

IMPLEMENTATION OF GREEN BUILDING LEED RATING CONCEPTS IN EXISTING LIBRARY BUILDING

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ABSTRACT

Over recent years, there has been a great increase in the understanding of sustainable development and "green" Issues. Engineering responsibilities for the environment are currently governed by laws controlling environmental Matters. These are designed to ensure that the industry conducts its business in an environmentally friendly Fashion. More importantly, these regulations have begun to form a culture in the industry where green awareness is at the heart of the project, rather than a late "adorn". The goal of the "GREEN BUILDING" project is to reduce the impact of construction on the environmental, the aim of the project was to assess "GREEN BUILDING" concept in the university library block in terms of water, energy, an air use etc. To develop a scheme, evaluation of the building rating schemes as per Leadership in Energy and Environmental Design (LEED) norms was used. The provision of suggestions is to increase the library's LEED Rating. In this thesis, the green building concepts, advantages of LEED rating norms requirements are discussed. The application of LEED green building rating system leading to certification points for SRM LIBRARY BUILDING by using Assessment of Green building norms. For creating Green building some significant suggestions are general planning, green technology and its benefit, for saving energy its types of light, specification, quantity and cost, for improving Indoor Environmental Quality (IEQ) and then for improving materials and resources- alternative eco-friendly materials are discussed.

INTRODUCTION

Green Building (also known as green development or reasonable building) is those act of making structures Also utilizing forms that need aid naturally answerable Furthermore resource-efficient for An building's life-cycle: from sitting to design, construction, operation, maintenance, renovation, What's more deconstruction. This act stretches and complements the established building plan worries for economy, utility, durability, and solace. Green fabricating hones point to decrease that natural effect of new structures. Structures represent an expansive amount from claiming area use, vitality Also water consumption, Furthermore air and air modification. Recognizing those statistics, decreasing the measure from claiming characteristic assets structures devour

and the sum of contamination provided for off will be seen concerning illustration essential for future sustainability, as stated by EPA (Kats, *et al.*, 2008; Lange and Grottker, 2008; Simpson, 2002; Fedrizzi, 2009; Kimmins, *et al.*, 2015).

The united states Green building committee (USGBC), An national non-profit entity, created the heading done Leadership in Energy and Environmental Design (LEED) Green Building rating framework on rate new What's more existing commercial, institutional, What's more high-determination private edifices as stated by their Ecological qualities Also maintainable offers. The LEED framework uses a rundown about 34 possibility execution built "credits" worth dependent upon 69 points, and also 7 prerequisite criteria, partitioned under six categories:

manageable Sites, Water Efficiency, vitality Also Atmosphere, Materials Also Resources, indoor natural Quality, improvement plan. Four levels for LEED Confirmation would possible; contingent upon that number for criteria met, and demonstrate progressively economical fabricating practices: LEED confirmed 26-32 points, LEED silver 33-38 points, LEED Gold 39-51 points, LEED Platinum 52+ focuses.

Sustainable site development and landscaping involves preparing a physical site for construction and later planting and maintaining the site while lessening the impact on the environment. Sustainable site development strategies include selective landscape clearing, Brownfield or soil remediation and erosion control. Sustainable landscaping involves selecting plants that are native to the region and that require less input such as water and chemicals. Some important Criteria are Development Density, Alternative Transportation, Reduced Site Disturbance, Storm water Management, Heat Island Effect, Light Pollution Reduction.

Building materials if make concentrated and made mainly of the building site to minimize the vitality inserted clinched alongside their transportation. The place possible, fabricating components ought to be made off-site Also conveyed to site, with expand profits of off-site assembling including minimizing waste, expanding recycling, prominent elements, noise less and dust. Some critical Criteria need aid building Reuse, development Waste Management, asset Reuse, reused Content, Local/Regional Materials, and quickly renewable Materials (www.sustainablesites.org; www.igbc.in; www.wbdg.in; www.buildinggreen.com).

Indoor air nature looks for to decrease unstable natural compounds, or VOC's, Also other air impurities for example, microbial contaminants. Structures also legitimately designed Heating, Ventilating, and air Conditioning (HVAC) framework should give satisfactory ventilation Furthermore air filtration and also disconnect operations starting with other occupancies. Throughout that configuration What's more development transform picking development materials Furthermore inner part complete items for zero or low discharges will move forward IAQ. A lot of people building materials Furthermore cleaning/maintenance results emanate poisonous gases, for example, VOC's Also formaldehyde. These gasses can wood have adverse effect with respect to occupants' wellbeing Also profit also. Avoiding these results will expansion a building's IEQ. A few significant Criteria need aid ventilation

Effectiveness, development IAQ management Plan, Low-Emitting Materials, indoor concoction and Pollutant wellspring Control, Controllability of Systems, warm Comfort, sunshine and perspectives.

Water protection could a chance to be characterized as: Any valuable finding On water loss, use, or waste; A decrease clinched alongside water use finished Eventually Tom's perusing usage from claiming water protection alternately water effectiveness measures. Percentages imperative Criteria are Water productive Landscaping, imaginative Wastewater Technologies, and Water utilize Reduction, Rainwater use.

Green Building regularly incorporate measures to diminish vitality utilize. To expand the productivity of the building envelope (Structural respectability, Moisture control, Temperature control, Control of pneumatic force limits of sorts), they may utilize high-effectiveness windows and protection in dividers, roofs, and floors. Another procedure, inactive sun based building configuration, is regularly actualized in low-vitality homes. Architects arrange windows and dividers and place canopies, yards, and trees to shade windows and rooftops amid the mid-year while amplifying sun based pick up in the winter. Also, viable window position (day lighting) can give more normal light and diminish the requirement for electric lighting amid the day. Sun-powered water warming further decreases vitality loads. On location age of sustainable power source through sun based power, wind control, hydropower, or biomass can fundamentally lessen the natural effect of the building. Power age is, for the most part, the most expensive element to add to a structure. Some imperative Criteria are fundamental Building Systems, Minimum Energy Performance, and Reduction in HVAC Equipment. Development and Design process critical Criteria are Conceptual configuration Reprocess.

CASES TAKEN FOR STUDY

Bank of America

- Project Size (ft²): 2.20 million square feet
- Over all Building Costs: \$240 per square foot
- Owner: The Government of America, Building Architect/Project Team: Cook+ Fox Architects, Completed in June 2008
- An arrangement of rainwater cisterns were set around those edge of the building should gather roof waste What's more might hold over 110, 000 gallons from claiming rainwater.

- The 5.1 megawatts cogeneration systems would be sucking 95% internal polluted air.

Sohrabji Godrej Green Business Center Building

- Construction area: 1900 (sq. meters)
- First Green Building In INDIA, Completed September 2007, Cost (land excluded): 57.6 Crores, Indoor potable water use: 36, 700 gal/yr (139, 000 liters/yr)
- An efficient lighting system, daylight dimming, and occupancy sensors reduce energy consumption.
- The roof garden covers the 60 percent of the roof of the building as an excellent insulating property and to cut down the load on the air-conditioning system.

Wipro Technologies Development Centre

- 175, 000 Sqft (Incl for basement).
- 82. 2% of the downright top territory may be green, secured for porch enclosures.
- 27% of the outer region need cement grass pavers Also 17% may be secured for vegetation, 100% of the water may be recycled, 50% for occupants have customize temperature, light and warm conditions, 75% of the territory is day light.
- 46% sparing in the power bill by channeling regular light Furthermore air.
- Extra building material utilized to finishing outside territory.
- Photocell-based controls naturally faint accessible light dependent upon daylight, lessening vitality wastage (Fig. 1).

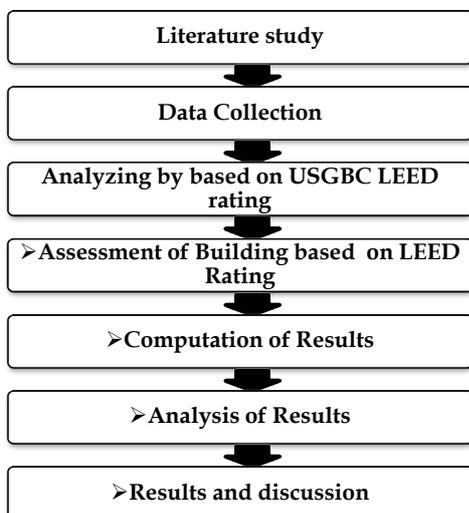


Fig. 1 Methodology flowchart.

METHODOLOGY

Concerning Site

The University library building is located in the 15-Storey cum Administrative Block, and is spread over Ground + 3 floors of 1.5 Lakh sqft areas. The whole building is fully air-conditioned and automated with RFID (Radio Frequency Identification) technology, and well furnished High-tech classrooms well protected with fire alarms and CCTV security systems, equipped with reading halls in all the floors, Fully Hydro Pneumatic Water supply. Centrifugal Chilling Plant For HVAC with reference collection.

Building Name: SRM University Library cum Administrative Building

Building Location: Kattankulathur

City: Chennai

State: Tamilnadu

Country: India

Total built up area: 51558.06 sq.m

Building Type (s): University Library and Administrative Building

Project Type: Institutional Building

Storey: G + 15 Storey’s (Eighth floor is service floor)

SRM UNIVERSITY LIBRARY BUILDING ANALYSIS

Level 1: Engineering and Technology and Food Court

Level 2: Computer Science and Life Sciences

Level 3: Science and Humanities

Level 4: Theses and Dissertations, Exam Books

ASSESSMENT FOR LEED RATING SYSTEM

Computation for rating system

The points gaining by the Library Building in terms of Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality and Innovation and Design Process as follows

1. Sustainable sites in 14 possible points.
2. Water efficiency in 5 possible points.
3. Energy and atmosphere in 17 possible points.

- 4. Materials and resources in 13 possible points.
- 5. Indoor environmental quality in 15 possible points.
- 6. Innovation and design process in 5 possible points.

Four levels of LEED certification are possible; depending on the number of criteria met, and indicate increasingly sustainable building practices:

- LEED Certified 26-32 points
- LEED Silver 33-38 points
- LEED Gold 39-51 points
- LEED Platinum 52+ points

Outcome

LEED Rating: SRM University Library Building - 25 points. A subsequent outcome of the project was the discussion of the available information sources and design tools about Green building concept, LEED rating system, requirements, criteria etc. An evaluation of LEED prerequisites and credits indicates that SRM University Library Building has 25 LEED Rating points, which is just below the points needed to be certified as a Green Building (26 points). This indicates that with a little more attention, the Library Building can go for certification.

OBSERVATION OF RESULTS AND DISCUSSION

A subsequent outcome of the project was the discussion of the available information sources and design tools about Green building concept, LEED rating system, requirements, criteria etc. An evaluation of LEED prerequisites and credits indicates that SRM University Library Building has 25 LEED Rating points, which is just below the points needed to be certified as a Green Building (26 points). This indicates that with a little more attention, the Library Building can go for certification, for further factors are considered in water efficiency Energy Efficiency and indoor Air quality the building would be gained for further 27 Points now the total LEED rating is achieving 52 Points for Platinum Level Table 1 and (Fig. 2).

Comparison Between Original and Green Building Version

The Initial assessment of the building rating is only 25 points after considering of all green energy efficient equipment's, tools and Innovation design in Water Efficiency, Energy Efficiency and Indoor Air Quality gaining of additional 27 points will be resulted the total 52 points have been platinum rating level.

Description	LEED Rates	LEED Already Exist	Gaining Points From Suggestion	Total
Sustainable Site	14	9	0	9
Water Efficiency	5	0	5	5
Energy Efficiency	17	3	13	16
Material & Resources	13	7	0	7
Indoor Environmental Quality	15	2	9	11
Innovative Design	5	4	0	4
Total	69	25	27	52

Table 1. LEED rating comparisons after and before the implementation of suggestions.

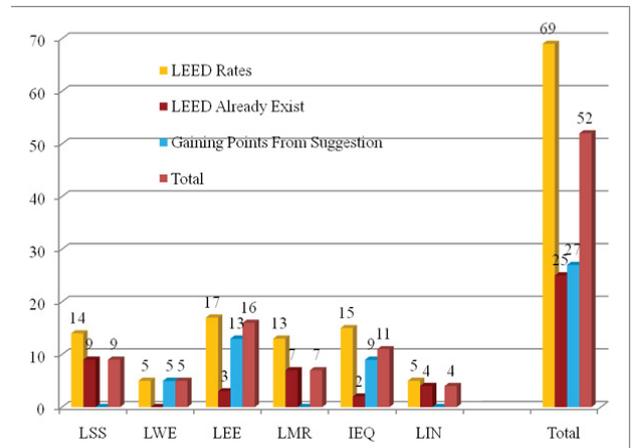


Fig. 2 LEED rating comparisons after and before the implementation of suggestions.

CONCLUSION

The aim of this project was to Assess the “Green Building” content included in the University Library building in terms of energy, water use etc. To develop a scheme, evaluation of the building rating schemes as per LEED norms was used. The provision of suggestions is to increase the building’s LEED Rating. Green building rating systems are transforming the construction industry by focusing on high-performance, sustainable site, energy efficient, economical and environment friendly buildings. Though, site and energy efficiency is a major component of designing a green building thus gives more significant to it. A subsequent outcome of the project was the discussion of the available information sources and design tools about Green building concept, LEED rating system, requirements, criteria etc. An evaluation of LEED prerequisites and credits indicates that SRM University Library Building has 25 LEED Rating points, which is just

below the points needed to be certified as a Green Building (26 points). This indicates that with a little more attention, the Library Building can go for certification.

Further, in order to make SRM University Library building as "Green building" the following categories have to be developed such as Water efficiency, Energy and Atmosphere and Indoor Air Quality while using green design principles, requirements and strategy in SRM University Library building project. The Initial assessment of the building rating is only 25 points after considering of all green energy efficient equipment's, tools and Innovation design in Water Efficiency, Energy Efficiency and Indoor Air Quality gaining of additional 27 points will be resulted the total 52 points have been platinum rating level. Even though the initial cost can be high in making a building green, in the long term, increasing profits and life span, decreasing cost, time and risk assessment are the benefits that can be gained.

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