

## ANALYSIS OF GREEN TECHNOLOGY APPLICATION IN CONSTRUCTION

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**ABSTRACT:** *Construction industries have contribution to the global warming because the activities of constructing buildings involve the usage of fossil fuels which emit a lot of toxic gases and harmful to humans and the environment. Furthermore, the buildings and projects constructed also contribute greatly to the global warming because these buildings need power, and most of them are powered by conventional power plants which use also highly polluting fossil fuels such as coal and oil. This mix of environmental impact from the actual building construction itself and from the operation of these buildings after construction is one of many human activities that lead to the emission of greenhouse gases, especially the carbon dioxide (CO<sub>2</sub>), The aim of this research is to investigate the contractors' understanding of green construction,*

**KEYWORDS:** *Construction industries, building, green house*

### INTRODUCTION

The construction industry, however, can alleviate its carbon footprint by following several steps which include the design, construction process, maintenance and operation. Of these various steps through which the carbon footprint of a building can be reduced, this study focuses on the construction process. The concept of sustainable construction aims to minimize the environmental impact of construction process and maximize both economic viability and the social benefits of construction. The most important thing is to make sure that the buildings and the surrounding establishments are constructed in a way that is environmentally friendly and still retain all their comfort. This is to create an environment which is free from pollution and can protect the atmosphere to avoid global warming.

This effort requires contribution from all related parties in the construction industry, including the contractors, engineers, workers and so on, and also outside parties such as the government and the people in general. The contractors can do their part in promoting the green construction concept in the construction process by following several steps such as making sure that the projects they are building have the highest energy efficiency possible and by implementing a more environmentally friendly approach in the construction process. The government, on the other hand can also support this green initiative by providing helps to the contractors in developing their projects with green concept in mind. The general public should also take part in green construction development because they are the end users of a construction project, and thus can have a voice also in determining the way the contractors build the project. After all it is in everybody's interest to reduce the impact of global warming due to the increase in the greenhouse gases emission to the Earth's atmosphere, as this phenomenon can have dangerous outcome to the environment.

Green building is also known as green construction or sustainable building. It is a way of enhancing the environment. It benefits humans, the community, and the environment in order to reduce resource consumption while enhancing quality of life. this ultimately results in reduction of green house gases which will help to reduce green house effect. this paper presents an overview of application of modern green infrastructure construction technology which makes a significant impact on conservation/proper utilization of

resources like land, water, energy, air, material thereby reducing the overall cost of construction as well as adverse impacts of climate change.

Green Building refers to a structure and using a process that is environmentally responsible and resource efficient throughout a building's lifecycle. Since buildings consume nearly 50% of World's Total Energy, Green Buildings, on the other hand, consume minimum amount of energy with the use of energy efficient materials. Hence, location of green buildings in the close proximity would create a green zone and providing much healthier environment with minimum heat island effect. In India, there are 2 primary rating systems for green building: GRIHA (Green Rating for Integrated Habitat Assessment); LEED (Leadership in Energy and Environmental Design).

The Ministry of New and Renewable Energy have adopted a national rating system-GRIHA which was developed by The Energy and Resources Institute (TERI). It evaluates the environmental performance of a building over the entire life cycle and hence subsequently awards the points. It is a 100 point system where the points are allotted as per the ability of the project to successfully meet the criterion standards of construction listed by GRIHA. This point bracket specifies the star allotted to a particular building. GRIHA takes into account the provisions of the National Building Code 2005; the Energy Conservation Building Code 2007 announced by BEE and other IS codes.

The LEED Green Building Rating System developed and managed by the USGBC, is the most widely used rating system nationally and internationally. Buildings are given ratings of platinum, gold, and silver or "certified", based on green building attributes. The Indian Green Building Council (IGBC) founded by the collaboration between the Confederation of Indian Industry (CII) and the private manufacturer Godrej, has taken steps to promote the green building concept in India. LEED-India rates buildings on environmental performance and energy efficiency during design, construction and operation stages.

Green Building when compared to a conventional building seems same externally and in building use but differs in the operational savings and concerns for human comfort and indoor environment. Green Buildings enjoy the benefits of saving 40-50% energy by reducing CO<sub>2</sub> emissions into the atmosphere. It also saves about 20-30% water by using rain harvesting or grey water reuse techniques. It also reduces VMT (Vehicles Miles Travelled) by choosing the location near by public transport and conveniences which helps in reduction of gasoline consumption. But on the other hand, green buildings face many barriers like the high initial investment required for construction, Split incentives, whereby, the benefits of investing in a green building project is enjoyed by the people who actually use the building and not by the person investing on its construction cost. The financial institutions face major hurdles of low financial returns, credit risks, uncertainty and difficulty in evaluating the added financial value of green buildings. Since green buildings save approximately 50% of the energy, so the annual power consumption is also reduced significantly thus saving the electricity bill. Green buildings are also cost effective in terms of CER issued by the Executive Board of the CDM of United Nations Framework Convention on Climate Change against 1 ton each of the CO<sub>2</sub> emissions saved. Sale of each CER would help earn a company 12 Euros each.

CII - Sohrabji Godrej Green Business Centre, Hyderabad is considered to be the first centre of excellence for green buildings, energy, environment, water, renewable energy and climate change activities in India.

The country has a number of policy initiatives to mainstream energy efficiency and green buildings as control and regulatory instruments. These include:

- Energy Conservation Building Code 2007: This is the nation's first building energy code and aims to have a major impact on energy-efficiency in buildings
- The Ministry of New and Renewable Energy has initiated several programs focusing on the utilization of renewable energy sources in buildings.
- Sustainable Habitat Mission under the National Action Plan on Climate Change: This include missions on enhanced energy efficiency, sustainable habitat, conserving water, creating a "Green India", establishing a strategic knowledge platform for climate change.

- Energy Labelling of Appliances: In a move to manage energy demands, BEE has made star rating for energy efficiency mandatory for a host of electrical appliances.

By the end of 2014, a total of around 2015 projects had been certified under the LEED. To the degree that green buildings are simply “higher performing buildings”, we need to design and build better buildings that can readily be accomplished by the existing industries. However, if one considers the innovation of rating and certifying buildings against energy and environmental design criteria, as in the LEED green building rating system, then we can apply a classical theory of diffusion of innovation which encompasses substitution of new ways of doing things for old ways, to forecast market demand.

### RESEARCH OBJECTIVES OF GREEN BUILDING

Green Buildings are designed to reduce the overall impact on human health and the natural environment by the following ways using energy, water and other resources efficiently by reducing waste, pollution, and environmental degradation.

Background research done to assess the need of green building design & practices in the India and existing approaches to construction innovation

The overall purpose of this effort is summarized as follows:

- ❖ *Understand scenario of urbanization in India*
- ❖ This thesis assess the growth of urbanization, impact on environment and natural resources, severity of scarcity of energy and related issues.
- ❖ *Understand green building concepts & prevailing practices.*
- ❖ This dissertation describes the green building concepts & practices prevailing in world with special reference to India.
- ❖ *Providing comprehensive study of green building rating systems*
- ❖ This thesis provide knowledge of various agencies engage in green building movement and various green building rating systems their scope, criterion covered & related topics.
- ❖ *Comparative Analysis of prevailing of green building rating systems in India*
- ❖ In this thesis, a comparative study of various green building rating systems done. Analysis of various factors for green design number of criterion adopted, credits provided to each criterion. Credit distribution analysis in various segments and rating systems
- ❖ *Perception and Implementation of Green Design in state of Madhya Pradesh in India*
- ❖ In this thesis, a survey conducted, which includes all stakeholders about the Implementation status of green building concept, awareness about, reasons for adoption/non-adoption, most arising problems in implementation in state of Madhya Pradesh in India.
- ❖ *Analysis of green building certified projects in India, to find out a list of methodology and strategies adopted for green building certification*
- ❖ In this thesis, data collected from different Surveys conducted in India earlier, and find out a list of various methodology and strategies which are most commonly used for implementation of green building concepts.
- ❖ *Identification of green building materials that facilitate adoption of green building practices*
- ❖ To increase the use of green building practices, identification of green building material are needed. This dissertation provides information about conventional materials and their substitutes as green building materials.
- ❖ *To study the financial aspects of green buildings.*
- ❖ In this paper, we discuss the cost variation of green buildings, bifurcation of cost increased and various myths associated with.

### SCOPE & LIMITATIONS

The concept of green buildings though popular among professional has yet not reached the common man properly. The main idea behind the project is to make the green concept assessable to the common man so that they can appreciate its importance. There are various misconceptions regarding the cost and economic viability of green buildings which needs to be clarified. The main challenge of this design problem will be inter-linking the various functions performed by the building and at the same time not compromising with the energy efficient aspect of the structure.

### RESEARCH AND DATA COLLECTION

The entire project revolves round the idea behind the topic which was to find out the relevance of green concept and study the parameters and requirements of a green building. The idea is also to apply these concepts in the design solution and get a first- hand experience in designing a green building and face the challenge.

### ORGANIZATION OF THE THESIS

The thesis is organized into eight chapters. The first Chapter focuses on the introduction and motivation of the study. The second Chapter discusses the literature review. In Chapter 3, Prevailing green building rating systems are discussed with special reference to India. Chapter 4 gives details comparison of rating systems used in India. In Chapter 5, survey carried out to find the status of “Perception and Implementation of green design/construction in state Madhya Pradesh in India. In Chapter 6, we go through a study of various stages of construction project comparing between Traditional Design Approach and Green Building Design Approach. A Study of, surveys carried out by researchers previously, done to find the proven general methodology and strategies, which may be used in second tier cities, without much expertise. In Chapter 7, a brief discussion about conventional building materials & green building material done In Chapter 8, financial aspect of green buildings discussed. The Challenges for green buildings in India are presented in Chapter 9.

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