



A Review Paper on Study of Practical Aspect of IGBC Rating System

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ABSTRACT

As there is only one earth, it is essential to know the relationship in the nature to maintain environmental balance. First challenge is to protect the earth, Green the earth and heal the earth. The depletion in natural resources has led to unsustainability of the environment. The building sector accounts for 30-40% of the total global energy consumption. Out of which 80% is consumed during the operational stage of building and remaining 20% of during its construction phase. Thus some urgent and hard decisions to be taken to stop the deterioration of the environment.

This paper highlights the study of sustainable perspective in which we analyse the buildings in terms of Sustainable Architecture and Design, Site Selection and Planning, Water Conservation, Energy Efficiency, Building Materials and Resources, Indoor Environmental Quality and innovation. The green building study highlights implementation of sustainable practises as per building feasibility with available limited resources to make the building sustainable and to achieve certification

Key Words-Sustainability, Energy Efficiency, Water Conservation, Green Building Practices

1. INTRODUCTION

Sustainable development is expected to protect the Earth, Green the Earth and heal the earth. It refers to fulfilling the present needs without ignoring the needs of future generation. It also involves the different implementation of sustainable practices according to energy efficient principles during pre-construction, construction stages and post construction activities to get some extra benefit as a reward. Now some urgent and hard decisions should be taken for the concept of sustainability and their implementation which is most important to improve the disturbed quality of environment and life.

According to the Indian Green Building Council (IGBC) India will have 1 lakh buildings will certify by 2025. Currently it has only 2000 green rated buildings. India is emerging as a rapid adopter of sustainable building practices and holds third rank. As per latest US Green Building Council report in India there is 11.64 million gross square meters LEED certified space.^[3]

Climate change, energy scarcity, Water scarcity, Raw material scarcity, food security, waste management pose ever increasing threat to sustainability. Thus green building is only alternative to achieve the sustainability in which planning, designing, construction, operation and maintenance is carried out with less water consumption, optimizing energy efficiency, conserving natural resources, generates less waste and provide maximum comfortable environment to occupants

2. NECESSITY OF GREEN BUILDINGS

Building sector is the largest energy, water, electricity, raw material consuming and green gas emitting source around the world. They contribute around 40% of global greenhouse gas emission, 30% of carbon dioxide emissions, 65% of electricity, 50% of raw material, 35% of municipal solid waste generated and 30% to 40% energy consume. Due to these negative environmental impacts of traditional building, the green building concept has attracted more attention in recent years. Factors like Energy, Water and Material efficiency, improving indoor air quality and optimal operation and maintenance cost minimises the negative environmental effects using best practices of 'Green Building.'

3. LITERATURE REVIEW

Janhavi kailas, Mahale Ms, Kanchan C. Khare Dr (2021) "A Bibliometric Analysis of Global Research on Green Building" The study presents the trend of an increasing number of publications and patents in the area of GBRTs in the last twenty years. It implied that researchers are actively taking interest in this particular research area of GBRTs recently as the demand for sustainable environments along with the construction of green buildings is increasing over years.

Chenyao Shen, Kang Zhao, and Jian Ge College of Civil Engineering and Architecture, Zhejiang University, Hangzhou 310058, China (2020) "An Overview of the Green Building Performance Database" Research on how the database method can assist building performance diagnosis has become an important direction of current green building studies. Many research institutions have attached great importance to the building performance database, adopting new technologies to integrate indoor environmental quality and occupant satisfaction with building energy consumption data

Nahla Hazem, Mohamed Abdelraouf (2020) “A Novel Green Rating System for Existing Buildings” Sustainability and green buildings have become vital to maintaining a certain life quality level for future generations. Accordingly, several international governments have started to develop new rating systems and sustainable development standards, such as Leadership in Energy and Environmental Design (LEED), to boost their development plans, goals, and objectives.

Ms. M Sandra Kirthy, (2019) “Comparative study on Indian credit rating agencies rating methodology, process, rating symbols & services”, 2015 International Journal & Magazine of Engineering, Technology, Management and Research. The services of Credit rating agencies to the investors play a major role in evaluating risk and return of the investment in taking the decisions. It is very much essential to understand the credit rating agencies methodology process and rating symbols adopted and overall services.

Yingling Shi and Xinping Liu (2019)“Research on the Literature of Green Building Based on the Web of Science: A Scient metric Analysis in Citespace (2002–2018)” This paper can help readers to better understand the status quo and development trend of green building and to easier recognize the short-comings in the development of green building, so as to provide a promising direction for future research.

Omair Awadh, (2017) “Sustainability and Green Building Rating Systems: LEED, BREEAM, GSAS and Estidama critical analysis.” 2017 Journal of Building Engineering In the built environment, a green building rating system provides the project team a framework and a tool to help achieving a better sustainable development. The research presents how Green Building Rating Systems (GBRSs) are environmental-oriented tools and should not be confused with Sustainability Assessment Systems; the latter is defined by the sustainability three pillars; environmental, social and economic.

Dat Tien Doan, Ali Ghaffarianhoseini, Nicola Naismith, Tongrui Zhang, Amirhosein Ghaffarianhoseini, John Tookey, (2017) “A Critical Comparison of Green Building Rating Systems.” ,2017 Building and Environment. This paper aims to develop a systematic review of the development of green rating systems focusing on four well-known rating systems, namely BREEAM, LEED, CASBEE, and Green Star NZ to

- 1) discover how interest and research in green rating systems have developed
- 2) identify the similarity, difference, strength and weakness of green rating systems
- 3) examine whether they fully assess the projects in all aspects of sustainability.

Sharad R. Khese, M.N. Hedaoo, B.A. Konnu (2017) A Comparative Study of Rating Systems in Green Building. International Journal of Engineering Research, Volume No.5 Issue Special 1 pp 134-136. Department of Civil Engineering, Govt. College of Engg. Karad 41512 (MS).

This study presents a complete and detail comparative review of four well known sustainable green building rating systems. All four rating systems are good enough to be used in certain part of the country but they are not unique in nature. Since these systems are based on different parameters, the above four rating systems rate the same buildings differently.

RG Reed, “Green Building Rating Systems”, (2017)

Comparing BREEAM, LEED, Green Star, and CASBEE BRE (2008) compared four environmental tools and Table 3 illustrates the comparisons. The assessment criteria were launch date, rating scales, information gathering, assessment, third-party validation, certification and labelling, update process, governance, required qualification of assessors, assessor CPD requirements, compound annual growth rate, assessment fee, certification fee, cost of appeals, credit interpretation request costs, number of units certified, number of domestic and nondomestic buildings already certified, and availability of assessment information

Bon-Gang Hwang and Jac See Tan.Green Building Project Management (2016) “Obstacles and Solutions for Sustainable Development. Department of Building”, National University of Singapore, Singapore. Green building construction is earning a place in Singapore’s construction industry and with augmenting cognizance of environmental issues and growing concern over climate change, sustainable construction is gradually being put forth globally.

Dr. Dina Ahmed Elmeligy. Rating Systems Awareness for Green Buildings Applications International Refereed Journal of Engineering and Science (IRJES) ISSN (Online) 2319-183X, Volume 3, PP.53-64. Tanta University, Egypt.

Buildings have major environmental impacts over their entire life cycle. Thus, buildings are one of the major pollutants that affect urban air quality and contribute to climate change. Hence, the need to design a green building is the essence of which would be to address all these issues in an integrated and scientific manner.

Amos Darko, Albert P.C. Chan (2016) “Critical analysis of green building research trend in construction journals” This study aimed at providing insights into GB research trend in CM by reviewing selected GB research papers, but not to review the complete population of GB-related studies conducted during the studied period. Therefore, it has to be noted that the results presented herein are exclusively based on the analysis of the GB research papers obtained from the specific sampling approach discussed in section

Mahbub Rashid and Kent Spreckelmeyer (2012) “Journal of Corporate Real Estate” Based on the statistical analyses of the data collected from 175 occupants of a Gold-level LEED-certified building using a questionnaire instrument, this study found no evidence for direct relationships between the occupant’s assessments of individual workspace and departmental space features and their assessments of EA and OI.

Binh K. Nguyena Hasim Altana, (2011) “Comparative review of five sustainable rating systems”,2011 International Conference on Green Buildings and Sustainable Cities The paper presents the comparative review of five prominent sustainable rating systems namely BREEAM, LEED, CASBEE, GREEN STAR and HK-BEAM. The review process adopts a system of criteria which encompasses all features of sustainable rating tools.

4. IGBC RATING SYSTEM PARAMETERS

Sr.No	Category	Mandatory Requirement	Points
1	Sustainable Architecture and Design	0	5
2	Site Selection and Planning	2	14
3	Water Conservation	2	19
4	Energy Efficiency	3	28
5	Building Materials and Resources	1	16
6	Indoor Environmental Quality	2	11
7	Innovation and Development	0	7
	Total	10	100

Source-IGBC Green New Buildings Rating System Version 3.0

Abridged Reference Guide September 2014

4.1. Sustainable Architecture and Design

It involves integrated design approach, Site Preservation and Passive Architecture carries separate points. Integrated design approach practices involve approach towards enhanced building performance, from planning stage to completion stage of the project. Where as site preservation includes to maintain the site features and to minimise the negative environmental impacts like site contour, water bodies and channels, natural rocks, existing topography / landscape and existing trees. Passive architecture involves climate-responsive concepts and design features and passive cooling / heating technologies. This credit overall carries 5 points.

4.2. Site Selection and Planning

Site selection and planning includes Local Building Regulations and Soil Erosion Control as its mandatory requirements where as basic amenities, proximity to public transport, low-emitting vehicles, natural topography or vegetation, preservation or transplantation of trees, heat island reduction, non-roof, heat island reduction, outdoor light pollution reduction, universal design, basic facilities for construction workforce, green building guidelines carries separate points.

Basic amenities and proximity to public transport intent is to use of low-emitting vehicles (such as electric and CNG powered) to encourage the use of non-fossil fuel vehicles and minimise the negative impact on environment. Natural topography or vegetation and preservation of trees must to maintain biodiversity. Reducing disturbances to microclimate by minimising heat island effect. Outdoor light pollution control has to be done on site by Prescriptive Approach towards lighting and its power density. Adequate facilities must be provided for the workforce. Site selection and planning carries 14 points.

4.3. Water Conservation

Water conservation includes rainwater harvesting, (Roof and Non-roof) and Water Efficient Plumbing Fixtures as its mandatory requirement whereas Landscape Design, Management of Irrigation Systems, Waste water treatment and reuse, and Water Metering carries separate points. Rainwater harvesting has to be done on site for alternative storage of water for non-potable purpose such as flushing, landscaping, air cooling. For water efficiency, use of fixtures which having limited flow rate as recommended by IGBC. Water metering includes compulsory installation of water meters to observe the performance of the project. Outdoor temperature can be reduced by landscaping and for that management of irrigation system is required. The landscape should be min 10% of site area. Also waste water should be treated to the quality standards prescribed by pollution control board and at least 25% treated water should be used for non-potable purposes.

4.4. Energy Efficiency

Energy Efficiency includes Ozone Depleting Substances, Minimum Energy Efficiency and Commissioning Plan for Building Equipment & Systems are the mandatory requirements. Where as eco-friendly refrigerants, enhanced energy efficiency, on-site renewable energy, off-site renewable energy, commissioning, post-installation of equipment & systems and energy metering and management carry separate points.

IGBC recommended using BEE 3-star eco-friendly refrigerants and halons in the building, to minimise negative impact on the ozone layer and to reduce the energy consumption as well. On-site renewable energy and off-site renewable energy encourages adopting possible use of renewable energy on the site. Energy metering must be done for continuous monitoring and enhance the performance of the building as well. Use of solar panel helps to reduce the burden on fossil fuels.

4.5. Building Materials and Resources

It includes 11 points and segregation of waste is mandatory requirement. Segregation of waste and organic waste management intent to segregation of waste at source and recycling of material to avoid wastes being sent to landfills. Same as sustainable building materials intent to reduce dependence on materials that can have negative impact on environment. IGBC recommends At least 2.5% salvaged or reused material of the total building material should be used. Also 95% of construction waste should be diverted from landfills.

4.6. Indoor Environmental Quality

It has fresh air ventilation and tobacco smoke control as its mandatory requirement. Whereas the credit CO2 monitoring is to control the level of CO2 occupant comfort and well being. IGBC recommends demonstrate through computer simulation that 75% of regularly occupied spaces in the building achieve daylight illuminance of minimum 110 Lux in clear sky condition. Also building occupants must have access either to sky or flora and fauna or both. To reduce adverse health impact on occupants, use paints and coating with low or no VOC for 95% of interior wall and ceiling surface area is recommended. Thermal comfort, indoor temperature is to maintain building temperature and humidity level for well-being of occupants. Facilities for differently able people ensures making the building user-friendly by providing ramps, audio bell provision in elevators etc This credit carries altogether 11 points

4.7. Innovation and Development

It includes credits under innovation and one IGBC AP credit. There should be at least one IGBC AP member in the project team. Whereas valid innovations expected other than guided by IGBC. For optimization in structural design it is recommended to demonstrate a saving of at least 5% by weight of steel and cement. Also recommends replacing at least 10% of potable water by treated waste water provided that quality of construction should not be degraded.

5. CONCLUSION

From above given literature review we conclude that, achieving certification for new building from IGBC is to facilitate a holistic approach to create environment friendly building through Sustainable Architecture and Design, Site Selection and Planning, Water Conservation, Energy Efficiency, Building material and resources, indoor indoor air quality. It possesses lots of tangible benefits and intangible benefits as well. There is need to work to minimise the initial cost of green projects. There is a need of an hour that Government has to take a step to define and apply separate green policies and include it in a city wise

Development plan also allowing extra FSI to the developers and some extra discount in registration to customers for successful implementation to the route level. Easy approvals, faster

clearance and transparency is also important for implementation of the same. The rating system is fundamentally designed to address national priorities and to enhance the quality of life of users. Thus to certified as a green building new building should satisfy all mandatory requirements and minimum numbers of credit points.

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