

PROSPECT OF GREEN BUILDING IN BANGLADESH: A CASE STUDY ON LARGE GARMENTS FACTORY IN BANGLADESH

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Abstract: Green Building (GB) is becoming the popular research area nowadays. In Modern age, the demand for sustainable building construction has experienced significant growth. Nowadays developed countries are trying to be a GB based country; whereas in developing countries like Bangladesh, although the practice is still low, the rate of interest about GB is rising. Till now, very few studies have done in the context of Green Building in Bangladesh. Based on the primary and secondary data the study sought to understand the prospect of Green Building in Bangladesh. The primary data of this research are mainly opinions from specialists of Bangladesh Green Building Academy and design2occupancy(D2O) through “Workshop on Green Building” in KUET and an “Industrial Tour” at AKH ECO Apparels in Dhamrai about the prospect and overview of Green Building in Bangladesh. Green Building has the ability to optimize site potential; minimize non-renewable energy consumption; protect and conserve water; enhance indoor environmental quality; optimize operational and maintenance practices through rainwater harvesting, maintain passive system, active system and hybrid system, wastewater recycling, radiant heating and cooling, passive heating and cooling, building massing and orientation and HVAC simulation. This paper also focused on LEED (Leadership in Energy and Environmental Design) rating system according to opinions from green specialists in Bangladesh. Finally, Result drawn from this research will be useful for people of Bangladesh who have an interest in Green Building field to build up an environmentally friendly building construction and also helpful for the future researchers, builders and environment specialists in the similar geographic area.

Keywords: Bangladesh, Green Building, LEED, Sustainability, USGBC.

1. INTRODUCTION

Green Building is a type of Building which is energy efficient, water efficient, provides better indoor Environment and hence better-living conditions, uses environmental friendly sustainable materials, produces less waste, has lesser transportation requirement and protects or restores habitat. An increasingly popular goal for According to U.S. Green Building Council (USGBC), Green Building is achieving Net Zero Energy. Commercial and Residential buildings consume almost 40% of the primary energy in the United States or Europe, nearly 30% in China and approximately 32% in Bangladesh (Deng, S., Wang, R. Z., & Dai, Y. J. 2014). In order to reduce dependency on the primary energy for

buildings, a number of studies on energy -saving technologies have been done worldwide. On the other hand, renewable energy utilization was regarded as reasonable solution to global warming, air pollution, and energy security. Sustainable design seeks not only to reduce negative impacts on the environment but also to preserve the health and comfort of building occupants, thereby improving building performance. Net zero energy commercial Building initiative supports the goal of net zero for all new commercial buildings by 2030. The California Public Utilities Commission of the USA has an energy action plan to achieve net zero energy for all new residential construction by 2020 and net zero for all new commercial

construction by 2030 (Deng, S., Wang, R. Z., & Dai, Y. J. 2014). The main environmental concerns today are climate change, depletion of resources, ozone depletion, land pollution, water pollution and air pollution. There is a common perspective that industries are responsible for the major part of greenhouse gas emissions. Buildings directly contribute towards all the environmental pollution. Green building can be a major part of the solution to these environmental issues. In Bangladesh, various businesses are inter-related with real estate business, such as garment, rod, cement factory, stone, and brick industry, still mills and so on. In Many ways, construction create a huge employment opportunity to in Bangladesh. It also negatively effects on energy sector concerning consumption of the rate. It is explicit that housing is the fundamental requirement and real estate business is paying for it in a big way. A huge amount of investment and cash flow happen in this sector than other available industry. So we should build up this part thinking about its present esteem and Government has taken up the Palli Janapod Project which is under process (Dailystar, 2015).

Although a number of researchers worldwide have conducted research on the Green Building; however, there is no specific guideline and work on the Green Building in the context of Bangladesh. Following those potentialities in this field of GB, this paper describes importance and prospect of Green Building in Bangladesh through literature review and in-depth interviews from Green Building Specialists in Bangladesh.

2. RESEARCH METHODOLOGY

2.1 Case Study Area

We, the 40 students and honorable teachers of Building Engineering and Construction Management department have visited “AKH ECO Apparels” (23.9181° N, 90.1133° E) 495 Balitha, Shah Belishwer, Dhamrai, Dhaka-1800, N5, by the side of Dhaka-Aricha highway at 10th August 2017 (figure-1). We have spent there almost 2 hours to observe the whole project. AKH has built up this eco-friendly project strictly applying the Gold Classification prerequisites of Leadership in Energy & Environmental Design

(LEED), which are officially recommended by the U.S. Green Building Council.

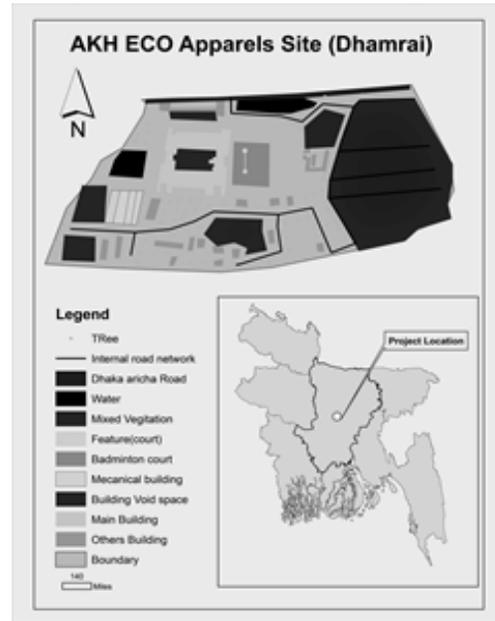


Figure 1: Case study area

2.2 Workshop and Interview

Primary data, such as the opinions from green specialists were collected through in-depth interviews with LEED Consultants like Al-Emran Hossain of Bangladesh Green Building Academy and Lukan Alamgir, project manager/director at ARCHETYPE LIMITED which is working as a Green Architectural consultant, through a “Workshop on Green Building” at the Department of Building Engineering and Construction Management (BECM), Khulna University of Engineering and Technology KUET, Bangladesh at 1st December 2017 (figure-2) and Kushagra Juneja, LEED AP and Santanu Dattagupta, Indian Green Building Council (IGBC) AP(Accredited Professional) from design2occupancy services, India. All-important data related to Green building activity and LEED Certification projects and activity were noted from observations and interviews.



Figure 2: Workshop on Green Building at KUET

3. ANALYSIS AND FINDINGS

The main outcome through this research is to find out ways and means to reduce consumption of non-renewable resources, minimize waste and create healthy, productive environments. As it is a questionnaires' research, we have asked many questions like how many projects registered in LEED online from Bangladesh, how many projects already get certificate, how many projects are LEED Platinum, how many Projects in LEED Gold, how many projects in Silver in Bangladesh? They told us about 402 projects registered in LEED Online from Bangladesh, 63 Project already get certificate, 17 projects are LEED Platinum, 15 Project in Gold, 9 Project in Silver and rest of Certificate. They also told us about passive design strategies which is used for ambient energy sources instead of purchased energy like electricity or natural gas. These strategies include daylighting, natural ventilation, and solar energy. If a structure is designed well, the consumption of energy will automatically be reduced. And there is a scope of energy saving by adopting proper and longer policy as well. If we start eco-friendly building design we can protect 20%- 30% energy.

Even we can protect the cost of one quick rental capacity (small power plant) plant per year if we follow green building policy. From the interview, we can conclude that through passive system, active system and hybrid system we can reduce consumption of non-renewable resources. We can also follow building massing and orientation system properly. That is how we can feel visual comfort and daylight. Passive heating uses the energy of the sun to keep occupants comfortable without the use of mechanical systems. Using simulation tools and software, we can estimate how much energy the building will utilize, making changes in accordance with the building

systems, and compare amongst these to decide the optimal configuration. Also, we additionally take after radiant heating and cooling system. Be that as it may, radiant heating and radiant cooling systems are not quite the same as ordinary HVAC systems since heat or cool surfaces oppose to air. Water-efficient fixtures and equipment's may be the most effortless approach to reduce consumable water utilize. Rainwater harvesting can save water for reuse.

Below the table-1 which indicates LEED rating system from the interviews. Here, we see that many categories of LEED rating which indicates the parameter of Green Building. It comprises of an integrated process, area and transportation, water proficiency, energy and atmosphere, materials and resources, indoor natural quality, advancement and regional priority. Here we see that the importance of energy and atmosphere is greater than any other categories. It indicates 33 points out of 110 points (Todd, J. A., Pyke, C., & Tufts, R. 2013). Buildings use energy, materials, water, and land to create the right environment for its occupants. All of these things cost money and all of them have an environmental impact.

Table 1: LEED Rating System

Category	Prerequisite	Credits	Points
Integrated process (IP)	None	1	1
Location and Transportation (LT)	None	8	16
Sustainable sites (SS)	1	6	10
Water Efficiency (WE)	3	4	11
Energy and Atmosphere (EA)	4	7	33
Materials and Resources (MR)	2	5	13
Indoor Environmental Quality (IEQ)	2	9	16
Innovation (IN)	None	2	6
Regional Priority (RP)	None	6	4
Total		48	110

Source: Based on interview

We have visited AKH ECO Apparels at Dhamrai, Dhaka, Bangladesh (Figure-3). Here we have gained the practical experience of prospect of Green Building in Bangladesh. It is at Dhamrai by

the side of Dhaka-Aricha highway, on a 13-acre land, AKH has developed this eco-friendly project strictly applying the Gold Category requirements of Leadership in Energy & Environmental Design (LEED), which are officially prescribed by the U.S. Green Building Council. It has 480,000 sft of constructed area. Adequate space and scope for fresh air, rainwater storage and use, wastewater managing as well as recycling and reusing, reduction of carbon emission, use of efficient and renewable energy, and use of heat-resistant and carbon emission free building materials are a few of the major features of this green project (AKH Has Gone Green, 2017). About 4500 workers can work here in the most pleasant indoor and outdoor environments. The factory building, which will never rise beyond 3rd floor ever, does have all measures and features to ensure safety, security and good working environment for the people working in it. Open terrace with grass carpeting and rooftop gardens add to its pleasant and healthy ambiance (AKH Has Gone Green, 2017).



Figure 3: AKH ECO Apparels at Dhamrai, Bangladesh.

According to Green Building Information Gateway below (Figure 4) the position of LEED certification activity of Bangladesh comparing other countries in the world. We can see that 76 LEED Certification projects and 57 LEED Certification activity is in Malaysia. There is no LEED Certification project and LEED Certification activity in Nepal. The LEED Certification projects and LEED Certification activity are higher in India than Bangladesh. About 801 LEED Certification projects and 567 LEED Certification activity in India. There are 13 LEED Certification projects and 11 LEED Certification activity in Pakistan. From the site visit, interviews, secondary data, workshop and personal observation and analysis we have found that there are about 63 LEED

certification project and LEED Certification activity in Bangladesh.

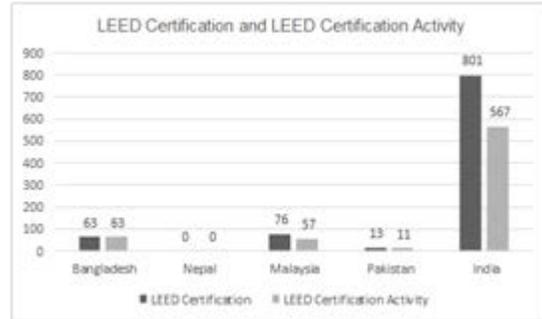


Figure 4: LEED Certificate and LEED Certificate activity in different countries

4. CONCLUSION

According to interview, LEED rating system has been explained in this research and it focused on the importance of energy and atmosphere category which importance is greater than any other categories. It indicates 33 points out of 110 points of LEED rating system. We should consider the opportunity at design phase to energy efficiency and atmospheric protection like reducing building energy use, using less harmful chemicals for refrigerants, generating renewable energy on site, providing for on-going energy savings and purchasing green power for project use. We should consider materials and resources consideration like providing for recycling, reusing existing buildings, reducing construction waste generation, using salvaged and recycled content materials, using rapidly renewable (agricultural) materials and certified wood products. It is also may consider to indoor environmental quality like improving indoor air quality, increasing outside air ventilation, managing air quality during construction, using only non-toxic quality finishes, carpets, and composite wood products, reducing exposure to toxic chemicals during building operations, providing individual comfort control and maintaining thermal comfort standards for the betterment of sustainable green building technology. The number of LEED certification Building is very low. Only 63 buildings of Bangladesh have LEED certification. For the development of green construction sector, there is no alternative way without energy efficient

building. By implementing this green building technology, it will be a great relief for the government and the future generation from energy problem. The architect and engineer should think over it at design phase. A shower tap from which water discharge will be little quantities. It can be energy efficient equipment and ultimately it will convert the building a green building. The results coming out from this such as energy demand will be decreased and it will be beneficial worldwide majorly for Bangladesh. If we ensure to implement the green building policy we can save electricity (energy), environment and social interaction which is equal to a smart green power plant, sustainability, and social imbalance.

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