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Analysis of Green Building Certification Attainment through LEED System for SDC Block at KLEF, India

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Abstract. LEED (leadership in energy & environmental design) Certification of a project brings credibility to its safety & environmental charge. The green building labeling scheme is widely accepted by the public and personal house owners. Contractors and property developers have shown a belief in adding to the success of the project in achieving sustainability goals through an appreciation of the LEED process. The credential system is focused on award points for excellence in areas such as sustainable site development, electricity and climate, water usage, indoor environmental quality, materials and resources, national significance and architecture creativity. Furthermore, the research focused on the idea of green building to reduce the environmental impact of growth. The outcome of this research is the appraisal of the green building model for the University Skills Development Center (SDC) in terms of water, power, air usage, etc. The plans aim to improve the LEED score system for the university building.

1. Introduction

The green building concept has grown rapidly over the last few years. Buildings with energy-efficient designs and innovative combined energy-efficient and energy-efficient systems are rapidly chosen compared to conventional buildings due to a growing awareness of sustainable development [1]. There are many aspects that need to be weighed while designing a green building[2,3]. It is very important to know how successful an infrastructure project is in terms of its environmental friendliness[4,5]. This quick analogy would test the building on a number of points to give an idea of where a green building stands[6,7]. Rating systems are sufficient enough to be used in certain parts of the country, but they are not special in design[8]. Since these measures are based on different parameters, it is common for these rating systems to classify the same buildings differently[7]. These are also quite nuanced in nature and do not always give a clear picture of the success of the programs[8]. Every framework has certain strengths and weaknesses and is not limited to some evaluation standards. As a consequence, these programs are actually misleading Indian architects, builders with the clearance of their projects and buildings[9]. According to the United States Green Building Council, more than 74,500 commercial buildings are accredited by Leadership in Energy and Environmental Design (LEED), one

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of the most popular green building rating systems in 155 countries and regions [10]. LEED-certified buildings will also have a high level of environmental performance, such as reduced energy consumption, carbon emissions, and operating budgets, and less distressed structures [11]. Green buildings can save up to 13.6% of operating budgets. It is also reported that the typical LEED-certified building requires 32% less electricity and decreases the average annual carbon emissions by three hundred and fifty metric tons [12]. In reality, energy efficiency is taken into account as an important attribute within the LEED owing to the pressing need for energy savings [13]. Generally, funding programs for green building projects are accessible in many nations [1]. Green buildings are designed to provide access to the entire life-cycle performance of the house. Typically, the scoring system uses the entire building as an assessment body. The proposal must fulfil all the specifications. If a project fails to satisfy any prerequisite then it'll not be eligible for certification. No points are awarded for achieving prerequisites and therefore the Project teams choose a mixture of credits to earn points towards certification. Each credit features a certain number of points; if a project meets the wants of credit then it earns the points related to this credit [10]. Different credits are worth different points and therefore point allocation also depends on the grade during which you achieve the credit [14]. LEED is recognized internationally due to its high-performance architecture, construction and operation of green buildings. To receive approval for commercial buildings and neighbourhoods, a project must fulfil all criteria and earn at least 40 points on a scale of the 110-point scoring system as shown in table1Projects earn points to meet the requirements of sustainable design. The rating of the award depends on the number of points that the project gets during the certification process [15]. And these systems are highly efficient green buildings, so they are cost-saving. The credit rating system consists of criteria required to meet the specifications for increasing the value of properties and eliminating waste transported to landfill sites and preserving both energy and water, as well as reducing harmful greenhouse gas emissions to the environment. It also provides a basis for making healthy, mandatory, and credits selected by the expense, environmental benefit, and administrative targets endorsed by the project team. Four rates of LEED certification may be obtained; depending on the number of criteria achieved, as shown in Table 1 below.

Table1. Project Certification levels**.**

Certification	Points
Certified	40 – 49
Silver	50 -59
Gold	60 – 79
Platinum	80 – 100

Sustainable site planning and landscaping involves making a concrete site appropriate for construction, and then building and preserving the structure, while at the same time attenuating the environmental impact. Sustainable land development strategies include intensive forestry, brownfield or surface management, and the reduction of erosion. Sustainable landscaping means growing plants that need fewer resources, such as water and fertilizer or are native to the area. Some of the appropriate Building Criteria or Density, Similar Traffic, Reduced Site Disturbance, Storm Water Management Effect, Heat Island, Lightweight Pollution Control[16].

Construction resources are mainly designed and produced from a ton to eliminate the built-in tension clenched on-board their transport. The location capacity, production products must be required to be collectively produced off-site and sent to the site, with off-site selection growing income along with reducing pollution, the usage, excellent materials, and less noise and debris. Some crucial criteria would like to employ help building, manage waste development, employ quality, reuse content, local/regional materials, and rapidly renewable materials[17].

The frameworks are collectively technically built system for heating; ventilation and air-con (HVAC) should also provide adequate ventilation and jointly detach operations starting with alternate occupancies. In comparison to cleaning/maintenance performance, a significant number of individuals building materials emanate toxic gases, as an example being the combined aldehyde in VOC[14]. Such cam illumination gasses have conjointly detrimental effects with the affluence of related occupants and jointly benefit. Evicting these findings will increase the IEQ of a firm. Some important Criteria would like support ventilation Effectiveness, IAQ management scheme for growth, low-emitting materials, wellspring management of indoor concoction and waste materials, device controllability, heat comfort, sunlight and views[15].

Water safety can be defined as some useful finding on water loss, usage, or waste; a drop clenched on-board water utilization ended Overall Tom's perusal use of arguing water security instead water efficacy steps[18]. Imperative ratios Productive landscaping requirements or soil, innovative effluent systems, and energy use Control, Rain usage.

Green Building also takes steps to minimize energy use. We will use high-efficiency windows and security on walls, buildings, and floors to increase the profitability of buildings. Another method, mostly construction based on passive light, is also used in low-vital residences Architects build windows and dividers and arrange canopies, yards, and trees in the middle of the year to cover windows and roofs, whereas sun-based amplification occurs mostly in the winter. Adequate position of the window (day lighting) will, therefore, provide a lot of traditional light and raising the need for artificial lighting in the middle of the day[18]. Clear, sun-powered water heating decreases the energy of hundreds. The building's inevitable result would be minimized by the position of a renewable source of solar, wind, hydro or biomass electricity. The power era is the first much-won element to have the structure for the first quarter.

2. Sustainable construction with LEED rating system overview

The Green Building rating Management System for Power and Environmental Design is a product of the United States of America. It can often be a non-private initiative operated by the Indian Green Building Council (IGBC) in India. LEED shall set down the foundations and criteria for the construction of buildings to understand the purposes and goals of its property. LEED is equivalent to the set of loans capable of achieving seven major classes. Other groups include Sustainable Sites Environmental Usage, Power & Atmospheric, Materials & Resources Indoor Environmental Quality Technology & Development Method and Regional Priority. The goal is to improve people's well-being, environmental quality, and economic return of services, new and emerging processes, procedures and innovations by using them as a conceptual reference and as a third-party assessment tool. Due to its early adoption and professional appreciation, LEED is considered to be one of the world's leading green building rating systems. The LEED certification system is based on agreed energy and environmental criteria that integrate current activities into the values of crisis. Quality has been reached everywhere by meeting the requirements for addressing the specific environmental impacts of design and construction. All credits earned are funded exclusively by different types of green building qualifications or are released. The program must be thorough in the specification, but must be implemented immediately. Similar distinctions between scoring systems shall provide standards for the design and construction of facilities of all sizes in each final public and private sector. The first phase in the certification process is the admission of the project. The proposals can also be reported on the GBCI website (www.gbci.org). And the page also displays the expense of registration for testing. The process used in certification is shown in Figure1.

3. Study area

The K L University Skill developing block is found within the 10-Storey cum parking Block and is cover Ground -1 floor of 3165.86 sq.mt area. Except for parking, the remaining part of the building is completely air-conditioned and fully furnished with advanced appliances equipment well installed with smoke detectors and CCTV safety systems, as well as learning rooms on all levels, including

pneumatic water supply. Glazing plant to HVAC and installed with power savers and supplied shades and glazing sheets or double glazed glass for installation of radiation.

- Building Name: KL University Skill development Building
- Building Location: Vaddeswaram
- Location: Latitude: 16* 26’36.05”N Longitude: 80*37’16.20”E
- City: Guntur
- State: Andhra Pradesh
- Country: India
- Gross constructed area: 32162.88sq.m
- Construction Type (s): Skill development and car parking Building
- Form of the project: Institutional construction
- Stairs: G + 8 Stair’s (ninth level support unit)

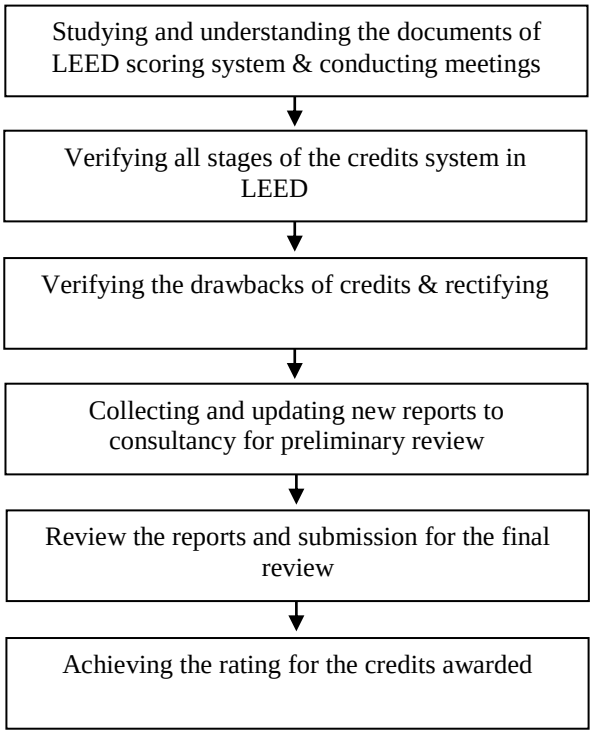

Figure1. Steps involved in attaining green building Score under LEED.

3.1 Outcome

The KL University Skill Development Block receives 87 points. The subsequent outcome of the report was a review of the relevant sources of information and resources for the construction of green buildings, the LEED rating system, criteria, and qualification. The location of the building is shown in figure2. Evaluation of the LEED requirements and rewards reveals that the KL University Skill Development Block has 87 LEED ranking points through which the university building can earn a platinum rating.

Figure2.site location on Google earth.

4. Result & Discussion

The results of the study included a summary of the available information channels and design tools for the Green Building Plan, requirements, benefits, etc. Analysis of the LEED criteria and incentives indicates that the KL University Skill Development Block has attained 87 LEED rating points which are shown in figure 3. The current status of the building has procured all major criteria of LEED to achieve a platinum rating. Few credit points are not attained due to certain factors that cannot be added to the current building site facilities.

In the division of "Location and Transport," the maximum points accessible are 16, while the current building only exceeded 14. The two-point difference occurred due to a high-priority location where benefits include three opportunities to help restore areas deemed undesirable by decontamination, gentrification or security and where the site is not part of the historic district or any government agency. In the "Sustainable Sites" category the maximum points available were 10 the current building has attained 9. The difference between one points occurred due to the open space. Where the construction is supposed to have a capacity of 30 per cent of the ground area, it must have open space and 25 per cent of the open space must be vegetated. The “Energy & Atmosphere” category has a maximum of 33 points. The building has presently attained 25 points. 8 points were not achieved by the building under Energy & Atmosphere criterion. The following are the sub-criterion in which the building lost the credit points namely enhanced commissioning, optimizing energy performance, grid harmonization, green power, and carbon offsets. Enhanced Commissioning point is lost due to multiple paths to compliance it involves in the review process and verifying the inclusion of systems manually and reviewing the building operation after 10 months for that the building has to get a commissioning report from HVAC and BMS commissioning agency. And under optimize energy performance LEED addresses the building’s energy performance through a prerequisite that establishes a minimum level of energy efficiency for the proposed building to reduce environmental and economic impacts associated with inefficient energy use. Optimized energy performance and higher percentages of energy efficiency are needed to earn points. The number of points depends on the level of energy savings. The energy output of the building is focused on a decrease in the energy demand of the building and the functionality of the interconnected building systems compared to the baseline. Grid harmonization is challenging in the Indian scenario and hence 2 points were not achieved. Under Green power and carbon offsets to achieve these credits, the building must purchase 35% of electricity consumption at least for two years. This credit is based on the quantity of energy consumed. And the building has to purchase power from the green-e certified provider on the closed or open electricity market and have to purchase carbon offsets to reduce the emission of greenhouse

gases. In the "Materials and Resources" category the maximum points available were 13. While current building has attained 8 points. The disparity of five points occurred due to the decrease in the effects of the design life cycle, which can be provided for the efficient re-use of existing building services or by minimizing the use of products through a life cycle study where the project cannot re-use the materials. In the "Indoor Environmental Quality" category the maximum points available were 16 the current building attained 11. The difference of five points occurred due to enhanced indoor air quality, interior lighting, and acoustic performance these credits are focused on reducing the chemicals entering into the building as well as produced inside the building and thermal comfort should be considered for its direct influence on occupants satisfaction and productivity and the building lost points in interior lighting where it doesn't have individual controls for lighting which have a significant effect on occupants. And in the "Innovation" category the maximum points available were 6 the current building attained 4. The difference between the two points has occurred due to the innovation that these points are missed because the structure does not achieve exceptional performance. And these incentives are granted with structured strategies that illustrate quantifiable environmental benefits.

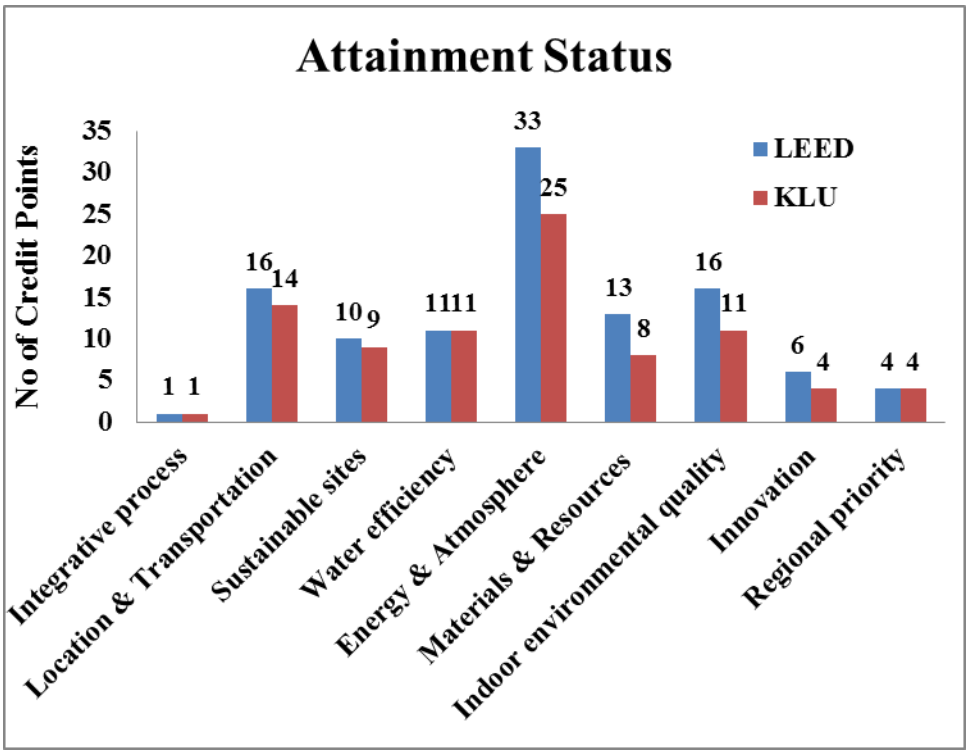

Figure3. Attainment Status of LEED credits by the Building.

5. Conclusion

The objective of this project was to receive the certification of the University Skills Development Block with Green Building LEED in positions of energy, water usage, etc. during the planning phase of the building. And also evaluations of building quality facilities following the LEED guidelines were used to establish a system. Green building rating systems promote the design sector by focusing on high-performance, creative, energy-efficient, economical and environmentally friendly structures. Location and energy efficiency could be a key component in green building design, but this makes it more relevant. The project's subsequent outcome was the review of available sources of information and design resources on the Green Building Model, LEED scoring scale, specifications, qualifications,

etc. The assessment of LEED criteria and incentives shows that the KL University Skill Development block has 87 LEED rating points. Although the initial cost of building green is often high, the benefits that will be achieved in the future will be increased profits and lifetimes, lower costs, energy and risk assessment.

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