

# A REVIEW STUDY ON SMART & SUSTAINABLE DEVELOPMENT RATING SYSTEM BY USING DIFFERENT CRITERIA.

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**Abstract:** The Population of the world grows day by day. With the increasing inhabitants in the world standard of living life is also increase. As a result of the rise in inhabitants, co2 emission and global warming effects are considerably high. To cure the effects of co2 emission and climate change build some sustainable cities for inhabitant people also for protecting the environment. In The times of developing smart cities world also needs sustainable cities. with the utilization of Smart and Sustainable city world spotlight on the best strategy to restrict the utilization of non-sustainable sources. The study shows the various Smart & Sustainable city rating system in the world with their rating points. For discovering the serval key elements literature review is done and different measures and pointers were discovered which give productive Smart and Sustainable cities.

**Key factors – Sustainable city, Rating system, indicators, Factors, advantages & disadvantages**

## I. INTRODUCTION

Urbanization alludes to the expanding number of individuals that live in metropolitan zones. The worldwide metropolitan populace has risen drastically throughout the last 100 years, with provincial to-metropolitan movement answerable for most of this development (United Nations, 2014). This shift is anticipated to proceed, with 60% of individuals assessed to dwell in urban areas by 2030 (United Nations, 2014). The move from country to metropolitan conditions influences individuals' lives from numerous points of view. A portion of these impacts are positive, with urbanization supporting, for instance, financial development and improvement alongside a scope of advantageous social results (Dye, 2008). Simultaneously, urban communities are packed, contaminated and more upsetting than rustic territories (Dye, 2008), and the opposition for space implies there is no place for nature.

Here, in this paper two problem related to urbanization and environment are considered. With combination of this two area better solution can be find out This concept of Sustainable city is to increase the use of renewable sources and minimization of carbon foot print. The Objectives of this paper is study various Rating system for the Smart & Sustainable practice across the world.

## II. WHAT IS SUSTAINABLE CITY?

The ability to be maintained at a certain rate or level. Meets the need of present without compromising the future generation to meet their own need or ability to maintain certain rate or level (Brundtland commission).

### 2.1 Advantages of Sustainable city

- Better utilization of materials
- Expanded efficiency
- Land is saved for different purposes including farming, relieving ecological difficulties and keeping up eco-framework.
- Assembled climate prerequisites for truly expanding populace are upheld. Rebuilding and/or redevelopment of existing urban communities become simpler as a result of movement to new turns of events.
- City frameworks are to work 24x7 and consequently, chances of work inside urban areas and public support in help, organization and the board are improved.
- Occupants live inside open to strolling distance from their working environment, diversion, study and love.
- Cost and Fuel/Energy utilization in vehicular transportation and metropolitan administrations is fundamentally diminished and consequently air contamination is additionally decreased.

### 2.2 Elements of Sustainable city

- Admittance to Public Resources
- Metropolitan Renewal activities
- Decrease of CO2 emanations
- Preferring moral utilization

## III. CRITICAL LITERATURE REVIEW

Dr Rajeev Garg, AR Anoop Kumar Sharma in the course of the paper, various advantages and disadvantages of the sustainable vertical cities are identified. Various aspects of research related to sustainable vertical cities (SVC) are also been identified and touched upon in the paper. The challenges of SVC (Sustainable vertical cities) are also elaborated in the segment of the paper.

Abu Bakar, Khor Soo Cheen the sustainable urban development involves ecological, economic, technological, cultural, and social sustainability. Building design did not take into account energy efficiency and green affordable housing. Sustainability of housing development gives more emphasis to environmental, economic and social issues. The criteria can be categorized in six categories namely; Environment, Social, Economics, Building Forms, Site or Land usage, and Communication and Transportation.

Simon Elias Bibri Smart Sustainable city development involves the application of a set of integrative foundational elements drawn from urban planning, urban design, sustainability, sustainable development, sustainability science, data science, computer science, complexity science, systems theory, systems thinking, and ICT.

Baile átha cliath the first chapter of this report is to describe the national planning objectives. In this chapter population forecasting by 2020 is described. In this report on Sustainable residential development they describe various planning proposals and implementation strategies for sustainable neighborhood planning. Addresses the issues affecting individual dwellings and their immediate environs – issues which are likely to impact directly on residents' perceptions of quality of life.

#### IV. ASSESSMENT TOOLS FOR SUSTAINABLE URBAN DEVELOPMENT IN VARIOUS COUNTRIES

##### 4.1 BREEAM: -Building Research Establishment Environmental Assessment Method

- BREEAM is a voluntary green building sustainability rating system established in the UK for assessing the environmental performance of buildings. BREEAM is the world's leading sustainability assessment method for master planning projects infrastructure and building.
- BREEAM does this through third party certification of the assessment of an asset's environmental, social and economic sustainability performance, using standards developed by BRE. This means BREEAM rated developments are more sustainable environments that enhance the well-being of the people who live and work in them, help protect natural resources and make for more attractive property investments.
- BREEAM measures sustainable value in a series of categories, ranging from energy to ecology. These categories are, 1. energy, 2. health and wellbeing ,3. Innovation, 4. land use, 5. materials ,6. Management ,7. Pollution ,8. transport, 9. waste ,10. Water.

BREEAM Rating	% score
OUTSTANDING	≥ 85
EXCELLENT	≥ 70
VERY GOOD	≥ 55
GOOD	≥ 45
PASS	≥ 30
UNCLASSIFIED	< 30

Fig -BREEM RATING POINTS

##### 4.2 CASBEE: - Comprehensive Assessment System for Built Environment Efficiency

- Comprehensive Assessment System for Built Environment Efficiency (CASBEE) is a method for evaluating and rating the environmental performance of buildings and the built environment.
- CASBEE has been designed to both enhance the quality of people's lives and to reduce the life-cycle resource use and environmental loads associated with the built environment, from a single home to a whole city.

- Consequently, various CASBEE schemes are now deployed all over Japan and supported by national and local governments. This website provides overall information about CABEE, associated with presentative green buildings with CASBEE evaluation.

Ranks	Valuation	BEE value, etc.	Indication
S	Excellent	BEE = 3.0 or more and Q = 50 or more	★★★★★
A	Very Good	BEE = 1.5-3.0 BEE = 3.0 or more and Q is less than 50	★★★★
B <sup>+</sup>	Good	BEE = 1.0-1.5	★★★
B <sup>-</sup>	Fairy Poor	BEE = 0.5-1.0	★★
C	Poor	BEE = less than 0.5	★

Fig - CASBEE Ranking points

Source -<https://www.ibec.or.jp/CASBEE/english/graphicE.html>

#### 4.3 GBI: -Green Building Index

- The Green Building Index (GBI) is Malaysia's industry recognized green rating tool for buildings to promote sustainability in the built environment and raise awareness among Developers, Architects, Engineers, Planners, Designers, Contractors and the Public about environmental issues and our responsibility to the future generations.

Point	GBI Ratings
86 to 100 points	Platinum
76 to 85	Gold
66 to 75	Silver
50 to 65 point	certified

Table - GBI Rating points

#### 4.4 GRIHA: - Green Rating for Integrated Habitat Assessment

- GRIHA is a Sanskrit word meaning – 'Abode'. Human Habitats (buildings) interact with the environment in various ways. Throughout their life cycles, from construction to operation and then demolition, they consume resources in the form of energy, water, materials, etc. and emit wastes either directly in the form of municipal wastes or indirectly as emissions from electricity generation.
- GRIHA is a rating tool that helps people assesses the performance of their building against certain nationally acceptable benchmarks.

Rating threshold	
GRIHA V 2019 Rating threshold	GRIHA Rating
25-40	1 STAR
41-55	2 STARS
56-70	3 STARS
71-85	4 STARS
86 or more	5 STARS

Fig - GRIHA Rating points

**4.5 LEED: - Leadership in Energy and Environmental Design**

- LEED is an internationally recognized green building certification system, providing third-party verification that a building or community was designed and built using strategies aimed at improving performance across all the metrics that matter most: energy savings, water efficiency, CO2 emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts.



Fig -LEED Rating points

Source: -<https://www.usgbc.org/leed>

**4.6 IGBC: - Indian Green Building Council**

- The Indian Green Building Council (IGBC), part of the Confederation of Indian Industry (CII) was formed in the year 2001. The vision of the council is, "To enable a sustainable built environment for all and facilitate India to be one of the global leaders in the sustainable built environment by 2025"

Rating	Point	Recognition
Certified	51-60	Best practice
Silver	61-70	Outstanding performance
Gold	71-80	National excellence
Platinum	81-100	Global Leadership

Fig -IGBC Rating points

**V. MAJOR FINDINGS**

Before planning or regenerating any region it is necessary to find out the current situation of the city. Every city is a Sustainable city but to what extent Sustainable is present is necessary to find out. Sustainable development criteria are useful to develop a Smart and Sustainable City.

There are major 4 criteria which is necessary to study for finding accurate Sustainable development. These criteria are:

- Environment
- Resources Management
- Economy
- Physical

For these different criteria different indicators are there which help us to develop sustainable city.

➤ **Environment**

1. Greenhouse gas emission
2. Green coverage field
3. Sustainable resource management
4. Recycling of used resources

➤ **Resources Management**

1. Sustainable energy management
2. Sustainable transportation management
3. Natural resources management

➤ **Economy**

1. Land acquisition
2. Cost of the project
3. Profitability

➤ **Physical**

1. Water supply
2. Storm water management
3. Sanitation
4. Sustainable Infrastructural facilities

From this criteria and indicators Smart and Sustainable development of the city has been easily developed.

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