

“A Review Paper on Study and Analysis of Green Building Rating System to Improve Performance of Residential Buildings in Sangli and Kolhapur Region”

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Abstract - The construction industry is having the highest rate of growth in the last 10-15 years, which causes a major negative impact on the natural resources available for construction and the environment in its consumption of energy. To resolve these problems, one needs to go for "Green Buildings". Today, there is a high level of demand for green or sustainable buildings. The most important decisions regarding a green building's features are made during the pre-construction and design stages. With the increase in demand for green buildings, the demand for Green Building Rating System (GBRS) is also increasing. Green Building Rating System (GBRS) set the benchmark for green building measurement, which helps to reduce the negative impact on the environment by promoting quality green buildings. Hence, it is considered as an attempt to check the status of green buildings growth in India. This paper includes the Objective, Methodology, Study process adopted for criteria of the Green Building Rating System (GBRS) to improve the performance of residential buildings in the Sangli and Kolhapur region and the expected conclusion. This research helps the builders to consider the criteria of the Green Building Rating System (GBRS) for residential buildings during the planning phase of the project. This will lead to the development of a sustainable world.

Key Words: Green Building, Green Building Rating System (GBRS), criteria

1. INTRODUCTION:

Due to increased population and rapid urbanization, there is a huge demand for commercial and residential buildings. Traditional methods of construction and materials are harmful to our society and environment because they emit greenhouse gases (GHGs), dust, consume more water and energy. Natural resources like forests, ground cover, energy, and water are reducing to give way to buildings. Many occupant functions and building processes create a huge amount of waste. Therefore, buildings are major pollutants that affect urban air quality and contribute to climate change. To resolve these issues, it is necessary to go for sustainable construction or green building. A Green building utilizes less energy, less water, creates less waste,

and gives more advantageous spaces to tenants as compared to a regular building.

The Green Building focuses mainly on two objectives:

- To reduce building's negative impact on the environment and human health, by site selection, better design, construction, operation & maintenance.
- To increase the efficiency of buildings by using energy, materials, and water.

As the demand for green buildings is increasing, the demand for Green Building Rating Systems and assessment tools is also increasing. For evaluating the environmental performance of buildings all over their life cycle, a Green Building Rating System is a rating tool. This rating tool helps to reduce the negative impact on the environment by promoting quality green buildings. It consists of a set of criteria that includes different parameters related to design, construction, and operation of green building performances, benchmarks, and largely quantifiable goals which are mentioned in each criterion. Each criterion has pre-assigned sets and points. If the project fulfills the rating criteria, then it is awarded by points and the final rating of a project is decided by adding points from start to end. For fair calculation of project rating systems call for independent third party and different processes are put in place.

Some of the successful international Green Building Rating System programs which are used in India are:-

- **GRIHA-** Green Rating For Integrated Habitat Assessment
- **LEED-** Leadership in Energy and Environmental Design.
- **IGBC-** Indian Green Building Council

To decrease the impact on our planet and improve the living standards of all, one solution is to go for green buildings in the country. The solutions that we make now

will shape our opportunities in the future and those of future generations. Thus, it is considered as an attempt to check the status of green buildings growth in India. Further, it will help in creating awareness in the builders and the general public and motivate them to use this concept. This will lead to the progress of a green world.

The project aims to study and analyze the current status of the application of Green Building concepts in the Sangli and Kolhapur region. Also, to give suggestive measures to improve the performance of residential buildings and to create awareness amongst the builders and general public about the standards of application of Green Building Rating Systems in Sangli and Kolhapur region.

1.1 Green Building:

Green building means the incorporation of eco-friendly and resource-efficient processes at each stage of construction, right from site selection and design of construction, an operation followed by Maintenance, Renovation, Retrofitting, or even Demolition. The endeavor is to achieve the minimum possible impact on the environment. In other words, green building design involves finding the balance between homebuilding and the sustainable environment.

1.2 Benefits of Green Building:

- Reduce wastage of water
- Conserve natural resources
- Improve air and water quality
- Protect biodiversity and ecosystems
- Improve occupant productivity
- Reduce operating costs
- Improve the quality of life
- Improve occupant health and comfort

2. LITERATURE REVIEW:

Dr. Dina Ahmed Elmeligy (May 2014) described comparative review to understand the differences in using different types of evaluation systems, particularly in categories of each one, and performance of their impact as applied to sustainability—both from the viewpoint of General information, Applicability, Certification levels, Usability, Categories and present a case study as well as a Sample of On-line Evaluation. By this comparison, it can be concluded that it is necessary to select the suitable rating system according to its categories which are generally considered the most significant measure in building sustainability assessment, likewise to ensure the sustainable

design environmental performance goals are being met when desired ratings are achieved. Nangare Priyanka Pandharinath, Pound Gaurav Chandrakant (2015) described that the comparison of green building with conventional building concerning the economy is studied. It also includes the study of existing green buildings, by surveying concerning energy saving, operating cost, saving in electricity water, etc.

Rakesh Awasthi (2016) has explained that there are different rating systems available in India, the process of awarding the green building system & finally finds out which is the most critical part of the green building certification process. He gives the idea to understand the rating system & critical parts of the certifications process so that we can have a detailed understanding of the selection process. Shaik Rehana Begum, B. Harish Naik (2017) described how to understand and find solutions to the significant impact of real estate activity in India on the environment and resources. They investigate the cost efficiency of green buildings through a cost-benefit analysis and a study on the payback period of the extra investment in developing green buildings. Starting with the benefits that may be obtained during the design and construction phase, the discussion then shifts to the asset value and returns received by investors and developers. This is followed by the operational benefits such as cost savings, workplace health, and productivity, and finally the issue of risk mitigation, which plays a role in every stage of a building's economic life.

3. OBJECTIVES OF THE STUDY:

- To study the present status and make a literature review of the application of Green Building concepts in the Sangli and Kolhapur region.
- Collection of required data according to the various criteria of the selected Green Building Rating System for residential buildings located in the Sangli and Kolhapur region.
- To perform analysis of ongoing and recently completed residential buildings as per selected Green Building Rating System criteria.
- To suggest suitable Green Building techniques to the residential buildings that have been analyzed, to improve the performance of residential buildings.
- To compare the cost of the residential building before and after the application of selected Green Building Rating System criteria.

4. METHODOLOGY:

The following methodology will be adopted:

- Collection of preliminary information through literature survey.
- Comparing the different rating systems and choosing an appropriate Green Building Rating System.
- Choosing ongoing and recently completed residential buildings sites and studying the current situation of Green Building concepts in the Sangli and Kolhapur Region.
- Collection of data required through questionnaire survey and Analysis of the selected residential buildings according to Green Building Rating System criteria.
- Suggesting the suitable Green Building techniques to those analyzed buildings, to improve the performance of residential buildings.
- Comparing the ratings before and after application of the Green Building techniques to those residential buildings.
- Comparing the cost of the selected residential building before and after application of Green Building Rating System criteria.
- Results and Conclusions.

Flow Chart:

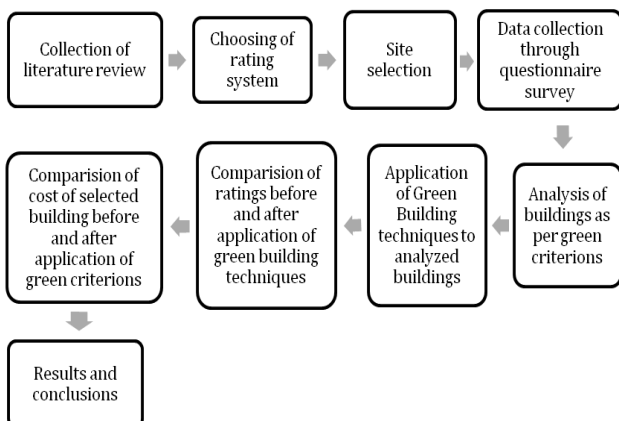


Chart-1

5. STUDY PROCESS:

This study involves mainly the following process:

- Determination of objective and scope of study work.

- Review of the literature.
- Site visits and collections of data using the questionnaire survey
- Analysis of residential buildings as per Green Building Rating System's Criterions.
- Suggestions for improving the performance of residential buildings.
- Comparison of cost.
- Discussion of results and conclusions.

6. SCOPE OF STUDY:

This study covers the application of the Green Building Rating System's criteria on ongoing and recently completed residential building construction sites in the Sangli and Kolhapur. In the study, collections of data from residential building sites in the Sangli and Kolhapur are carried by using a questionnaire survey, and analysis of residential buildings sites is done by using criteria of the Green Building Rating System. Also give suggestions to the builders and general public, about the standards of application of criteria of Green Building Rating System to residential buildings and thereby improve the performance of residential buildings in the Sangli and Kolhapur.

7. PRACTICAL IMPLICATION:

The study seeks to have positive implications on builders of those residential buildings are:

- The results will enable residential buildings organization to use less electricity, utilize renewable energy, consume less water, to minimize the burden of residential waste on municipal waste management.
- Improving the overall performance of residential buildings by using criteria of the Green Building Rating System will help in protecting biodiversity and ecosystems, creating a market for green products and services, improving occupant health and comfort, improving air and water quality, Improving the quality of life.

8. OUTLINE OF THESIS:

This thesis consists of the following Chapters:

- In the first chapter general information and the need for green building are given along with the objectives and motivation of the dissertation work.

- The second chapter contains a literature review including a review of previous studies carried out by some of the researchers.
- Chapter three explains the path of the methodology adopted to achieve the objectives of the dissertation work carried out.
- The fourth chapter deals with the status of the application of green concepts and the selection of residential buildings sites in the Sangli and Kolhapur region.
- The fifth chapter includes the data collection and analysis of sites by the green building rating system's criteria along with the methodology adopted to achieve the objectives of the dissertation.
- Chapter sixth explains results, discussions, which are evaluated from the data, and also suggestions for improving the performance of residential buildings.
- In the Seventh chapter cost comparison of the site is done.
- Chapter eight concludes the overall study and recommendations for future research.

9. CONCLUSIONS:

- SVAGRIHA rating system variant from Green Rating for Integrated Habitat Assessment (GRIHA) is chosen for the study of residential buildings.
- SVAGRIHA rating system has 14 criteria which are separated into 5 broad sub-groups. For this rating system, the total points that a project can achieve are 50 and the analysis of residential buildings will be done as per a 1-5-star scale.
- Performance of analyzed residential buildings can be improved by suggesting the suitable Green Building techniques And then the cost comparison of the residential building before and after application of Green Building techniques is to be done.

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