GREEN BUILDING CONCEPT WITH THE WORLD'S LARGEST SEISMIC ISOLATED HOSPITAL IN TURKEY

Kemal Solak[1]

[1a] Atatürk University, Atatürk Üniverstesi Rektörlüğü Yakutiye, Erzurum, Turkey, 25240
[1b] Civil Engineering Department, Politeknik Negeri Jakarta, Jalan Prof. DR. G.A. Siwabessy, Depok, Jawa Barat 16424

e-mail :kemal_solak@yahoo.com[1]

ABSTRACT

Certification systems used to test green buildings have become popular nowadays. In addition, there has been a gradual increase in the involvement of the players in the construction sector and public awareness of sustainability. These systems, which are useful in mitigating the building's environmental impacts, reveal difficulties in their implementation, especially for devoloping countries. Because of the problems affecting the population, such as air pollution and health problems, most world states came together and held conferences to take joint binding decisions. In Turkey, Leadership in Energy and Environmental Design (LEED) is first on the total number of certified green buildings, followed by the Building Research Establishment Environmental Assessment Method (BREEAM) and the German Sustainable Building Council (DGNB). This article summarizes the methodology used by some of these rating methods, shows a comparative approach between these rating systems, and provides an overview of how green building relates to sustainable development practices. Lastly, the building of the hospital was analyzed using LEED certification system as a case study and the differences in the results were evaluated.

Keywords : Green building certification system;Hospital;Green Building;Sustainability

INTRODUCTION

The relationship between man and his world was mostly man trying to adapt the latter to him in a macro or micro-scale, with specific attempts to change and regulate it. Human need to monitor and/or change nature and its climatic characteristics is not just a post-industrial period feature. Human beings have always shaped their environment, just through their life, like other living organisms (Beade, 2019). In addition to this "passive" influence that all creatures have as a result of the universe's thermodynamic balances, human beings have been trying to implement several climate control techniques since prehistory. In addition to building shelters with an altered microclimate within them, human beings have attempted to alter larger climatic scales (Cotton & Pielke, R.A., 2019).

The negative effects of climate change and the increased awareness of the public about the environment create pressure on each industry to come up with creative solutions to reduce GHGs. Building industry stakeholders demonstrate their commitment to solving environmental issues by building their buildings in a more environmentally friendly way by using environmental standards.

Nowadays, natural gas is generally satisfied with heating or indoor hot water charges in homes. Grid power is used by heat pumps and chillers for cooling. This approach has strong implications for

Accepted: 03 January 2020

global warming and loss of ozone, while fossil fuels tend to provide grid electricity. Therefore, it is necessary to develop new conservation and energy efficiency methods. Use energy resources like renewable energy, surface water, waste heat and combining these resources to buildings has become a sustainable imperative (Iodice, Dentice, & Abagnale, 2019).

Concrete, cement, steel, aluminum and iron were the most common types of waste used as building material. Dead cement could be recycled as filler material for new constructions as a consequence of the demolition of structures and as surface reinforcement for road construction. Many construction waste parts, such as aluminum and steel, could also be reused and used as raw material in the production of new building materials (Ozgoren, 2012). Wastes produced by other industries could also be used by incorporating them into building product manufacturing. For brick construction, wood chip waste and waste from the manufacture of lime cement could be used (Turgut & Algin, 2007). They could be used as filling material in embankments, retaining walls and filling the ground because of the low unit weight of waste tires (Alatas, Somunkıran, & Ahmetzade, 2006). Marble fragments and crushed marble waste could be used as raw material in the manufacture of asphalt, lime, calcined dolomite, slag materials and plaster materials (Sentürk, Gunduz, & Ugur, 1996), as a chemical filler for enhancing rough surface characteristics (Zorluer & Usta, 2003, December 18-19), as an aggregate for concrete and ground surfaces, and as a filling component for packed street and railroad walls, reservoirs and other buildings. In the manufacture of building materials such as cement, thermoplastic PVC waste was used (Choi, Moon, Chung, & Cho, 2015). Big combustion plant fly ash had a positive effect on cement and concrete solidification properties (Turhan, 2003). The use of silica fume, used in the manufacture of silicon metal and ferrosilicon alloys, improved concrete strength and reduced its permeability (Duval & Kadri, 1998). In addition, silica fume reduced the water / cement ratio in cement and helped to obtain impermeable internal concrete structure (Toutanji, Delatte, Aggoun, Duval, & Danson, 2004). At the same period, more experiments have been carried out to turn incised old asphalt into fresh asphalt by different technologies (Akbulut & Gürer, 2002) for use in road construction and use of boron-related waste in the construction sector (Booklet of 1st International Symposium, 2002).

First of the most widely used environmental performance evaluation certificates was BREEAM (Building Research Establishment Environmental Assessment Method), which was introduced in 1990 in England by Building Research Establishment. Then, LEED (USA), SBTool (International), EcoProfile (Norway), Promise (Finland), Green Mark for Buildings (Singapore), HK-BEAM and Cepas (Hong Kong), Green Star (Australia), SBAT (South Africa), CASBEE (Japan), Environmental Status (Sweden), and others followed. Currently, there were numerous certification systems for different types of buildings. Generally LEED and BREEAM certificates have been applied in Turkey. However there was not a local certification system in Turkey yet, CEDBIK (Turkish Green Building Council) has been working on this issue.

The number of the buildings having LEED and BREEAM certificates

Accepted: 03 January 2020

regarding to their cities were given in Fig. 1.

METHODS

In the first chapter, the purpose of the research is described in detail. The other section called Green Building includes a general definition of conservation, sustainable development or green building so that the topic is thoroughly explored and clearly understood.In the other chapter, green building criteria used to create green building rating systems and most well-known green building rating systems around the world were reviewed on order to have a general opinion on the rating systems and their assessments. Also, the most widely adopted global LEED program is evaluated in a more detailed way.

Europe and the green building campaign in Turkey have been confronted with its elements in order to understand the current situation. And as an overview of Turkey's LEED accredited house, Erzurum Healthcare Campus is offered as a case study to define the criteria that can help generate the first steps in implementing a national green building rating system.

In fact, sustainability foresees a continuous development with only changing our consumption habits without reducing our current quality of life. It is also related to a universal solidarity and a democratic and fair allocation to be sustainable of this development. In other words; through the concept of sustainable development, it is proposed the full comprehension of sustainability which seeks to control the climate, social responsibility, and economic solutions through giving up being a consumer society. From this view, sustainability can be said to have three major dimensions / components called ecological, financial, and societal. Interactions of effective sustainability parameters, which are environmental protection, economic progress, and social fairness, are shown in Fig. 2.

LEED is an internationally recognized green building certification system that provides third-party assurance that a building or neighborhood has been designed and built utilizing techniques aimed at improving performance across the most important metrics: power consumption, water usage, CO2 emissions reduction, improved quality of the indoor environment, and resource management and responsiveness.

Turkey's green construction industry has been in a rapid development phase lately. Government policy is becoming increasingly aligned with Turkey's energy deficit and further encouraging environmentally responsible development by external pressures. International investors and non-profits also bring an eco-conscious mentality to some of the high-profile projects in Turkey.

Turkey is a leading country in the development of LEED accredited buildings. Earlier this year, with 245 LEED-certified ventures and 6.15 million certified gross square meters, USGBC announced the Top 10 LEED Countries including Turkey for the third year in a row. We acknowledged some of the firms behind this amazing work at Greenbuild Europe in Berlin. Eventually, the hospital structure will be assessed using the LEED rating program.

Accepted: 03 January 2020

RESULTS AND DISCUSSION

The Erzurum Healthcare Center is the largest medical center in eastern Turkey and is located right next to the current Research and Training Hospital in the middle of Erzurum City in Turkey. The facility consists of medical facilities and community care departments spanning more than 2,000 square meters and more than 1,600 patient beds.

The hospital comprises the Institute for Obstetrics, Gynaecology and Maternity (300 beds), Oncology Hospital (150 beds), Chest Diseases Hospital (150 beds) and Cardiovascular Hospital (150 beds).

Seismic base isolation is the most well documented and proven way to maintain buildings secure and quickly in operation. Although it has been widely practiced in some countries such as the United States and Japan, in Turkey it is a new and unknown method. Erzurum Medical Campus has been built with a total capacity of 1,600 beds as one of the world`s largest seismic independent hospital. The campus is made up of five buildings (Figure 3 and Figure 4).

After a possible Erzurum earthquake, architecture was built to achieve effective and efficient serviceability. To minimize the risk of the earthquake, more than 1,200 earthquake isolators were used. It is aimed that any possible earthquake will have no harmful effect on any critical medical facilities, the operability of the hospital premises or medical equipment, as well as building services such as sanitary, medical fuel, fire protection.

Energy and water saving is the first aim of Erzurum Healthcare Campus for the buildings. The hospital building was designed to be sustainable as in the direction of their aims. The building has a lot of environmental advantages. 20 percent water saving has been given on its landscape and indoor. Energy savings of 30 percent was made. Regional resources were used to contribute to the economy. Recycled products are used for the preservation of natural sources and this is very effective. As a way for recycling, waste management is advantageous. The city was cleaner due to the high quality and quantity of the fresh air inside the building. Most of the sunlight is used. There are viewpoints that can be observed. Products are more public health-friendly.

For drinking, washing and cleaning, flushing toilets, irrigating plants, etc., a large quantity of liquid is required in this building. All of this water needs energy-consuming therapies and distribution. Also the water that exits the building will be treated as sewage.And this building use rooftop rain harvesting. Rooftop Rain Water Harvesting is the method by which rainwater is collected and processed in dams from the roof catchments. Harvested rainwater can be collected in a sub-surface groundwater dam by following strategies of artificial refill to meet the needs of the household by tank processing. The main goal of rainwater harvesting on the roofs is to provide water for potential use.

In addition Most of the construction waste was diverted from landfills.Most of the furniture budget included salvaged furniture.Low-VOC materials and comprehensive green cleaning program.

The hospital will receive the LEED Gold, the Green Building Certificate, which is the International Green Building Certificate. The hospital, being an environmentally sensitive hospital, having seismic isolator resistant to

Accepted: 03 January 2020

earthquake and having the standards that can be performed even in the event of an earthquake, having standards to use as irrigation water in the gardens by collecting rain water especially on the crescent terrace and having solar panels to produce its own electrical energy. was awarded the LEED Gold certificate due to its various top technological features.

CONCLUSION

It could be seen that there is increasing awareness of the construction sector for the system of sustainable evaluation. The most important point is that businesses want these certification qualifications not only for marketing purposes, but also for having principles such as tolerance to the climate. Although single projects that make little sense to the world but in Turkey there are ongoing projects and in the future there will be more green buildings. This will show the importance of staying in suitable conditions of the amount of safe buildings for residents.

The first step for the architect is the awareness of the design team on the design phase of the sustainable certified buildings on the certification procedures. The following missions of the architect are the adoption of life-cycle cost methodologies in budget reduction, promoting the use of recycled, reclaimed and renewable resources and ensuring the maintenance of design. In this step, integrated work is important. The organisation of accredited construction continues, design solutions, equipment collection should be addressed in multiple disciplines together. In order to improve the overall process, customers, users, suppliers and key stakeholders could also be included in these meetings.

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Accepted: 03 January 2020

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Appendix

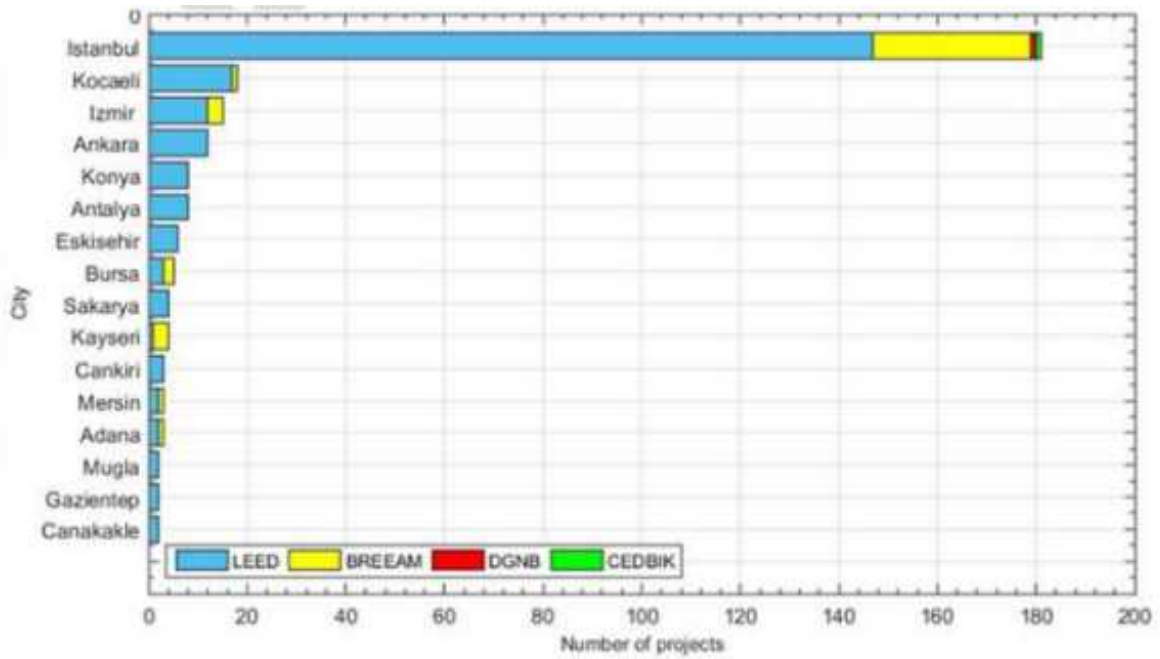

Figure 1. Geographical distribution of certified projects (Xhensila THOMOLLARI , 2019)

Accepted: 03 January 2020

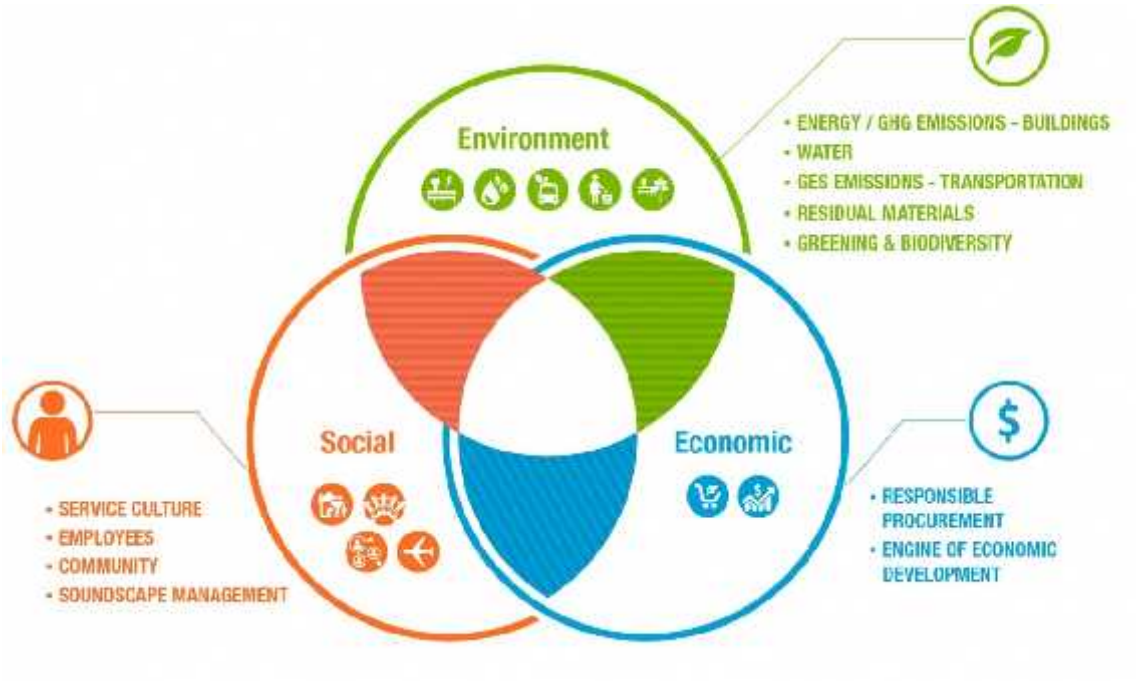

Figure 2. Elements that form sustainable development
(https://www.admtl.com/sites/default/files/2019/Sustainability-priorities.jpg , 2019)

Figure 3. Visualization of the medical campus (Aymaz Architecure ,2019)

Accepted: 03 January 2020

Figure 4. Visualization of the medical campus (Protamuhendislik, 2019)

Accepted: 03 January 2020