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Applied the Indicators of Green Buildings in Educational Hospitals in Iraq.

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Abstract— Achieving High Quality in the Indoor Environment of the Educational Hospital is the task of the architect with the application of Sustainability and Green Building Standards. Where the Principles of Green Buildings swept all Hospital buildings to achieve the High Quality of the Internal Environment through: (Thermal Comfort, Acoustic Comfort, Natural Ventilation, Cleanliness, and Waste Disposal) for patients and their families to enjoy high health, and for the purpose of enjoying time inside the hospital building, and get a faster recovery, So the Research Problem grow up from : lake of knowledge about the elements of Quality in Internal Environment in Educational Hospitals (applied the elements of green hospitals ,As the Research aims to examine the quality of the internal environment (green hospital elements) in Educational hospitals, The Research followed the Descriptive Approach in determining the Basic indicators of Green buildings and for the purpose of applying the practical study included . The selection of two Educational hospitals in Baghdad to test the extent of application of the principles of the green building on them, and the research includes sixr axes starting with the first axis and includes the introduction, the importance of research, the research problem, second axis reviewing previous literature, While the third axis includes definitions: green building, sustainability, The relationship between sustainability and the green building, green hospital, while The fourth axis includes sustainability standards and global green buildings : BREEM, LED, PERAL BEADS and quality indicators for each, and the five axis includes the practical study, and Al-Karama Educational Hospital and Al-Kindi Educational Hospital were elected through the application of the theoretical framework indicators and collecting information about them, and the six axis show results and recommendations of the research were: Achieving the Green Hospital (Environmental Sustainability): 31.1% for Karama Educational Hospital and 45.7% for Al-Kindi Educational Hospital. The research concluded: the need to increase efforts to achieve the elements of the green hospital, especially those related to environmental sustainability in Educational Hospitals.

Keywords— "Green Architecture, sustainability, Sustainability parts, internal environment, quality"

1. Introduction:

Because of the increasing environmental pollution and the exacerbation of the effects of climate change necessitated many fields to reconsider the order of their priorities and objectives [[1]directing the attention of most of the specializations to the concept of sustainability, which seeks to reduce the damage to the environment and preserve its resources, as the deterioration of the health of our environment is a painful reality, and since the health sector itself has a role to play in causing climate change. Where the health sector works in the same environment as any other industry, and this environment supports billions of people affected in return by that same environment, the importance of highlighting educational hospitals by reducing the amount of environmental impact: as a result of surgeries, general waste, and others, also the large number of people who enter the hospital from: patients, visitors and doctors, nurses, biologists, physicians, and service's team, as well as its employees.Research Questions:

Before starting the research, the interests may have the following questions in mind:

What are the standards of the internal environment of the hospital?

How do we achieve high quality in the internal environments of the hospital?

The reasons for choosing the Educational hospital: represented by the following (from the researcher):

1) Educational Hospital is the cultural health interface of the country, Being the largest hospital with a bed capacity of not less than (400-450) beds.
2) Its location is in the center of the capital or the center of the region and adjacent to the Faculty of Medicine and medical institutes
3) It includes various medical specialties and rare specialties such as neurology, orthopedic microsurgery, various kidney diseases, ophthalmology, and others that are not available in public hospitals
4) It includes a large educational section with discussion and study rooms and a hall for scientific conferences to hold scientific conferences and present the latest developments in technological development in the medical and health field and the latest findings of modern medicine in methods of treatment, diagnosis, and nursing.
5) Receives at least 1000 people in one day (beyond statistics of the Iraqi Ministry of Health..

1.1 *Literature review*

To inform the research problem as follow we must review the studies that deal with the similar study as:

1.1.1 Study of [11]

the study aims to understand the basics of green hospitals, their various functions, the need to implement the ideas in hospitals rendering them environment and patient-friendly, to identify the factors that affect the quality of green hospital design, and to inform future green hospital designs, the findings of the study were: By observing various green hospital data, the strategies reduce buildings' operating costs and increase building value by return on investment, that reach Healthcare facilities in India and around the world

1.1.2 Study of [[3]];

the study deal with the concept of "green hospital" used to define the hospitals fulfilling at least one of the alternatives such as choosing environmentally settlement design, buying nature-friendly building materials and products, being ecologically sensitive during the construction of the hospital building and keeping this sensitivity going in the service production process. Green Hospital defines a facility that recycles, and reuses materials, reducing waste and giving clean air to the environment. This approach based on an environmentalist management understanding is seen under the headlines like management of waste and hazardous materials, water management, energy management and air emission regulating system, and innovator environmental designs; findings of the study were

the term: "Healing hospital" as "patient-centered," not "care centered," defines innovative environmental designs, aims at patient-friendly and non-scary hospital environments,

The designers must be entered the process of changing patient, staff, and visitor experiences by designing healing, improving, relaxing, and friendly, welcoming spaces. Natural mediums gained importance.

1.1.3 Study of [[4, 5, 6]],

The study deal with: Good Health and Well-being of the international Sustainable Development Goal (SDG), and The World Health Organization (WHO) estimated the increase of healthcare expenditure to be ($2 - $4) Billion USD by the year 2030 as a result of Climate change. That caused a high service level for the patient and reduced the environmental impacts of operation, which are the pillars of sustainable development. The study presented aims to develop a sustainability rating system for new and existing healthcare facilities suitable to the Egyptian context that encourages two general prerequisites for the top management commitment towards sustainability and creating an environmental management plan. The system divides the facilities into new and existing, with each type having different awardable points that take into consideration the differences in applicability between the two types of facilities:

Table 1: lists the literature reviews and their deal with green hospital indicators.

No	Elements of sustainability	Kumari , Kumar	Dolic e	Mittiny , l-heggar
1	Thermal comfort			
2	Acoustic comfort			
3	Natural ventilation		*	
4	Clean less			
5	Recycle, Waste disposal		*	
6	Reducing cost		*	*
7	Energy management			
8	Increase building value	*		
9	Reuse, Friendly building material.	*	*	*

From the table up , we reach that all the study deal with one aspect or two about green building and the quality of internal environment (thermal , acoustic , ventilation, etc.so we can put our Research problem as:

1.2 *Research Problem:*

"The lack of knowledge about the elements of quality in internal environment in educational hospitals (applied the elements of green hospitals)."

1.3 *Hypothesis of the study:*

"The applying of the indicators of Green Hospital achieving the quality of internal environment in Educational Hospital in Iraq ".

2. The Second Axis:

The Theoretical Framework which includes the definition of the following items: Architect James Wines points out in his book "Green Architecture" that buildings consume 1\6 of the world's freshwater supply, 1\4 of wood production, and 1\5of fuel and manufactured materials. At the same time, 1\2 of the gases are produced, which causes the harmful phenomenon of "greenhouse," [[9.11]] indicated that the area of the built environment in the world would double in a short period ranging between 20 and 40 years following. These facts make the construction and operation of buildings one of the most energy- and resource-intensive industries in the world**.**

2.1 *The concept of sustainability:*

In (The al-[[8, 9] the word (sustainer), which has Latin Origins word in the sense of (to hold up), i.e., the attribution from below, is the origin of the term sustainability in the English language, and the concept of sustainability was formulated as (meeting the needs of people in the present without affecting future generations to meet their needs in the future), and during the World Conference on Development and the Environment some definitions of sustainability were approved, namely:

Sustain = Life-extending support to connect or survive.

Sustenance = the process of giving life, sustenance, or food.

Sustainable = an attribute that gives support, comfort, food, and assistance; thus, the supported thing remains alive and continues and long eves.

Elements of sustainability: The essential elements of sustainability are [[9]] (the economy - environment - society), which are Essential elements that make up the sustainability system, as shown in the following figure.

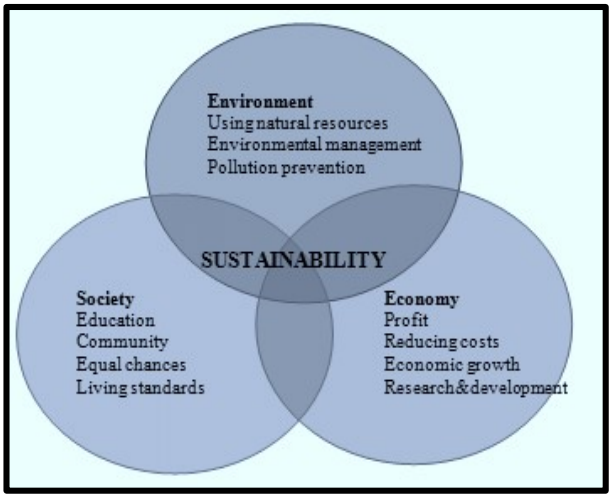

Figure 1: shows the main Three Elements of Sustainable

2.2 *Percentage of Each Element:*

The sustainable elements achieved in hospitals and healthcare buildings [[10], by: 59% for environmental sustainability, 27%for sociology, and 14% for economic sustainability,

Table 2: lists the ratio for achieving sustainability elements in healthcare buildings:

Nom.	Elements of sustainability	Ratio
1	Environmental sustainability	**59%**
2	Sociological environment	**27%**
3	**Economical environment**	**14%**

2.3 *The Relationship between Sustainable Architecture and Green Architecture: [[11], [12]]*

The key difference between sustainable buildings and green buildings is that sustainable buildings operate with all three sustainability pillars in mind (people, planet, and profit), whereas green buildings focus on the environment (external and internal), A green building is one where that implements Individual practices and processes as incremental steps towards environmental sustainability. As suggested in the "operation and maintenance" step earlier, green initiatives can include switching to renewable energy, implementing natural ventilation systems, and reducing your long-term carbon footprint. [[13]].

2.4 *The U.S. Environmental Protection Agency defines a green building (USPEGA\2022) as*

"The practice of constructing structures and using environmentally responsible, resource-efficient processes throughout the life cycle of a building from site identification to design construction, operation, maintenance, renovation, and dismantling. This practice expands and complements classic building design concerns about economy, facilities, durability, and comfort. A green building is also defined as a sustainable or high-performance building.

2.5 *The Relationship between Sustainable Architecture and Green Architecture: [[14]]*

The key difference between sustainable buildings and green buildings is that sustainable buildings operate with all three sustainability pillars in mind (people, planet, and profit), whereas green buildings focus on the environment (external and internal), A green building is one where that implements individual practices and processes as incremental steps towards environmental sustainability[[13]] . As suggested in the "operation and maintenance" step earlier, green initiatives can include switching to renewable energy, implementing natural ventilation systems, and reducing your long-term carbon footprint.

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2.6 *Green hospitals [13]]:*

It is a term given to environmentally friendly hospitals where results are less harmful to the environment and less consuming environmental resources, and green hospitals are buildings that are less in energy consumption in terms of lighting, operating devices, air conditioning, and water heating, green hospitals are buildings that are less in medical or non-medical waste in a way that reduces the volume of carbon emissions significantly, and green hospitals are the ones that take into account reducing operating costs and increase energy efficiency. It is a healthcare institution that cares for and respects the environment in many aspects (building construction, energy saving, re-construction, recycling, transportation, etc.

Procedural definition of the Green Hospital\ Researcher: It is the hospital (building) that respects the environment and preserves it through the use of its available natural resources to achieve the lowest percentage of carbon emissions and the least possible waste and waste resulting from its departments (operations, laboratories, lobbies, emergencies, consulting clinics, etc.) and the lowest consumption of energy and water, recycling and conservation of these resources.

As for the Green Hospital initiatives, they include the basic measures adopted for green buildings (the experience of the Bavarian [[9]] namely: the use of energy-saving lighting systems and medical equipment and the use of technologically enhanced renewable energy systems, energy use more efficiently, as hospitals look at how to create designs that allow more exposure to daylight and natural ventilation in the internal environment of the hospital, the following items show the principles of green hospitals :

Improving air quality is a key element of green hospital design. Hospitals are exploring effective ways to reduce the air content of toxins and pollutants throughout the building.

Certain statistics found that using rainwater will save 180,000 gallons of potable water yearly. In addition, the collected rainwater will also be used to power the cooling towers that the hospital uses for its air conditioning system.

Use high-efficiency windows to get as much natural light as possible and super-insulated ceilings that protect the hospital building from high heat during the summer.

The Free State of Bavaria has set itself the goal of becoming the first climate-neutral federal state by 2040. Everyone is invited to contribute; free state institutions support this commitment. With this in mind, the Ministries of Environment and Consumer Protection and Health and Welfare continue the Bavaria Green Hospital initiative, started in 2011 as the Green Hospital Plus initiative, capturing rainwater from the roof and using it to irrigate the landscape.

Use sensors that automatically turn off or turn on the lights in the lobbies (patient rooms), depending on whether they are occupied.

Patient rooms are designed to allow for more exposure to natural light and ventilation

Recycling laboratory chemical waste for toxic solutions and waste paper, plastic, light bulbs, batteries, and cardboard.

2.7 *Quality (definition): from [26 [15]]: the main feature of something is the excellent degree of the product.*

Perceptual definition for quality \researcher: It is the standard (reference) for any work to do about it. For example: when we design an operation room, we must

go to the references that write about it and its specifications.

2.8 *Internal environment : [[16]]*

it means all the conditions, components, events, and factors within the internal spaces of a hospital that affect its activities and choices, in particular, the behavior of staff and material and technological resources. Factors that are part of the internal environment are the organization's mission statement, leadership styles, and organizational culture.

Perceptual definitions: Internal Environment: it's all the conditions inside the building (Space, Room) that keep the people fine inside it from all dangerous circumstances. The hospital's internal Environment is like the patient room, laboratory, corridors, and consultant room.

2.9 *External Environment:*

it's the outside Environment meets the sky directly, in hospitals it refers to the services yard outside the building, which contain: a sewage treatment station, boiler, water tanks, water sterilization station, thermal burn for rubbish, etc., and: gardens, car parks, street, yards, (no ceiling), and it must be close and safety from animals, sandstorms, and raining heavily. Also, it must be saved from fire, electricity, seismic, pollution, and swage by treatment of each; Internal and External Environments must achieve the minimum range of Assurance Quality Indicators .

The [18 [17]] presented a form for the main requirements of internal environment quality,

Table 3: Main Requirements of Internal Environment:

Nom.	Item.	Dots
1	Fresh air quality	
1.1	Minimum scale of thermal comfort	Must
1.2	Recording	Must
1.3	Goodness average of changes in thermal comfort	1
1.4	Strategies for Thermal sustainable	1
2	Comfortable views	
2.1	Low average of natural lighting	Must
2.2	Low average of industrial lighting	Must
3	Comfortable acoustic	
3.1	Assessment environment of noisy	Must
3.2	Back noisy isolation acoustic	1
4	Safety and Security	
4.1	Safety environment	Must
4.2	Wayfinding to lose the diffusion	Must
4.3	Help special need people	Must
4.4	Human design suitable for the function	1
4.5	Design prevents people from falling	1
4.6	Courtyard helps people to less pressure	1

Conclusion: from the table above, we resulted that in the quality of the internal environment, some items must be applied, such as (Minimum scale of thermal comfort, Low average of natural lighting, Low standard of industrial lighting ….etc.) and some items can be avoide such as : design prevent people from falling and courtyard helps people to less pressure .

3. The Third axis:

Standards of quality in the internal environment, Criteria of standards.

The trend towards green evaluation is a global trend towards energy conservation, raising awareness, and rationalizing consumption for individuals. Still, the evaluation systems were divided into systems for construction, sustainability, energy conservation, and its design (sustainable design) and other techniques that followed the sustainability of communities and their systems in terms of:

3.1 *BREEAM Evaluation Criterion the Most Important Criterion:*

The word BREEAM means an objective approach to the environmental assessment of buildings (including hospitals)[21 [18]], which is a system for evaluating and classifying structures Green in the United Kingdom, where many countries of the world have adopted the program, such as Canada, Australia, Hong Kong, and others, which have made simple adjustments to the system to suit their local environment. In the Arab region, specifically in the Gulf region, a version of the system was developed under the name of BREEAM GULF to suit the local climate there.

3.2 *LEED: Standards Leadership in Energy and Environmental Design: Shows [[17]]:*

To judge the degree to which any building meets sustainable building standards, the Green Building Classification System, i.e., Leadership in Energy and Environmental Design (LEED), developed by the US Green Building Council (USGBC), has emerged in the United States of America, which provides a set of criteria for sustainable building Environmentally. Since its inception in 1998, LEED has expanded to include more than 14,000 projects in the United States and 30 countries, encompassing 1.062 billion square feet (99 km²) in the developed area. The professional mark of LEED is that it is an open and transparent process in terms of the proposed technical parameters (Wikipedia, the free encyclopedia Leadership in Energy and Environmental Design) .

3.3 *The ISOTEC 2015 study [22 [19]]*

indicated that the USGBC in the United States of America was the first to start developing the Leadership in Energy and Environmental Design LEED standard in the United States of America and began to apply this standard in 2000, where the LEED certification is granted to projects that use the principles of green sustainable architecture, to produce a greener built environment and buildings with better economic performance than those that do not apply These principles, and the areas of application of the principles of LEED in Design, Construction, Maintenance, Operations, and according to these standards, points are awarded to the building in various aspects, for example:

Table 4: shows the points awarded towards each item \ researcher from ISOTEC 2015[1 [13]

Nom.	Item	Points
1	Energy Efficiency	17
2	Sustainable Applications	14
3	Water Efficiency	5
4	Resources	13
5	Quality and Environmental	15
6	Safety	15
7	Innovation in Design	5

3.4 *Pearl Beads Standard: [[19]]*

Pearl Rating System (Abu Dhabi): Pearl Rating System (PRS) is the building evaluation system for the Emirate \ Abu Dhabi, designed to support sustainability from the urban design of the project includes works: buildings and villas, gives guidance and requirements, the Pearl Evaluation Program, is the Dubai Government's initiative to improve the lives of those living in Abu Dhabi by focusing on cultural customs and social values, the evaluation system is meticulously detailed On the climate of Abu Dhabi, The various sections in the Pearl Rating System, there are in the Pearl Rating System of certification levels, the certificate from one to five pearls. At least a single pearl certificate is required to develop a project within Abu Dhabi. The pearl system is divided into seven compulsory lashes and optional credits. To obtain at least that all compulsory credits are met.

The research believes that the most important thing before beginning the design work of the hospital is to choose the right site. The midst of these intellectual trends implemented on the ground towards sustainability and green building makes the architect's task more excellent in selecting the appropriate place to establish the hospital, as we mean the sustainable location of the green hospital.

3.5 *The Quality of the Internal Environment: [20 [20]]*

Showed that interior design plays a significant role in improving the internal environment of hospitals (as we mentioned earlier), as the components of the internal environment include: lighting, colors, sound, ventilation, green spaces, [24 [21]] Lighting is great importance, especially in rationalizing energy consumption, and **lighting is provided in two ways**:

3.5.1 Natural lighting coming from the sun:

The sun is the only source of natural light, as the excellent design should be the distribution of windows and choosing their places to obtain the most significant amount of natural light, mainly reflected and trying to avoid direct light, And the allocation of open spaces such as courtyards in the building allow the use of sunlight, taking into account the privacy factor and that the planning of the site takes into account the heights of the buildings and the distances between them so that the

building does not block natural light from another building close to it or facing.

3.5.2 Industrial lighting inside the building:

It is used if the natural lighting is insufficient in the parts far from the windows or when the sun sets, and Darkness falls, and it is considered when choosing industrial lighting units to give a type of lighting as close as possible to natural light.

We must select the type that saves on electrical energy consumption.

The research finds that the presence of natural sunlight is essential in all departments of the hospital, as it helps to activate patients and provide psychological comfort to them and inspires optimization and vitality and is achieved through windows with areas commensurate with the size of the walls and rooms and directed towards sunrise and helps to enter them in appropriate quantities to achieve the required comfort without causing high brightness and gloss and hindering vision.

3.5.3 Philosophy of choosing colors within the hospital: [25 [22]]

The interior design of hospitals in particular need of an atmosphere , positive psychological , organic color effects booming serve patients and contribute to giving them optimism, vitality, activity , hope for a speedy recovery, God willing, as well as providing the medical , administrative team and support services through the active atmosphere and psychoactive color effects that send activity to work with dedication and without boredom , this is one of the functional tasks on which hospitals are based ,The color affects the interior design of the hospital[[12] [6] according to the place, for example, dark colors such as dark blue on the floor give a sense of stability, but it helps to focus and think deeply, for example, (patient care rooms such as lobbies or intensive care rooms), which require the nature of the pathological condition of the constant wandering to check on Critical patients, colors have a significant role on the psychological comfort of the patient and remove the barrier of fear and feeling of pressure inside the hospital building and has substantial environmental and climatic effects.

Figure 2: (1), (2), (3) show colors using inside rooms and corridors of hospital / the impact of colors in hospital 2020

3.6 *Sound:*

A study [[20]] of noise and annoying sounds hurt the comfort of patients, medical staff, and visitors inside the hospital building because the standard of calm is considered essential in the internal environment inside the hospital building, and the Iraqi Ministry of Environment has determined that the acceptable sound standards in Iraq in hospital buildings are from (20-35) decibels, as the sound has effects on the psychological and physical health of humans and has two types of impact:

A. Good effects [[20]]result from beautiful, quiet sounds within the permissible limits' acoustic comfort standard.

B. Harmful effects: It is caused by loud sounds and noise, and one of the most important sources of noise inside the hospital is speaking loudly, screaming, and crying due to fear of disease and treatment. Noise from outside the hospital is carried by air and enters the hospital through open windows, doors, or small areas openings. They are of the following types:

- **Global noise**: includes all annoying and unwanted sounds caused by the external environment.
- **Transient noise**: It is continuous noise interrupted after some time and replaced by other sounds soon after (trains, planes, cars.(
- **Pulse noise**: all the annoying and unwanted sounds that follow at short intermittent intervals are more impactful on humans because their level is high.

The research finds that providing green spaces for different plants and trees may control the moving currents of the air and sends a beautiful view that improves the psychological state of the patient, and staff inside the hospital, raises reassurance within the human soul and helps the medical and service staff to perform their duty to the fullest Image.

3.7 *Resource Management in Green Hospitals: Managing the resources available in hospitals,*

1. Minimization of waste, Energy and Carbon. Rationalization of water consumption by providing effective information**.**
2. Developing sustainable designs represented in designing and redesigning buildings to suit sustainability.
3. Promoting green transportation by reducing carbon emissions during transport and travel activities is a priority.
4. Promoting green transportation by reducing carbon emissions during transport and travel activities is a priority—sustainable purchasing, which is the purchase of sustainable products and services.

3.8 *Medical Waste Management:*

Between traditional hospitals and sustainable hospitals [[15]],[[23]] Healthcare waste will first be classified (according to the following general classifications) into sharps waste, pathological waste, other infectious waste, pharmaceutical waste: including cytotoxic waste, hazardous chemical waste, radioactive waste, and general (non-hazardous) waste. The recipient may wonder the following: **How much medical waste does a regular hospital produce? Evaluation of waste generation rate data from around the world shows that about 0.5 kg per bed per day is produced in hospitals**. The basic composition of waste varies greatly depending on the local context, with high-income countries generating much higher levels of waste and plastics, for example, often making up more than half of all medical waste. Because of this huge diversity, there is no one better solution for dealing with medical waste. The abstract provides a robust methodology for analyzing the needs of healthcare waste generation, formation, and disposal and selecting appropriate technologies as part of a local waste management system. The basic processes involved in the treatment of healthcare waste: There are four basic processes involved in treating healthcare waste: Thermal, chemical, radiological, and biological processes, a study [[24]] showed that it allows the use of environmentally friendly treatment devices to treat waste.

1. **Thermal treatment** of infectious and acute medical waste by: wet heat treatment, steam sterilization (Autoclave) dry heat treatment.
2. **Microwave Irradiation**.

- The devices mentioned above must be coupled with a waste shredder before or after sterilization.
- The devices and equipment referred to above must conform to the standards and technical rules issued by the Standards and Metrology Institution.
- An inspection certificate for environmentally friendly alternative medical waste treatment devices must be provided by an internationally or locally accredited body by the quality system (ISO 17025). Wikipedia
- The Efficiency of Testing and Calibration Laboratories) and according to specifications and standards [25]or the general requirements for the competence of testing and calibration laboratories are the specification for laboratories or measuring laboratories.
- The supplier of the processing device must train the staff who will operate the device in health facilities or the commercial facility in a way that ensures the sustainability of the device's work and performance according to the technical specifications of the device and the conditions of the manufacturer and supervision of the device. Wikipedia

4. The Four Axis: The Practical study:

Two Educational hospitals in Baghdad were selected to study the possibility of applying the elements of sustainability: Al-Karama Educational Hospital and Al-

Kindi Educational Hospital, Table (8) lists the description of the mentioned hospitals in Iraq.

As mentioned earlier in this research, the green hospital meets all environmental sustainability requirements. The World Health Organization (WHO) indicated in its guide issued in 2017 on how to achieve environmental sustainability (which is concerned with environmental issues) in hospitals and healthcare buildings, which enhances the efficiency of the health system, and to achieve it, all pollutants resulting from hospital buildings that negatively affect the external environment identified by the World Health Organization must first be treated and managed according to the percentages mentioned, which are as follows; table (9) lists all the requirements of a sustainable environment (green hospital)

As the research applies the table items above to the two hospitals, table (9) items in the table were studied the reality of the situation of the mentioned hospitals, and through the officials of the maintenance and services divisions, we were provided with the following results:

4.1 *Discussion of the findings that emerged from the empirical study:*

1. Regarding the waste management section, Al-Karama Hospital got (8 out of 12) % and Al-Kindi Hospital (9.6 out of 12) %, and it was found that there is no waste recycling in both hospitals.
2. Paragraph (2) containing the sewage system, both hospitals got (0 out of 3) % due to the absence of a hazardous liquids drainage system and a toxic drug waste drainage system.
3. Paragraph (3) of the table containing reducing carbon emissions Karama Teaching Hospital got (21.3 out of 71) % and Al Kindi Hospital (28.4 out of 71) %, where it was found that both hospitals do not use green architectural techniques, do not use an alternative, do not have renewable energy, do not care about sustainable transportation, and avoid the use of toxic substances.
4. Paragraph (4) of the table containing: Reduction of toxic compounds Al-Karama Teaching Hospital got (1.8 out of 2) %, and Al-Kindi Hospital got (0.5 out of 2) %, where the disposal of toxic compounds is not available in Al-Kindi Educational g Hospital, and there are no devices or technologies for it.

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5) The final findings are 31.1% for Karama Teaching Hospital and 45.7% for Al Kindi Teaching Hospital, **Meaning that Both Hospitals do not achieve the environmental sustainability indicators recommended by the World Health Organization and need great efforts and the introduction of modern technologies to achieve environmental sustainability requirements**.

5. Conclusions:

The research reached the following points: The application of the elements of sustainability (Green Buildings) in Educational Hospitals is different from one region to another, and Two Educational Hospitals cannot achieve the same materials because they are natural resources available in that region.

- Careful application of one of the sustainability standards (BREEAM, LEED, Pearl bead Standard), as the achievement of sustainability principles, is from the stages of planning, design, implementation and construction, finishes, maintenance, and not only in the construction stages.

- The Establishment of a sustainable hospital requires achieving the principles of sustainability during the construction stages, such as transporting materials, maintaining the cleanliness of the site during work, and avoiding the introduction of cars emitting toxic

gases within the fence of the site to maintain a clean and carbon-free environment for people in the neighboring residential neighborhood and raising awareness and educating people, including patients, visitors, doctors, and nursing staff, in maintaining the cleanliness of the hospital and avoiding throwing cigarette butts and waste except in their designated places.

- Educating the Service Team about the importance of waste control and allocating sanitary landfills for disposal according to modern methods includes providing incinerators conforming to the conditions required by the It consists of the provision of incinerators working to the requirements Needed for the Technique of Burning and According to the standards of the Ministry of Environment.

5.1 *Recommendations:*

The research recommends the following points:

1. To study the possibility of achieving the elements of sustainability in one of the educational hospitals currently implemented and give it one of the particular evaluation criteria (BREEAM, LEED, PEARL BEADS standard) to achieve sustainability orally to achieve the environmental quality required for the internal and external spaces within the hospital fence.
2. It must keep pace with the rapid development in the application of the elements of sustainability, which must not stop at the establishment of the hospital only but must be achieved continuously, which includes the disposal of useless consumables and replacement of them with available natural materials that can be recycled.
3. The necessity of installing lighting and cooling sensors to turn off the electric lighting in the morning and introduce the best amount of natural light to the rooms, lobbies, and the rest of the departments of the teaching hospital.
4. Work as much as possible in introducing green spaces and forming gardens that include plantings suitable for the region's atmosphere of flowers and fruit trees to achieve the best view of the

- Rooms and spaces that make up the hospital departments.

- The water used within the hospital departments must be saved to be used in :**Table(5):** shows the description of the **Table (6)** lists the requirements of green hospital \ researchers from WHO 2017

Table 5: shows the description of the

Nom	Hospital name \ beds	Description
1	Al- karama hospital T 445 bed	**Baghdad –al karagh- street 6 – near Haifa Street, beside College of density – Almustansyria university**
2	Al-kindi educational hospital \ 400 beds	**Baghdad- al Russafa – Albab al-Sharqi near Alkindi Medicine College**

Table 6: shows the description of the lists the requirements of green hospital \ researchers from WHO 2017

Percentage from standard	Ways to achieve the standard	Percentage from standard	Standard	
%60	Rubbish construction	12%	Waste Management	1
%30	Medical waste			
%10	Recycling			
%70	Separation fluid	%3	Sewage Treatment	2
%30	Treatment chemical drug			
%54	Saving energy	71%	Gas Emission Reduction	3
%17	Green architecture techniques			
%17	Renewable and alternative energy			
%6	Sustainable transit			
%6	Toxic materials			
%20	Friendly material chemical	2%	Toxic Chemicals	4
%80	Throw out toxic materials			
%20	Recycling water	12%	Water Consumption	5
%50	Quality components			
%30	Sustainable fixture			
% 100		**Total**		

Table7: The application of WHO indecators for 2 educational hospitals in Iraq:

N.	Standard	Alkindi hosp.		AlKarama hosp.		Percentage from standard	Ways to achieve the standard	Percentage from standard
1	Waste Management	%9.6	%50	%8	%60	%60	Rubbish construction	12%
			%30		%10	%30	Medical waste	
			0		%0	%10	Recycling	
2	Sewage Treatment	%0	0	%0	%0	%70	Separation fluid	%3
			0		%0	%30	Treatment chemical drug	
3	Gas Emission Reduction	%28.4	%30	21.3 %	%20	%54	Saving energy	71%
			%10		%0	%17	Green architecture techniques	
			0		%10	%17	Renewable and alternative energy	
			0		%0	%6	Sustainable transit	
			0		%0	%6	Toxic materials	
4	Toxic Chemicals	%0.5	%15	1.8 %	%10	%20	Friendly material chemical	2%
			%10		%80	%80	Throw out toxic materials	
5	Water Consumption	%7.2	%0	%0	%0	%20	Recycling water	12%
			%30		%0	%50	Quality components	
			%20		%0	%30	Sustainable fixture	
To tal		45.7%			31.1%			

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تطبيق مؤشرات المبنى الاخضر على المستشفيات التعليمية في العراق.

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الخلاصة : ان تحقيق الجودة العالية في البيئات الداخلية للمستشفى التعليمي هي مهمة المهندس المعماري وبالتوازي مع تطبيق معايير الاستدامة والبناء الاخضر التي اجتاحت كل مفاهيم العمارة وجب تطبيقها في ابنية المستشفيات حيث ان الجودة العالية للبيئة الداخلية هو مفهوم واسع ويشمل كل مقومات البيئة الداخلية (الراحة الحرارية , الراحة الصوتية , الالوان , التهوية الطبيعية ,النظافة والتخلص من النفايات) ولكي يستمتع المريض وذويه بالوقت داخل المستشفى تعد مهمة المهندس المعماري في جعل هذه الابنية صديقة للإنسان وبيئته ,يهدف البحث الى توضيح تطبيق معايير البيئة الداخلية في المستشفى التعليمي , واهمية المحافظة على البيئة التي تحيط مبنى المستشفى اسوة بالحفاظ على اقسام المستشفى وجب ادخال هذه المستشفيات بمفاهيم الاستدامة والمبنى الاخضر . حيث ان تواجد عدد كبير من الناس داخل المستشفى التعليمي يوازي التخلص من الفضلات التي تنتجها هذه الابنية جراء تقديم الخدمات الطبية والتشخيصية والتمريضية والعلاجية.

الكلمات المفتاحية : العمارة الخضراء , الاستدامة , عناصر الاستدامة , البيئة الداخلية , الجودة