Leveraging digital technology to achieve sustainable interactive work environments

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summary

The importance of work environments stems from their central role in inclusive and sustainable economic growth, which is important in advancing the process of progress and achieving the eighth goal of sustainable development, as well as the importance of environments of Internal work in its area, the number of occupants, whether employees or an audience, means these buildings and the number of hours spent by the individual within his work environment and its reflection on the "health- safety- comfort" of the occupants of the vacuum and raising the level of competence of the workers, so attention had to be paid to design aspect of work environment and thinking at a level, which is certainly reflected in the choice of direction of design solution that suits each work area and the role it plays.

Design trends for work environments have evolved upwards and downwards, negatively and positively as a result of the many political, economic and social conditions prevailing in each time. One of the most important contemporary design trends has been "sustainable design - environmentally friendly design", because of its positive impact on the environment, individual health and economic development. Hence the problem of researching how to apply sustainability principles and standards within internal work environments? How can modern digital technology be used to achieve a sustainable interactive work environment, so that we can keep up with the rapid development in this area? The importance of research lies in the study of the digital technology and technology that is needed in the design of work environments regarding energy and environmental design system (LEED). Therefore, the research aims to achieve the concept of sustainability within work environments to reduce harmful emissions, energy consumption, and the research has reached the use of marginal technologies within work environments that play an important role in achieving many of the requirements of Internal design and in accordance with the system of water and environmental design (LEED) as it works to provide energy and water and improve the environment and achieve the required human, organic and psychological comfort.

Keywords:

Interior Work Environments - Sustainable Work Environments - LEED System -Interactive Work Environments.

Research problem:

The research problem lies in a developed environment friendly work environment that matches the language of our surroundings. The research raises several questions:

1- Using the left side in using energy, rationalizing energy and creating an environment.

2- How to apply the principles of sustainability within the internal work environments, as well as how to obtain a modern and sustainable work environment?

Research importance

1- Studying the impact of modern digital technologies and technology on designing work environments on the Leadership in Energy and Environmental Design (LEED) system.

Research goal:

Achieving the concept of sustainability within work environments to reduce harmful emissions, energy consumption and access to the impact of using modern technologies within work environments in the Leadership in Energy and Environmental Design (LEED) system, to make work environments environmentally and technologically compatible and keep pace with development in this field.

Research hypotheses:

Integrating technology and the environment, and creating a balance between them that leads to raising the efficiency of work environments and benefiting from modern technologies capable of achieving the concept of sustainability within work environments and making them more efficient environments.

Research Methodology:

The research follows the descriptive analytical approach of the most important contemporary trends in the design of internal work environments, and analysis of models of sustainable work environments.

Introduction

Creative aspects, human, social and technological development have combined to shape contemporary internal working environments, bringing about an unprecedented technologically driven transformation in recent years.

It also changed the understanding of the working spaces to "places to work", and the internal design of the working environments has recently seen a shift from the creation of long-lasting places to the design of spaces based on the realization of different dimensions and criteria of: (achieving) Sustainability standards for creating high-quality spaces adapted to the continuous development of sustainable style - obtaining certifications for environmentally friendly buildings - attention to the professionalism of workers and raising their efficiency - integrating and utilizing modern digital technology within the process of interior design), this development performed a cycle to which are the reduced ways of working. The interest in designing human-centered work environments (Design Centered Human), natural elements and daylight, improving the quality of the internal environment, maintaining the physical and psychological health of the workers has become a boost to participation, creativity, innovation and belonging to the organization.

The vision for the future of the working environment is focused on inspiring its employees, supporting cooperation between them, and having the flexibility to absorb continuous

technological development and achieve a sustainable environment that takes into account the environmental, human and economic aspects. Therefore, the work environment must be a healthy and vibrant environment that helps reduce stress and increase focus by integrating nature into building a design to create interior spaces that enhance a greater level of interdependence with natural elements, taking into account the use of energy-saving design strategies, and directing efforts to achieve social design objectives because of the ability of the interior environment to influence levels of physical and mental activities.

1- The most important trends affecting the designs of the interior work environments in the millennium

Human activity is one of the greatest challenges facing the designer to strengthen and direct it; To change people's beliefs and behavior towards sustainability and by taking advantage of advanced modern technologies that can promote sustainable behaviors, as well as environmental studies, psychology, energy efficiency, green buildings and equality are providing a solution by providing suggestions for designing regulated systems in the work environments of workplace energy delivery while achieving the quality of indoor environment, indoor environment quality is achieved in both lighting, temperature and ventilation. A more natural and environmentally friendly work environment can also be achieved by integrating green nature into the working environment through large windows, which also allow the entry of air and natural light, according to researchers from Carnegie Mellon University. "The Rocky Mountain" helps us maintain our Circadian Rhythms, which in turn reduce stress and reduce respiratory diseases, asthma and allergies. Therefore, attention has been paid since the beginning of the millenniums to the trends that are keen to achieve principles of sustainability and use modern technology to achieve those principles.

1-2 Interior design for sustainable work environments

Through sustainable development, we find a new definition of sustainability by involving all levels of environmental systems, management system and all members of the workforce, to attribute the culture of responsibility towards society and to raise awareness within internal work environments to reflect on how to achieve the principles of sustainability.

To achieve the eighth goal of sustainable development and to achieve decent work for economic growth, the combination of the wellbeing culture, sustainable design and the echoing environments of eco-friendly offices Filled with biophilic design, which prevails during this period by providing the right furniture, taking care of recycling, and making sure that the exiles are reduced, this has enabled companies to build sustainable workplaces that make employees happy and healthy; This, in turn, will help maintain sustainable workforce. To achieve sustainability in the field of interior design of work environments requires a great deal of effort as it is the most environmentally harmful environment and can affect the health of its personnel, and from guiding the construction industry towards a more sustainable working environment, through the development of standards and systems to assess the sustainable dimension of the environment globally and locally. Of global standards: (BREEAM-LEED), local standards system (Green Pyramid GPRS).

Picture 1: Smart Dubai Offices, illustrating the interior design of sustainable work environments

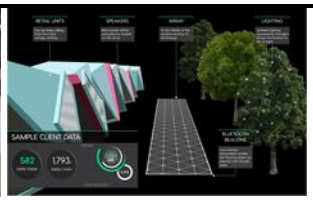
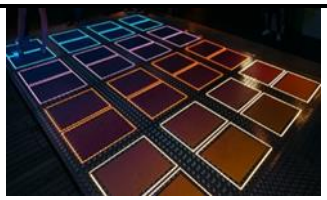
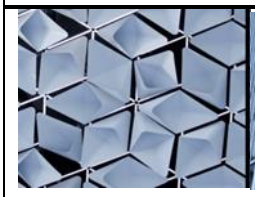
1-3 Eco-Friendly Offices

Where the world has witnessed rapid and great development in the realization of great technological elements in work environments, but with concern about the interaction of this in the ecosystem; By adopting a more environmentally friendly design approach and passive design methods and using renewable energy sources to achieve environmentally friendly offices.

Picture2: Hayden Place Cunningham Group illustrates an example of eco-friendly work environments featuring naturally airy and daylighting. The Cuningham Group worked with REThink Development to integrate sustainable technologies

2- Models of how digital technology can be used to achieve a sustainable working environment

Digital technology to achieve a sustainable interactive work environment	Interior design elements for the working environment
 Use of CEC Customer Experience Centers, which achieves the element of innovation, collaborative work and data and information sharing among workers within the work environment,	**Walls**
 Using Smart Glass technology, which can maximize natural light through strategic use, reduce the building's dependence on artificial lighting.	

   The use of interactive floors that generate energy is a new technology that works to interact with humans and daily activities that they perform. These high-tech floors contain sensors and electronics that detect movement and convert it into electricity.	**Floor**
   Smart Ceiling: The kinetic ceiling "CELIA" design "AI planetworks" for AI networks responds to external stimulation, it is a "computer-optimized luminous interactive architecture", where CELIA processes sensor data to generate motion and lighting patterns .	**Ceiling**

3- Models of work environments that have benefited from digital technology to achieve sustainable interactive work environments

PLP Architecture was commissioned to design (The Edge, Deloitte's new offices in Zuidas, Amsterdam's business center). The ambition of the project was two-fold: To consolidate Deloitte's employees, previously spread around multiple buildings throughout the city, within a single environment; and to create a 'smart building', intended as a catalyst for Deloitte's transition into the digital age.

In the Edge, employees no longer have assigned desks. This allows them to work anywhere in the building in varying levels of introspection or sociability: there are work-booths, focus rooms, concentration rooms, sitting desks, standing desks, balcony desks, along with the many work-stations within the sun-filled atrium itself. The building adapts to the users' preferences for lighting and heating via a mobile app, which also allows users to locate their colleagues and find free desks. The combination of app and architecture supports activity-based working: Employees actively choose the environment, mood and atmosphere they want to work in for different tasks throughout the day.

4- Apply digital technology to make the most of designing a sustainable interactive work environment:

The proposed application of digital technology to make the most of designing a sustainable interactive work environment	
▪ **Sustainable design: T**aking into account the environmental aspect of the design process for working environments and achieving sustainability principles. ▪ **Interactive Interior Design:** Digital technology can be used to achieve the principles of sustainability within work environments by integrating them into the interior design process to make the work environment interactive and sustainable through control through the use of sensors - the Internet of things - smart materials - interactive surfaces, solar panels and other modern technologies.	**Interior design of the working environment**
▪ Using sensors to control design elements within the work environment, for example (lighting - ventilation and air conditioning devices - entering natural light - temperature - ....), to save and maintain energy within the work environment.	**Using sensors**
▪ Using Internet of Things (IoT) technology to communicate with all devices that can work on the Internet and that can collect, send and process the data it captures from its surrounding environment.	**Use of the Internet of Things**
▪ Using photovoltaic panels to convert solar energy directly into electrical energy, taking advantage of the photovoltaic effect. The resulting electrical energy can be stored in huge batteries for use in the absence of the sun. ▪ Using systems with high energy efficiency with simulation of energy consumption inside the building before construction.	**Use of renewable energy systems**

Research results:

1- The use of modern technologies in work environments plays an important role in achieving many interior design requirements, in line with the Leadership in Energy and Environmental Design (LEED) system, as well as working to save energy and water, improve the environment, and achieve the required human, organic and psychological comfort.

2- Modern digital technology has achieved "The Internet of Things" within work environments in the form of digital panels that control temperature, water consumption and window shades "The Shades Window", which contributes to saving energy and increasing sustainability.