

International Scenario of Certifications and Rating Systems for Green Buildings.

Aboli A. Ravikar, Deepa A. Joshi, Radhika Menon

Abstract: Sustainable development in the construction industry demands implementation of a green rating procedure and certification to assess building. The rating tools set benchmarks for green measures for constructing and use of buildings to reduce their negative impacts on environment thereby making it more sustainable. In this paper, Rating systems and certifications across the globe are studied and compared to give a clear understanding of all for any green building project to be evaluated upon. There are 18 major certifications and 18 rating systems all over the world, however in India there are three rating systems which are mostly used viz. IGBC, GRIHA, LEED. It is recommended that a more simple system is needed for enhancing the participation of all stakeholders in Green building construction thereby leading to sustainable development.

Keywords: Certifications, Green Building, Rating systems.

I. INTRODUCTION

Globally, buildings are responsible for a huge share of energy, electricity, water and materials consumption. Buildings have a tremendous impact on the environment, using about 40% of natural resources extracted in industrialized nations, consuming virtually 70% of electricity and 12% of potable water, and producing between 45% and 65% of the waste disposed in our landfills. [1]. The green building movement in the U.S. originated in the year 1980's from the need and desire for more energy efficient and environmentally friendly construction practices. Thereafter the intensive research was conducted on green buildings in advance countries and rating systems were established. Green building is the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's life-cycle from siting to design, construction, operation, maintenance, renovation and deconstruction. Green building is also known as a sustainable or high performance building. Green building practices aim to reduce the environmental impact of building and so Rating systems are necessary to rate the buildings and check whether they comply upon the set guidelines. Certification through any rating system provides verification of the green nature of the project, and can be a valuable educational and marketing tool

for owners and design and construction teams through the process of creating a more sustainable building. The rating tools set benchmarks for green measures for constructing and using buildings to make them sustainable and to reduce their negative impacts on environment. Based on the magnitude of green measures adopted, points are awarded to a building and, after appropriate weighting; a total score is ascribed to determine the rating of the building. The guidelines within rating systems help to clarify a market filled with "green" options. There are many different rating systems all over the world. The choice depends on the uniqueness of each project and the project needs and requirements such as the project location, size, budget, and overall project goals. Also comparing essential issues such as cost, ease of use, and building performance will help determine which building rating system is applicable and which certification level is possible.

The objective of this paper is to study various rating systems for the above mentioned purpose and so review of available rating systems from number of countries has been presented to understand the global scenario of the same.

II. GREEN BUILDING CERTIFICATIONS

These are divided into two categories-

- **Single Attribute:** Single attribute green building rating systems generally focus on one aspect of sustainability, i.e. energy reduction and savings.
- **Multi Attribute:** Multi attribute green building rating systems focus on more than one aspects of sustainability.

A green building certification shows that a building meets the set standards and is environmentally friendly and respect human health. However, there are other major benefits for a green building certifications that can be summarized as money savings over the lifetime of a project, increased project value and increased building occupant satisfaction. A detail study of the important certifications has been done and a comprehensive analysis considering various parameters like type of certifications, area of focus etc has been carried out. The detailed analysis is presented in Table 1.

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Table 1: Certifications for Green Building

<u>Sr.No</u>	<u>Building Certification</u>	<u>Type of certification</u>	<u>Managing country or organisation</u>	<u>Area of focus of certification</u>
1.	Energy Star	Single Attribute	U.S	Electronic appliances, heating and cooling equipment, commercial roofing etc.
2.	Water sense	Single Attribute	U.S	Water efficient products.
3.	Scientific Certification Systems (SCS) Global Services	Multi Attribute	U.S	Biodegradable liquid products and recycled contents.
4.	Green Seal	Multi Attribute	U.S	Consumable items of building operation like adhesives, paints, windows, lamps etc
5.	Cradle to Cradle	Multi Attribute	U.S	Materials that can be disassembled, recycled and composted as biological nutrients.
6.	Material Analytical Services Certified Green	Multi Attribute	U.S	Low VOC content in products
7.	Carpet and Rug Institute (CRI) certification	Multi Attribute	U.S	Lowest VOC emissions from products like carpets, rugs and cushions etc.
8.	High Quality Environment (HQE) Certification	Multi Attribute	France	Assessment area includes most suited construction option to sustainable development

9.	Net Zero Energy Building	Multi Attribute	U.S.A	Energy needs and management in buildings.
10.	Living Building Challenge	Multi Attribute	U.S.A	Five aspects of green building.
11.	Forest Stewardship Council	Single Attribute	Mexico	Wood products.
12.	Green Squared	Multi Attribute	North America	Tile installation
13.	Fitwel	Multi Attribute	New York	Commercial interiors, single and multi tenant existing buildings
14.	Green Screen	Multi Attribute	England	Identifies chemicals of high concern and suggests the safer alternative
15.	GreenGuard	Multi Attribute	Underwrites laboratory	Threshold values for total volatile organic compounds(VOC's)
16.	Ecologo	Multi Attribute	Underwrites Laboratory	Products with reduced environmental impacts
17.	ParkSmart	Multi Attribute	Industry Experts	Recognizes high performance sustainable garages
18.	RESET	Multi Attribute	U.S	Ensures safety of structure at all times

From the above table, it is noted and found that Energy star is a recognized government run product certification label for energy efficiency products. All other are third party certifications which means they are independent of the product manufacturer, contractor and designer. Green Squared is the first multi-attribute sustainability standard developed for tile installation materials. Parksmart is the world's only certification program that measures and recognizes high performing, sustainable garages. The

certifications that deals with VOC content of a product includes GreenGuard, MAS certified green and the CRI certification. Energy Certifications include Energy star and the Net Zero Energy Building Certification. The products are assessed in five categories in Cradle to Cradle certification. Forest Stewardship Council (FSC) is a globally recognized certification framed to ensure that forests are managed sustainably.

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Many certifications are also recognized with comprehensive green building rating systems such as LEED, Green Globes and the National Green Building Standard. As a result, green building certifications are on great demand as the greener products continues to increase.

III. GREEN BUILDING RATING SYSTEMS

Alongwith Green Building Certifications, Green Building Rating Systems are also present across the country. Rating

systems are a type of building certification systems that rates the performance of building with specific environmental goals and requirement. Rating Systems and Certification systems are frequently used interchangeably. The aim is to create projects that are environmentally responsible and use resources efficiently throughout the project lifecycle.

A brief study of all the rating systems across the country is summarised in the table below:

Table 2: Rating systems for Green Building

Sr.no	Building Rating System	Type	Managing organisation	Area of focus of rating
1.	Building Research Establishment Environmental Assessment Method (BREEAM)	Multi Attribute	U.K	Performance in: Energy, Health, Transport, Water, Materials, Waste, Ecology and Pollution
2.	Leadership in Energy and Environmental Design (LEED)	Multi Attribute	U.S Green Building Council	Performance in: Sustainable sites, Water efficiency, Energy atmosphere, Materials and resources, Innovation in design etc.
3.	Green Rating for Integrated Habitat Assessment (GRIHA)	Multi Attribute	India	Performance in: Energy, Health, Water, Material waste and pollution.
4.	Building and Construction Authority (BCA) Green Mark	Multi Attribute	Singapore	Assessment area includes five key aspects.
5.	Green Star	Multi Attribute	South Africa	Performance in: Energy, Health, Transport, Water, Material waste and pollution
6.	Pearl Rating system	Multi Attribute	Abu Dhabi	Assessment of performance in: Integrated development process, natural systems and innovating practice.
7.	Comprehensive Assessment System for Built Environment Efficiency (CASBEE)	Multi Attribute	Japan	Assessment area includes five key aspects.
8.	The Sustainable SITES Initiative	Multi Attribute	U.S	Assessment area includes sustainable landscapes, performance measurement and elevation of their values.

9.	Home Energy Rating System (HERS)	Multi Attribute	California	Inspection and Calculation of home energy performance.
10.	German sustainable Building Council (DGNB)	Multi Attribute	Germany	Assessment criteria: Energy efficiency, Water efficiency, Material management, Indoor Environmental quality, Waste Reduction.
11.	High Quality Environment (HQE)	Multi Attribute	France	Assessment area include 14 criteria divided into exterior and interior.
12.	Green Star	Multi Attribute	Australia	Assessment area includes sustainability of projects at all stages of built environment life cycle.
13.	Passive Home Institute	Multi Attribute	U.S	Standards for low energy buildings, mainly for new projects.
14.	WELL Building Standard	Multi Attribute	U.S	Encompasses seven distinct areas of health and wellness in relation to buildings.
15.	Building Environment Assessment method (BEAM)	Multi Attribute	Hong Kong	Environmental performance of buildings.
16.	Excellence in Design for Greater Efficiencies (EDGE)	Multi Attribute	South Africa	Rating systems for new residential and commercial buildings.
17.	National Green Building Standard	Multi Attribute	America	Rating systems for homes and apartments approved by ANSI
18.	SABA Rating System	Multi Attribute	Jordan	Assessment criteria: Site, Energy efficiency, Water efficiency, Material, Indoor Environmental quality, Waste and pollution.

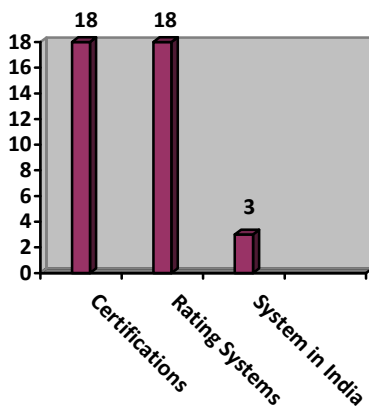
It is found that, BREEAM is the oldest rating systems developed in 1990's in U.S. and is the world's longest method of rating and certifying the sustainability of buildings. BREEAM certification is followed by more than 50 countries worldwide.[7]. Almost every country have their own rating systems and checks a building on aspects like energy efficiency, water efficiency, waste reduction, material management and indoor air quality. The rating system of Spain focuses on 14 criteria and is divided into interior and exterior. Countries like Poland, Sweden, Vietnam, Romania, Brazil follow LEED rating system. It is also found that LEED

is the common rating system used in almost in every country. LEED rating system consist of seven categories for evaluation. It is found that SABA rating system focuses more on water efficiency aspect of Green building whereas most of the raing systems focuses on energy efficiency aspect. [10].The regional priority credit is important and to be included in all rating systems as it helps the project team focus on local environmental, social equity and public health priorities.

In India, there are three most prevailing rating systems viz. GRIHA, IGBC and LEED. GRIHA is used for most of the government structures. The most commonly used rating system in India is IGBC. The ratings awarded for the building are more or less the same viz. Platinum, Gold, Silver, Certified. The criteria for rating the buildings should be widened as that of Spain's rating system since it gives a complete check to a building and gives a clear idea of its position in being green.

IV. RESULT AND DISCUSSION

From the above study, it is found that there are around 18 major certifications and 18 rating systems across the world to check the building on various points so as to give a fair idea of where it stands in being a green building. Each system has certain strong points and certain weak points and are not specific on some assessment criteria. Few are quite complex in nature and do not necessarily give a clear idea of the projects effectiveness.



V. CONCLUSION

Green building certifications and Rating systems are studied in detail. The comprehensive analysis considering the type, focus area and their use in countries across the globe is carried out. It has been observed that total 18 major certifications and 18 rating systems are prevailing across the world. In India, there are three prevailing rating systems viz. GRIHA, IGBC and LEED. It has been found that most of the rating systems focuses on Energy efficiency aspect whereas few rating systems focuses on other aspects of the building. Considering all the systems and their in-depth study, it is recommended that a more simple system is needed for enhancing the participation of all stakeholders in Green building construction thereby leading to sustainable development.

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