

Analytical study of the quality of the internal environment in the house according to the standards of the Jordanian Green Building Guide

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Summary:

The term indoor environmental quality is often confused with the term indoor air quality, but the term indoor environmental quality is larger and more comprehensive than the term indoor air quality, indoor air quality is a main part of indoor environmental quality which includes indoor air quality, the sustainable design has focused on the issue of the quality of the interior environment, as the sustainable interior design provides for achieving the quality of the interior environment by applying some special standards that are concerned with the quality of the interior air and the requirements of human comfort, the principle of internal environmental quality stipulates ensuring an internal environment in the dwelling that satisfies its residents, and this is done by providing fresh air inside the dwelling that does not cause harm to humans, by ensuring a good ventilation for the house, using building materials, interior finishing materials, furniture with low emissions and volatile materials, the requirement of thermal comfort should also be fulfilled by the temperature and humidity appropriate to the physiology of the human body. It is also necessary to secure the appropriate amount of lighting in the interior spaces of the dwelling by relying on natural lighting during the day.

Achieving indoor environmental quality helps reduce the amount of energy consumed inside the dwelling, maintaining human health and preserving the natural environment, the quality of the internal environment is achieved by taking advantage of the climatic characteristics of the place in which the house is to be constructed. Climatic characteristics mean the movement of the sun and the movement of the prevailing winds, as these elements must be used to help achieve the quality of the internal environment, the Jordanian guide for green buildings stipulated that the quality of the internal environment is met through some special standards, as these standards clarify the method of achieving the quality of the internal environment in the dwelling, it also evaluates it through earned points that show the extent to which the internal environment of the residence is compatible with these standards.

The most important results obtained through the research were that the application of the internal environment quality standards of the Jordanian standard for green buildings benefits

the natural environment and the residents of these dwellings. The standards of the guide help to provide a healthy indoor environment that is free of contaminants and meets human comfort requirements.

Keywords:

Sustainable interior design / Indoor environment quality / Jordan green building Guide.

Introduction:

The problem of indoor environmental quality emerged after the Industrial Revolution, environmentally incompatible raw materials were used, HVAC systems have also emerged that focus on saving energy through closing the building and cooling the indoor air and re-without renewing it. This caused the emergence of some new diseases that were not previously known, such as asthma due to the increased concentration of pollutants inside the house.

It is worth noting that indoor air pollution is more dangerous than outdoor air pollution, this is because the concentration of pollutants in the indoor air is more than in the air outside the house, also, a person spends most of his day indoors or in closed places, which makes him/her vulnerable to these pollutants for long periods of exposure, which causes great damage to his respiratory system, especially in children, hence the urgent need to create a healthy environment inside the dwelling that does not cause harm to humans. This is done by achieving the minimum concentration of pollutants in the indoor air of the house, thermal comfort requirements must also be achieved through adequate temperature and humidity while conserving energy, also, good levels of illumination must be achieved in the interior of the house.

Statement of the problem:

- Most Jordanian houses ignore the application of the internal environmental quality standards of the Jordanian Guide for Green Buildings in their interior design vocabulary.

Significance:

- The importance of the research lies in its approach to a problem related to real life in the Hashemite Kingdom of Jordan, as most of the houses that are currently existing or that are being built are unsustainable housing that do not meet the internal environment quality standards of the Jordanian Guide for Green Buildings.

Objectives:

- Shedding light on the terms and standards of the internal environment quality of the Jordanian Guide for Green Buildings in order to reach a healthy internal environment that meets the requirements of human comfort within the Jordanian dwelling.

Hypothesis:

- Applying the internal environmental quality standards of the Jordanian Guide for Green Buildings to houses leads to raising the efficiency of air quality in its indoor spaces, which will positively affect the health of its residents.

Methodology:

- Descriptive-analytical approach: through the descriptive study of the research problem and its elements, and analysis of a house model, in order to reach design solutions to the research problem.

Search limits:

Spatial boundaries: The Hashemite Kingdom of Jordan, Amman Governorate.

Research topic:**1. The concept of indoor environmental quality:**

Quality of the indoor environment is defined by the American Heating, Refrigerating and Air Conditioning Engineering Authority (ASHRAE) as "in a manner in which the health and comfort of the building users are achieved. According to this authority, acceptable air quality is the one in which the satisfaction rate is achieved to 80% or more of the building users, as well as the absence of any pollutants at a concentration above the harmful level.

The Jordanian Green Building Guide is a balanced, nonprofit coalition of the building industry promoting the understanding, development, and accelerated implementation of green building policies, programs, technologies standards, and design practices on a national basis, since its formation in 2009.

The Jordanian Green Building Guide deals with the issue of internal environmental quality because of its importance, because it affects human health directly.

With potentially hundreds of different contaminants present in indoor air, identifying indoor air quality (IAQ) problems and developing solutions is extremely difficult.¹ The study of indoor air quality is a relatively recent endeavor. Although much is known about the health effects of poor design and ways to overcome them through good design, a tremendous amount of research is needed in this complicated field. Over the in the past few years, many entities have made great efforts to promote research and science in this field, including the Hashemite Kingdom of Jordan. (7. p: 11)

This research attempts to provide guidance for improving the IAQ, in order to achieve a healthy indoor environment that meets human comfort requirements.

The quality of the internal environment in the house is achieved by providing a set of elements, which are as follows:**1-1. Temperature:**

The indoor air temperature is one of the most important elements of the quality of the internal environment, as it causes a feeling of distress if it rises above the required limit, and if it falls below the required limit, it causes a feeling of coldness and uneasiness, and it is worth noting that the appropriate air temperature for the human body ranges between (20-22) Celsius.

1-2. Air humidity:

In addition to providing indoor air at an appropriate temperature, an appropriate humidity percentage must be secured to achieve the quality of the internal environment. The appropriate humidity ratio for human body ranges between (40% -70%). (11. p: 34-35)

1-3. Speed of air movement:

A person feels thermal comfort when the wind speed is 0.03 m / s when the humidity is 40% -70%, this percentage increases as the percentage of humidity in the air increases.

1-4. Reducing pollutants in indoor air:

Increasing the percentage of pollutants in the indoor air of the dwelling causes many problems for human health, such as asthma, headaches, and respiratory disorders, and these pollutants are produced from several sources, as follows:

1-4-1. Building materials: Unsustainable building materials emit many pollutants, such as volatile organic compounds that cause harm to human health when inhaled.

1-4-2. Home heating and cooking: Fossil fuels are burned in the process of heating the house and cooking, and when it is burned, it produces toxic gases such as carbon dioxide, which causes harm to human health in the event that the concentration percentage exceeds the permissible limit in the internal life of the house.

1-4-3. Tobacco smoke: Tobacco smoke is one of the indoor air pollutants in the house.

1-4-4. Breathing: Respiration produces carbon dioxide, which may lead to an increase in the concentration of this gas in the internal spaces of the house.

1-4-5. Insecticide and air freshener: The use of air fresheners and insect repellants inside the houses causes indoor air pollution with volatile organic compounds that may cause damage to the human respiratory system if inhaled for a long period of time.

To avoid increasing the concentration of these pollutants inside the dwelling, good natural ventilation must be provided to the houses, which helps to provide good air quality through the constant renewal of the air in the internal spaces.

1-5. Natural luminance efficiency:

It is also necessary to take advantage of natural lighting to achieve the quality of the internal environment, as using it leads to saving energy consumed in lighting the home and also helps to improve the psychological state and strengthen immunity.

1-6. Achieve visual communication between the internal environment and the external environment:

achieving visual communication between the internal environment of the dwelling as well as the natural environment surrounding it helps to achieve the quality of the internal environment, as the invisible green spaces provide visual and psychological comfort for the person. (9. p: 320-341)

The quality of the internal environment is achieved by securing all the previous requirements through protection and design treatments, and the percentage of achieving these requirements is measured through evaluation systems such as the Jordanian Guide for Green Buildings.

2. Jordanian Guide for Green Buildings:

It is a comprehensive evaluation system that was developed by the National Council for Green Buildings in cooperation with the Jordanian Engineers Association with partners from the public and private sectors. This council is a non-profit and non-governmental organization, and this guide was completed in 2009.

The Jordanian directory contains a set of items that help achieve the quality of the internal environment, and these items also give points in terms of applying them correctly. These points express the level of providing a healthy internal environment in the dwelling, these items are as follows:

2-1. Ventilation:

This clause provides for the provision of adequate ventilation in the home, which has been estimated by the global concerned parties at a rate of 2 liters / square meter / second, and also provides for the prevention of smoking in the interior spaces of the dwelling, and also provides for the provision of an excessive ventilation rate of 40% over the percentage specified by the authority competent, and the housing is awarded four points in the event of achieving the above.

2-2. Thermal comfort:

This clause provides for the creation of a thermal control system that provides temperature grades between (20-22) degrees Celsius and relative humidity between (40% -70%) with no less than 50% of the total housing area, and the house is awarded two points if applied.

2-3. Natural luminance:

Natural lighting must be provided in at least 70% of the total area of the dwelling at a rate of 270 lux. and the house is awarded four points if this clause is applied.

Providing an automatic system that controls the intensity of natural lighting in order to avoid visual dazzling in at least 70% of the housing area, and the house is given two points if this clause is applied.

2-4. Materials and resources:

This clause provides for the use of construction materials with low emissions in order to preserve human health, and these materials are as follows:

2-4-1: The use of sealing materials and adhesives that do not contain volatile substances more than 50 g / liter, the house is awarded two points if this clause is applied.

2-4-2: The paints and dyes used inside the dwelling must not contain volatile substances more than 100 g / liter. The dwelling is awarded two points if this clause is applied.

2-4-3: The carpet installed inside the housing must not contain volatile substances more than 50 g / liter, the dwelling is awarded two points if this clause is applied.

The total points earned in case of using low-emission materials are six points, and the total points awarded by the Jordanian Green Building Index for the quality of the indoor environment in the dwelling are eighteen points.

The search ends with the following results:

-The quality of the indoor environment is achieved through achieving a set of elements, which are thermal comfort inside the dwelling, and ensuring fresh air free of pollutants, and daytime lighting must also be employed in the interior spaces of the houses.

- To achieve the quality of the internal environment, the house must be directed and the special architectural openings in it must be directed in proportion to the environmental conditions prevailing in the place in which the house is to be constructed.

Achieving the quality of the internal environment in the house leads to preserving the health of its residents and enhancing their sense of satisfaction and happiness.

- The application of the internal environmental quality standards of the Jordanian Guide for Green Buildings creates a healthy internal environment in the interior spaces of the house.

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