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Araştırma Makalesi

Suriye'de Yeşil Binalar Uygulanması İçin Öneriler

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Özet

Bu çalışma Suriye'de yeşil binaların yapılmasına yönelik önerileri içermektedir. Çalışma kapsamında, Suriye şehirlerinde yeşil binaların uygulanmasını teşvik etmek için yeşil binalar kavramı açıklanmıştır. Türkiye'deki yeşil binalar içerisinde Siemens Gebze tesisi örnek çalışma olarak alınmıştır. Bu örnek çalışma incelenmiş ve LEED sertifikasyon kriterlerine göre değerlendirilmiştir. Çalışmada söz konusu yeşil binaların enerji ve su kullanımı, arıtımı, atık yönetimi ve geri dönüşümü için değerlendirme sonucuna göre önerileri verilmiştir. Suriye şehirlerinde yeşil binaların uygulanması önerileri anlatılmıştır.
Anahtar Kelimeler: Yeşil binalar, sürdürülebilirlik, leed, öneriler

Recommendations For Constructing Green Buildings in Syria

Abstract

This study contains suggestions for the construction of green buildings in Syria. Within the scope of the study, the concept of green buildings is explained to encourage the implementation of green buildings in Syrian cities. Siemens Gebze facilities was taken as a case study in green building in Turkey, this case study was examined according to the LEED certification criteria. In the study, the suggestions of these green buildings for energy and water use, treatment, waste management and recycling are given according to the evaluation results and explain the suggestions for implementing green buildings in the cities of Syria.

Keywords: Green buildings, sustainability, leed, recommendation

INTRODUCTION

In a developing country like Syria, more of our resources will be consumed. The environment, society and the place we live in. Humans need shelter, heating and consumption. As a result, waste generates and rates of environmental pollution increase, as life continues it will drain resources, so we need to provide the resources, what we consume and what we have created. We need to make it reusable and to make the environment permanent Livable to leave a sustainable environment for future generation and this is known as sustainability (Pamuk and Kuruoglu, 2016). Environmental awareness can be said to be the topic of the agenda for the last thirty years. Because of the consumption-oriented community structure, visible environmental changes and the rapid depletion of energy resources have increased awareness of this problem. The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) shows that, with continued global policies and measures, total greenhouse gas emissions will rise from 25% to 90% in 2000 by 2030. It is clear that it will be exceeded (Bernstein et al., 2008). Which called on the international community to move towards sustainable development in all sectors, most notably the construction sector, which It represents the highest percentage of global environmental pollution through our direction to build eco-friendly green buildings that reduce environmental impact and provide a livable environment. Pamuk and Kuruoglu (2016) Studies made to make the project completely sustainable confirmed that it must be cost-effective, environmentally, economically, and socially effective in the planning, construction, and demolition stages, and emphasized this in the examples it gave (Yudelson, 2007). According to the study he did, the rate of energy reduction in green buildings is 50%, so resources can be used more efficiently than conventional buildings. This makes green buildings effective in protecting money and the environment (Yaman, 2009). In this study he talked about the definition of the concept of sustainability and conducted a survey on the effectiveness of green buildings in saving energy and gave an example that confirmed his study. Syria's construction sector suffers from control of traditional methods and systems that negatively impact on the environment and consume many natural resources and unsustainable construction materials, which do not fit the climate, healthy and environmental requirements of the residents. Which requires an orientation towards the application of the green building in the Syrian cities, in line with the technological progress in the fields of construction and building materials. From this concept, the aim of this study is to demonstrate the importance of the trend towards green buildings in Syria, and setting recommendations for their applicability in Syria.

Research methodology

In the research methodology, we will rely on Turkey's green building construction system according to LEED certification standards due to the great convergence between Syria and Turkey geographically, environmentally and climate.

Sustainability and green buildings concepts

There are several approaches to sustainability based on the concept of green buildings, there are two approaches (Vale, 1991). The architectural approach consists of land use efficiency, water and energy conservation, Application of building materials used in construction process to

reuse it (recycled materials concept). Mechanical and electrical approaches, on the other hand, consist of alternative energies that reduce the dependence on electricity use of state-owned (Setyowati et al., 2013). Green buildings are buildings that use sustainable materials to create them, using natural resources during construction and utilization. This building does not cause environmental pollution, or it may be resources for other structures after the demolition or return to its place in nature without damaging the environment, achieving the principles of environmental and economic sustainability in harmony with the sustainable architectural orientation.

One of the most important reasons to build the green buildings is to drain resources and increased) CO_2 emissions, Buildings make up over 40% of the world's total carbon footprint and are the most important element of global warming. The United States, European countries, India and Canada are among the largest contributors to greenhouse gas emissions in the world (Yudelson, 2007). According to the American Green Building Council data, the annual direct impacts of all residential and commercial buildings include 39% of total energy use, 68% of electricity consumption and 30% of greenhouse gas emissions (Yudelson, 2007). And 40-50% of the total (CO_2) emissions from developed countries will be derived from the use of energy inside the buildings (Strong and Burrows, 2007).

Green building advantages

Greenhouse buildings have many advantages, the most important of which is the use of low energy, which leads to greenhouse gas phenomena, ozone depletion, and reduced biodiversity damage. It helps reduce damage to the environment in the city, thus saving water and purifying the air, and reducing energy consumption (Almusaed and Almssad, 2006), Compared to traditional buildings, the rate of energy reduction in green buildings is 50% and therefore resources can be used more efficiently than traditional buildings. This makes green buildings effective in protecting money and the environment. The green building is of high quality, long lasting, low cost in operation and maintenance, and provides residents comfort and satisfaction (Hui, 2002). Green buildings can greatly save energy bills for residents for a long time, especially for retirees and the elderly who spend more time at home and consume more energy. More importantly, green homes provide them with appropriate health and environmental standards (Zuo et al.,).

Obstacles to the construction of green buildings in Syria

The control of traditional systems on the construction sector in Syria has prevented the trend towards build the green buildings in Syrian cities, in addition to that the general obstacles to build green buildings. One of these obstacles is the absence or weakness in the laws and building regulations for green buildings. Lack of technical knowledge of contractors and technicians due to the lack of knowledge of green buildings. In addition to the presence of some misconceptions, many believed that the implementation of green buildings requires a lot of financial investment, that the cost of construction is great and that their marketing is difficult. While a study by the World Council for Climate Research (WGBC) showed (Strong and Burrows, 2017).

-Sustainable green buildings save money by reducing energy and water consumption and lower maintenance costs in the long run.

-Owning buildings that have a sustainability certificate with greater marketing ability.

Green buildings in Turkey

According to Professor Dr. Necdet Altuntop, by Mineral Research and Exploration in 2008 solar house it founded in 1977, in the Directorate General of Marmaris, it is considered as the first example in Turkey (Sümer, 2013). Now in Turkey there are many examples of green buildings. In our study we will take Siemens Gebze facility as an example for green buildings in Turkey according to Leed standards.

Figure 1. Siemens Gebze facility project location

Siemens Gebze facility

Siemens the first building that aims to get the 'LEED Gold Green Building Certificate' from USGBC (Sümer, 2013). Siemens began construction of offices, production and technical buildings in the Gebze industrial area in March 2008 with a total floor area of 35.000 square meters, by applying LEED standards for green buildings in the design and construction phases, eco-friendly and healthy buildings are constructed.

Figure 2. Siemens Gebze facility (Pamuk and Kuruoglu, 2016)

Definition of LEED

The (Leadership in Energy and Environmental Design, LEED) certification system was created as a result of the US Green Building Council (USGBC) founded in the United States in 1993 in search of a system to define and evaluate green buildings in the sustainable building industry (Council, 1993). The first LEED pilot project (LEED, 1.0) was published in 1998, Several modifications have been made to reach the user's LEED 2009 (LEED, 3.0) currently (Çelik, 2009). Thus LEED is a voluntary initiative, and it is a method for evaluating buildings. According to the USGBC, the objectives of LEED are defined as defining the Green Building by creating general passing measurement standard, developing a comprehensive building design approach, and enhancing the orientation of the construction market towards sustainable buildings.

LEED certificate Classifications

The type of LEED certificate depends on the type of building and the scope of the project (Çelik, 2009).

- LEED-NC: (LEED New construction and major renovation).
- LEED-EB: (Existing Buildings pilot)
- LEED-CI: (Commercial Interiors pilot)
- LEED-CS: (Core and Shell pilot)
- LEED-H: (Homes)
- LEED-ND: (Neighborhood Development)
- LEED-R: (Retail)
- LEED-SCH: (Schools)
- LEED- HC: (Healthcare)

LEED evaluation criteria

The LEED rating system provides a framework that takes into account building design, construction and operational stages, and the environmental performance of buildings is evaluated under 7 different categories (Julien, 2009).

Table 1. The table shows the leed certificate categories

LEED Certificate Categories	Point	Total
Sustainable Sites	26	
Water Efficiency	10	
Energy and Atmosphere	35	100
Material and Resources	14	
Indoor Environmental Quality	15	
Innovation and Regional Priority	6	
Regional Priority	4	10
Total		110

- Innovation In Design 5 points can be obtained for innovation, +1 point if LEED AP is used.
- Regional Priority No points outside of the USA can be obtained for this standard (Julien, 2009).

The evaluation is done through a 100-point system. An extra 10 points can also be earned from the Innovation in Design and Local Priority categories. In addition, there are prerequisites that do not bring points, but must be met. Whichever score is targeted, it is necessary to fulfill the basic requirements in order for the project to be accepted in the certificate evaluation. The main requirements and criteria to be met in the LEED project are (Sümer, 2013).

Sustainable sites

Sustainable sites are concerned with the environment surrounding buildings and granting credits to projects that highlight important relationships

between buildings, systems, and ecosystem services and ecosystems. It is concerned with integrating the site with local and regional ecosystems, and keeping the biological diversity upon which natural systems depend.

Water efficiency

This standard is one of the main criteria; selection of indoor equipment for water supply, maintenance, irrigation, etc. throughout the building life cycle. The Water Efficiency category covers water comprehensively for indoor use, outdoor use, and special use. This category takes a "first efficiency" approach to water conservation.

Energy and atmosphere

Energy and the atmosphere cover energy from a comprehensive perspective, work to reduce energy use, use energy-saving strategies in design, and work to find renewable energy sources. Renewable energy use is seeks to reduce fossil fuel use and promote renewable energy use. If at least 1% of the electrical energy required by the building is met by renewable energy systems specific to the building, 1-3 points can be earned. Photovoltaic systems, energies produced from wind, solar, hydro and biological fuels and geothermal energy systems are specified as suitable systems in this criterion.

MATERIAL and METHODS

The main criterion of materials and resources evaluates and focuses on the issues of recyclability, reuse in building materials and resources. Recycled and reusable materials are used to support a life cycle approach that enhances resource efficiency and preserves the environment

Indoor environmental quality

Indoor quality of life criteria include sub-standards aimed at user health and comfort by improving indoor air quality and the use of low emission substances. The green building with a good interior environment protects the health of the residents of the building and ensures their comfort.

Innovation and regional priority

Sustainable design strategies are constantly evolving and advancing. New technologies are constantly entering the market, and the latest scientific research is affecting the building of design systems. The objective of this LEED category is to identify innovative building characteristics and sustainable building strategies. Since some environmental problems are specific to each region, USGBC chapters and volunteers at the LEED International Roundtable have identified clear environmental priorities within that area to address those issues. In LEED projects, a single certificate is obtained after the construction is finished. According to points there are four levels of classification in Leed (Erten, 2010).

Table 2. The table shows the four levels of certification

Levels of certification	point
LEED Certified	40 – 49 points
Silver Level	50 - 59 points
Gold Level	60 - 79 points
Platinum Level	80 points and above

In this study we will present the strategies applied to construct green buildings according to Leed, using the steps that have been implemented by Siemens facility .

- Sustainable sites

Reducing Environmental Pollution in Construction Activities To reduce environmental pollution caused by construction activities, prevent landslide (so that the soil does not pass from the road to the water channels, In order to prevent water pollution, many measures have been taken at the construction site as part of the erosion and sedimentation plan, Some of these are washing truck tires, applying soil settling systems in water channels, in Green Areas an intense greening strategy was followed with local plants and trees with low water consumption.

Figure 3. Environmental pollution reduction in construction activities (Yaman, 2009)

- Water Efficiency

Perforated stones are placing in the parking lot in order to ensure that the rainwater coming to the field passes to the ground and is absorbed by the soil in order to protect the groundwater resources and quality. For the same purpose, to provide and increase water efficiency, incoming rain water was directed to difficult landscape areas (especially asphalt roads) to the soil for be provided and then filtered.

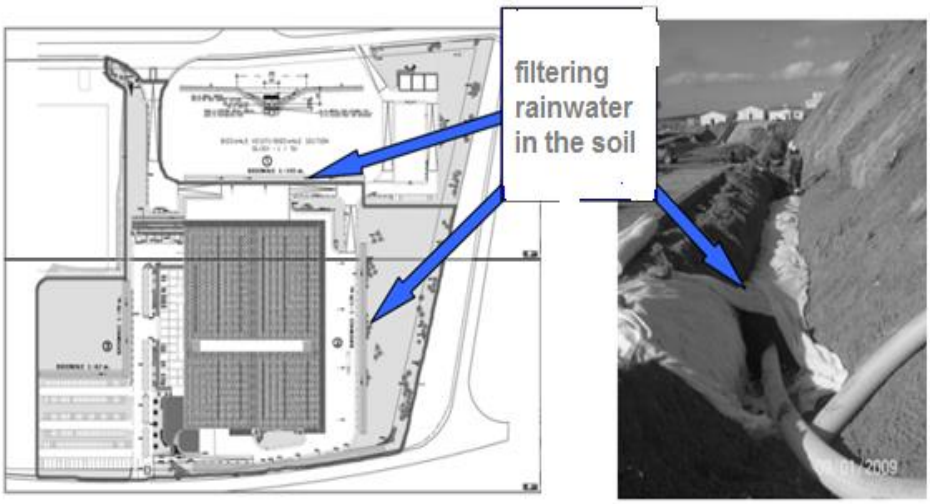

Figure 4. Environmental Pollution Reduction in Construction Activities (Yaman, 2009)

In the figure 4 the water from the purification system was used for garden irrigation, and from this method the rain water will be used via purification system with the implementation of these strategies, 50 % percent of the water was saved in landscape irrigation. Also, in the project water savings with 50 % in construction water have been achieved via choose low - flow toilets, sensors and urinals.

- Energy performance

standards Ashrae have been set in consideration when designing electrical and mechanical appliances, The best energy savings have been achieved as a result of computer aided power modeling, energy savings of 30 % have been achieved according to Ashrae criteria, with this system , lights sensitives to sunlight and movement are used in offices its aims to provide 50 % of the lighting.

- Materials and resources

In this project construction waste was managed within the scope of resource and environmental protection, according to the construction waste management plan, a waste area was created and 75 % of the construction waste can be recycled and collected separately (Altan and İbrahim, 2018).

Use of the recycled materials in order to protect the natural resources, it has been given importance that the materials used in the buildings are made of materials previously used whenever possible. Thus, products made of 35 % of the recycled materials were used, and fossil fuel consumption was banned.

RESULT and DISCUSSION

Through our study of the Siemens Gebze facility, we observe how environmental pollution has been minimized in construction activities, through the use of reusable resources, collecting rain water, use it to irrigate plants, choose local types of plants with low water needs, and use innovative wastewater systems, It is essential that the resources be sustainable in building construction, in order to survive and leave it healthy for future generations. By choosing a sustainable construction site, preserving the environment, and efficiently using water resources Pamuk and Kuruoglu (2016), reduce using carbon dioxide and fossil fuel, protect groundwater resources with rainwater management and management of construction waste through using 35% of recycled materials. Yudelson (2007) According to the study, the rate of energy reduction in green buildings is 50%, so resources can be used more efficiently than conventional buildings, In this study 50% of water and 30 % of energy was saved. Within the scope of this study, the Siemens Gebze facility was assessed according to the internationally recognized LEED certification standards, Water and energy efficiency aspects were also discussed in this project and its advanced features were emphasized. The Siemens Gebze facility project is an important result of the concept of sustainability as a green space in that region where people can spend a comfortable and healthy time in addition to being in a building that produces renewable energy in an industrial area. This project was an important example of sustainability through which we seek to implement and spread the concept of sustainability in Syria. The adoption of green technologies in the Syrian construction sector will contribute to halving the per capita consumption of electrical energy, from water by 40 %, and from heating by 30 %. Whereas green architecture needs energy from self-renewable energy systems from every building. In addition to reducing harmful carbon emissions by 100%. From this standpoint, the adoption of

sustainability technologies through the application of green buildings in Syria has become an important and necessary.

Recommendations for establishing a green building in Syria

After presenting this pioneering experience in the green buildings in Turkey, we see the importance of the orientation towards establishing green buildings in Syria. From this standpoint, this article aims to develop proposals and recommendations for the application of green buildings in Syrian cities.

The article proposes a set of procedures for applying green buildings in Syrian cities.

Forming an organization of engineers and legal experts to:

Enactment of the Green Building law. The law clarifies the concepts of green building and establishes plans and strategies for their implementation.

Using the LEED evaluation system to evaluate green buildings.

Providing legal facilities and providing financial support from the state to urge the public and private sectors to move towards the construction of green buildings.

Establishing institutions and laying the foundations for building green buildings and increasing allocations of funds and investments in this field.

Work on obtaining investments and financial loans to establish green projects from international conferences that support green buildings.

The establishment of training and technical courses for construction cadres specialized in establishing green buildings.

Development of special curriculums for green buildings in universities to clarify the concept and structure of green buildings for engineers who will work in this specialty.

Sending engineers and technicians outside Syria to conduct training courses on green buildings.

Holding seminars to introduce green buildings, their advantages and environmental impacts and their contribution to conserving resources and making the environment sustainable around us.

Make an awareness campaign in the visual and audio means to introduce the community to the green building.

When constructing buildings it is recommended:

Work to take advantage of the special climate enjoyed by Syria and employ the site, the materials and resources available in the field of building green buildings.

Start applying green buildings in Aleppo and Damascus due to the distinctive climate in which these two cities, in addition to being economic cities and have a strategic location in Syria.

Using sustainable and recyclable building materials.

Using building materials made from natural resources, such as the use of wood fibers and insulation materials that use cork boards.

The use of types of paints that depend on the composition of natural oils.

Attempting to convert the available building materials into reusable and sustainable building materials and work to establish factories specialized in sustainable building materials.

Collecting water and work to filter it or use it to irrigate plants, thus improving the efficiency of water use in the building.

Creating gardens on the roof of the building to help reduce and benefit from the heat gained.

Selecting local types of plants with low water needs.
Using solar energy systems to contribute to securing the building's energy needs.
Using the solar collector to get hot water in the building and thus saving energy.
Using air treatment techniques and developing natural ventilation systems.
Using motion-sensing lighting fixtures that aim to conserve energy.

CONCLUSION

The application of procedures in the field of building green buildings in Syria that work to save energy and reduce resource consumption in the construction and post-construction stages will lead to a transition in our country towards sustainable production and sustainable development. Green buildings provide significant benefits in economic, environmental and health terms with low long-term operating costs. The investments and actions aimed at protecting the environment, which are often seen as a burden, are in fact a positive reflection of our future. Important recommendations were made to apply green buildings in Syria. Given the increasing importance of building green buildings in the world, it is expected to start applying them in Syria, Therefore efforts must be made to ensure the required sustainability of our lives and the lives of future generations by establishing the necessary infrastructure and spreading the culture and concept of sustainability.

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