#/en/hom>

Practical study (analysis, questionnaire and results)

General Description for Al-Sadr Teaching Hospital

Al-Sadr Teaching Hospital is located in Basra province, Al-Bra'adiya region, it was inaugurated on 1/15/1979 as a teaching hospital in Basra city. Al-Sadr Teaching Hospital is located in Basra province, Al-Bra'adiya region, it was inaugurated on 1/15/1979 as a teaching hospital in Basra city. It was a model for advanced hospitals in Iraq and the Arab world and the hospital began to receive patients on 7/4 /1980. The hospital is implemented on a land with area of 14.525 dunums and consists of eight floors and with a capacity of 533 distributed on the following sections: Oncology Center - Emergency Division - CT scan unit-Catheter Unit - Blood Bank - Consultation of the ear, nose and throat - Intensive Care - Services - Workshop - Lab Oxygen - Doctors room-Dr. Sarkis Hall - Cafeteria - mosque - Radiotherapy Center - Drug Store - First Aid Division - Nursery.

Analyzing the environment surrounding the hospital

The hospital is located southeast of Basra and extends between Al-Bra'adiya Street and the new



Fig. 2. Diagram for Al-Sadr Teaching Hospital shows the external spaces proposed by the researcher.

Corniche Street in the southwest. The area is surrounded by a different using environment because it overlooks the Shatt Al-Arab where it is dominated by the commercial nature of a commercial market and banks, in addition to restaurants, casinos, the Faculty of Medicine and the Faculty of Dentistry. Also, the presence of car parks and also the presence of Husseiniya in the street linking with Al-Bra'adiya Street and the presence of the Italian bridge, which connects between Basra region and Shatt al-Arab region in addition to some government buildings.

Access to the location and hospital entrance

It is clear from the study that the hospital has access to a good location where the street associated with the main street of the hospital all lead to it, For example, Al-Istiklal Street intersects with Al-Tayaran Street in a junction connected at the main entrance for the hospital. It is also possible to reach the hospital from the new Corniche Street in the west or from Al-Bra'adiya Street in the east. As for the entrance, it contains two main entrances overlooking Al-Bra'adiya Street, one of them is activated and the other is not activated. There is another entrance in the emergency division overlooking the Corniche Street from the west side, while it has a special entrance for vehicles on the same street from it but it is not activated.



Fig. 3. Access to the location (source: the researcher).

Questionnaire

The questionnaire is considered one of the important methods in the design studies because of its guarantee and clarity in answering the questions posed until it became the first tool that collects the information, in addition to allowing the researcher to scrutinize that information and test the study hypotheses after determining the problem of the study and its objectives. The questionnaire forms were distributed randomly as shown in Appendix

(1) to the users of the location and its external spaces and with the number of (50) forms on (patients).

Analyzing the results of the questionnaire:

Q1: When asked patients and visitors what is characterized by the style of the hospital building and its external facades from their perspective? as shown in Figure (4). The results showed that the percentage of 83.60% for the shape is not aesthetic, but it is balanced with the surrounding environment and functionally and 2.3% for simplicity, clarity, complexity, and the fear for the patient and the visitor. This result agrees with (Khudair, 2010).

Q2: Figure (5) the highest percentage was for interviewing visitors, which amounted to (38.60%) in the teaching hospital, while the lowest percentage in the hospital itself amounted to (18.20%) was to talk with others.

Q3: Figure (6) The results of the questionnaire showed that the choice of the Wards more comfortable and free from the green surface and being uncomfortable, the highest percentages from the opinions of users amounted to (31.80%, 25.00%) and the lowest percentage amounted to (11.40%) which It is the choice not to provide shadows and protection from the sun and rain. The results of the questionnaire explain to us the need of patients for nature through the green areas to reduce psychological pressure and pain as it helps him to breathe properly and create an atmosphere of relaxation and positively affect the treatment.

Q4: The results showed the large role played by the colors on the psychology of the user where the highest percentage was favored by users of the teaching hospital is blue color, which its percentage amounted to (52.30%). There is a relationship between color and structural components where it can enhance the presence of color, but it cannot turn the bad design to good, but it can affect the value of good design. It is also possible that the low-quality design will be more acceptable, so cold colors are generally preferred for physical and structural components (pile, 2003) as shown in Figure (7).

Q5: The opinions of most users prefer to be aesthetic landscape in the form of independent mobile gardens in the first place and cultivating the climbings on the walls comes in second place.

Q6: explains the used model in the design of gardens which is considered the important things to highlight the elements of the garden and showing the element of aesthetic and considering the impor-

tance of the model results have resulted in the design of contemporary gardens highest value compared to the rest of the model because it fits the buildings important architectural buildings and high human value such as hospitals and schools so that the design lines fit with the shape of the building. Because the purpose of the model is to highlight the beauty of the building, Most of the gardens and spaces of the buildings are with level surface and

suitable for the implementation of such a design (Chalabi, 1991).

Conclusion

1. The success of the design of external spaces and gardens of hospitals depends largely on the attention to meet the needs and desires of patients in particular, staff and visitors in general (in-

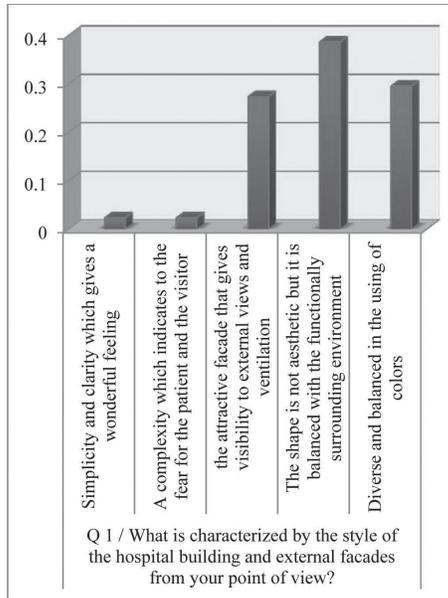


Fig. 4

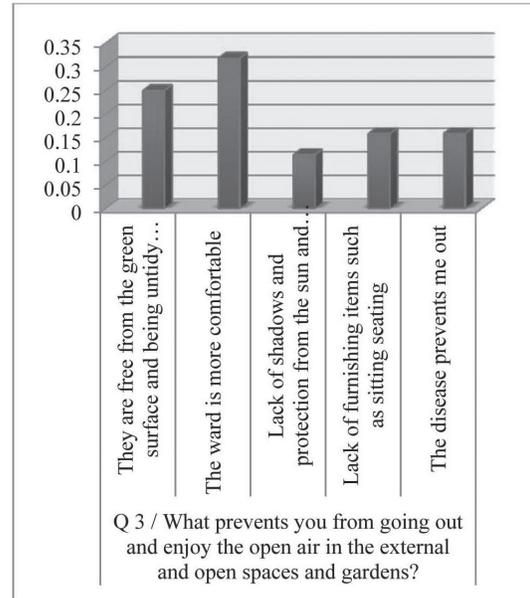


Fig. 6

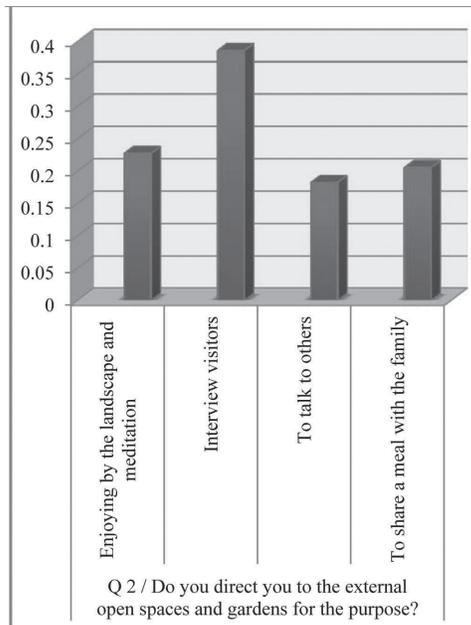


Fig. 5

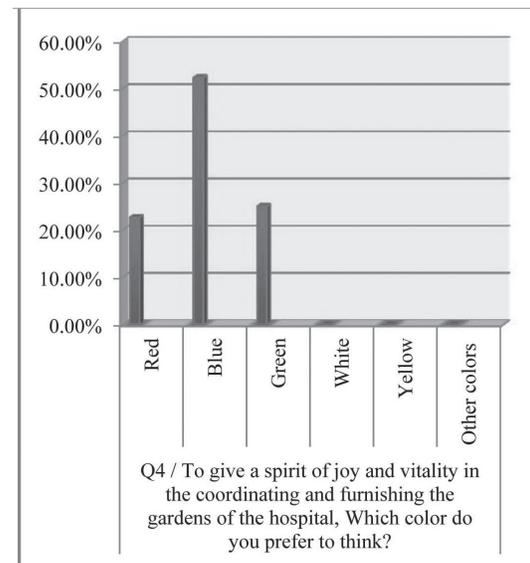


Fig. 7

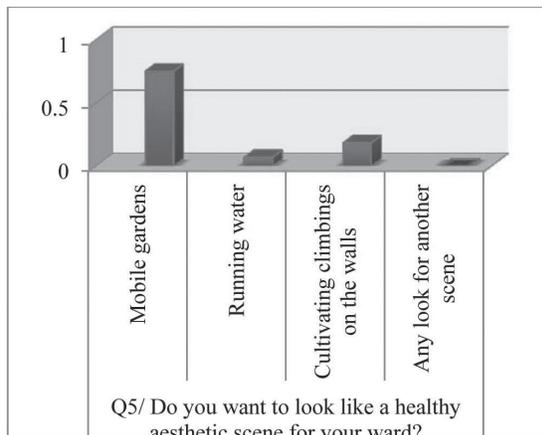


Fig. 8

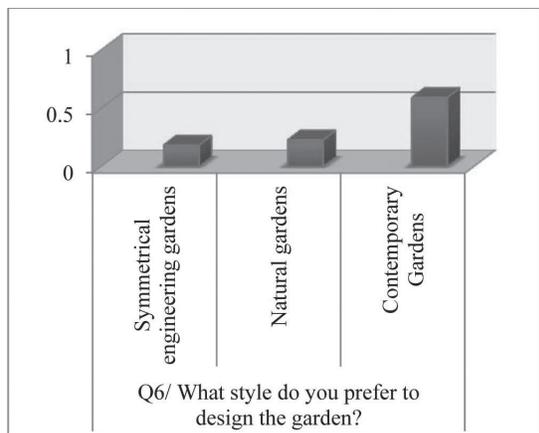


Fig. 9

creasing social interaction and attracting them to go out into the gardens as a kind of exposure to the open-air especially for children patients for the urgent need for sun exposure).

2. The need to increase the area of the green areas (Cynodondactylon), which is noted for degradation in the gardens due to its environmental, health and psychological role.
3. There are clear negligence and failure in the performance of hospital gardens for the main role in the city of Basra.
4. The need to choose the appropriate design to connect the garden with the building and make

it one unit and also to improve the aesthetic appearance and environment spaces.

5. Colors have a great role in the psychological impact and reduce stress in patients and children especially it is necessary to diversity in cultivated plants with its colors of their flowers and complementary components.

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