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Application of Green Building Concept

Anand Patel¹, Prajapati Nil²

¹Assistant Professor, ²M Tech CPM Student, Department of Civil Engineering

Abstract: Nowadays we are facing various environmental impacts due to which we need to build with more sustainable materials which will lead to reduction of impacts on environment. Use of tradition construction method and materials into environment degradation a comprehensive approach of adopting green building concept in the process of design to demolition good heal to achieve. A better environment standard an approach of sustainability good provide a benchmark for further generation in relation to reducing cart footprint on the environment, Further, analysis focuses on identifying methods and indicators that can be adopted for the assessment of green potential. As there are many green building assessment bodies are there for green building point system such as IGBC, LEED, and GRIHA etc. for evaluation of green building.

Keywords: Green building, Sustainability, conventional method, Green Rating System

I. INTRODUCTION

“Green building” means different things to different people. There is no generally accepted definition for “green building.” It is, however, essentially the design, construction, operation, and maintenance of buildings to reduce the use of natural resources, encourage reuse of construction materials, and encourage site development to minimize injury to the natural landscape and community. The terms “sustainability” and “high performance building” are often associated with “green building”. One definition of “sustainability” is “meeting the needs of the present without compromising the ability of future generations to meet their own needs.” The term “high-performance building” focuses on measurable and verifiable improved building outcomes through the use of cost-benefit analysis (Perkins, 2009). The building sector in India is growing at a rapid pace and contributing immensely to the growth of the economy. This augurs well for the country and now there is an imminent need to introduce green concepts and techniques in this sector, which can aid growth in a sustainable manner. Against this background, the Indian Green Building Council (IGBC) has launched „IGBC Green New Buildings rating system to address the national priorities. This rating programme is a tool which enables the designer to apply green concepts and reduce environmental impacts that are measurable.”^[1]

A. Objective of Green Building

The objective of green building concept is to develop buildings which use the natural resources to the minimal at the time of construction as well as operation. Green buildings emphasize on the resource usage efficiency and also press upon the three R's - Reduce, Reuse and Recycle. The technique of green building maximizes the use of efficient construction materials and practices; boosts the use of natural sources and sinks in the building's surroundings; minimizes the energy usage to run itself; uses highly proficient methods for water and waste management. The indoor equipment includes lighting, air-conditioning and all other needed equipment. To ensure minimum negative impact on the environment by the construction and operation of a building, the factors which are to be kept in mind are - to preserve the external environment to the building location; to improve the internal area for the residents of the building; and also preserve the areas which are not close to the building.^[2]

B. Principles of green building

- 1) **Sustainable Site Design:** Minimize urban sprawl and needless destruction of valuable land, habitat and green space, which results from inefficient low-density development. Encourage higher density urban development, urban re-development and urban renewal, and Brownfield development as a means to preserve valuable green space. Preserve key environmental assets through careful examination of each site. Engage in a design and construction process that minimizes site disturbance and which values, preserves and actually restores or regenerates valuable habitat, green space and associated eco-systems that are vital to sustaining life.
- 2) **Water Quality and Conservation:** Preserve the existing natural water cycle and design site and building improvements such that they closely emulate the site's natural “pre-development” hydrological systems. Emphasis should be placed on retention of storm water and on-site infiltration and ground water recharge using methods that closely emulate natural systems. Minimize the

unnecessary and inefficient use of potable water on the site while maximizing the recycling and reuse of water, including harvested rainwater, storm water, and gray water.

- 3) *Energy and Environment*: Minimize adverse impacts on the environment (air, water, land, natural resources) through optimized building siting, optimized building design, material selection, and aggressive use of energy conservation measures. Resulting building performance should exceed minimum International Energy Code (IEC) compliance level by 30 to 40% or more. Maximize the use of renewable energy and other low impact energy sources.
- 4) *Indoor Environmental Quality*: Provide a healthy, comfortable and productive indoor environment for building occupants and visitors. Provide a building design, which affords the best possible conditions in terms of indoor air quality, ventilation, and thermal comfort, access to natural ventilation and day lighting, and effective control of the acoustical environment.
- 5) *Materials and Resources*: Minimize the use of non-renewable construction materials and other resources such as energy and water through efficient engineering, design, planning and construction and effective recycling of construction debris. Maximize the use of recycled content materials, modern resource efficient engineered materials, and resource efficient composite type structural systems wherever possible. Maximize the use of re-usable, renewable, sustainably managed, bio-based materials. Remember that human creativity and our abundant labour force is perhaps our most valuable renewable resource. The best solution is not necessarily the one that requires the least amount of physical work.^[2]

C. Green Building Rating Systems

Green building standards seek to establish and implement measurable and attainable benchmarks to evaluate development impacts on the environment. The common theme found within all green building standards is to increase building efficiency and reduce the building's impact on the environment and human health through the efficient use of energy, water, building materials, and operational practices. While this sustainable theme remains constant, the construction methods, building materials, and architectural/engineering design for green buildings are constantly evolving. Thus, the standards that are used to measure green buildings are evolving constantly as well.

Most green building standards look at the following six categories in determining sustainable building practices:

- 1) *Site Location*: using existing infrastructure, minimizing the impact to the surrounding environment, and selecting sites served by mass transit; Energy conservation- use of on-site renewable energy, efficient building methods, natural lighting, and efficient mechanical equipment.
- 2) *Water Conservation*: promoting water conservation through the use of low-flow fixtures, the capture and reuse of water, and the use of gray water for irrigation;
- 3) *Material Selection*: promoting the use of sustainable materials by emphasizing the use of products with low or no concentrations of hazardous chemicals and that are grown sustainably and locally;
- 4) *Indoor Air Quality*: seeking to optimize indoor air quality through ventilation and the use of products that emit low or no volatile organic compounds; and
- 5) *Building Operations and Maintenance*: ensuring that buildings are operated and maintained properly by, among other things, using automatic shutoffs for lighting and ensuring that the building's mechanical systems are operating efficiently.^[3]

D. Benefits of green building

- 1) *Environmental Benefits*
 - a) Reduce wastage of water
 - b) Conserve natural resources
 - c) Improve air and water quality
 - d) Protect biodiversity and ecosystems
- 2) *Economic Benefits*
 - a) Reduce operating costs
 - b) Improve occupant productivity
 - c) Create market for green product and services
- 3) *Social Benefits*
 - a) Improve quality of life
 - b) Minimize strain on local infrastructure
 - c) Improve occupant health and comfort

E. Aim

Aims of study is to identify strategy and proposal for the study area by implementing concepts of green building principles and analysis the same with prevailing parameter to identify green building with IGBC guideline for new construction project.

F. Objectives

- 1) To study green concept in detail
- 2) To prepare proposal for study area and carry out cost aspect of proposal.
- 3) To evaluate the case study with IGBC guideline.

G. Scope of Work

Study is limited to a project multi-story tower and commercial building at samruddhi corporation naroda, Ahmedabad and applicable green solution in project.

II. LITRATURE REVIEW

A. Sustainable Building Material Used In Green Buildings^[4]

- 1) *Study:* In this context green buildings are sustainable building are sustainable or green. The components of the green building include material efficiency, water efficiency, energy efficiency, indoor air quality efficiency, waste reduction, HVAC design and sustainable site planning. An attempt has been made in this paper to describe the characteristics of the green material as material efficient and the environmental philosophy behind each of this characteristic. The green materials are environmentally responsible materials as they help in reducing environmental impact.

One of the principles that are adopted is using materials that are sustainable or green. As per IGBC “A green building uses less energy, water and natural resources, creates less waste and is healthier for the people living inside compared to a standard building.”

B. Role of Green Buildings in Sustainable Construction- Need, Challenges and Scope in the Indian Scenario^[5]

- 1) *Study:* Change in climate, caused by the release of greenhouse effect causing gases (primarily carbon dioxide) into the atmosphere, has been recognized as one of the greatest threats of the 21st century.

Buildings are the prime energy consumers in modern cities accounting upto 40 to 45% energy consumption. Their consumption can be largely confined through improving efficiency, which is an effective means to lessen greenhouse gas emissions and slow down depletion of fossil fuels. There is a heavy (over 50%) saving potential in the building sector and thus it is considered as a potential sector to meet the challenges of global energy demand and climate change.

C. Rating Systems Awareness for Green Buildings Applications^[6]

- 1) *Study:* It is critical to make the decision to build a green building early in the design process in order to maximize the green potential, minimize redesign, and assure the overall success and economic viability of the green elements of the building project. Therefore this paper focuses on different rating systems which evaluate sustainable design and construction off all types of buildings.

D. Green Building Architecture: A Literature Review on designing Techniques^[7]

- 1) *Study:* Buildings are found to be both, one of the biggest consumer of energy and producer of greenhouse gases. It has become a global issue. According to the National Institute of Building Sciences (USA), buildings generate 35 percent of the carbon dioxide (the primary greenhouse gas associated with climate change), 49 percent of the sulphur dioxide, and 25 percent of the nitrogen oxide found in the air.

This will render us a sustained environment and a healthy ecosystem. Green Buildings are buildings that subscribe to the principle of conscientious handling of natural resources, which means causing as little environmental interference as possible, using environment friendly materials requires low operational energy, utilizes renewable sources of energy to fulfill its requirements.

E. Life Cycle Green Cost Assessment Method For Green Building Design^[8]

- 1) *Study:* Life cycle green cost assessment (LCGCA) method, which can evaluate building environmental load and economic performance throughout its life cycle comprehensively, is propounded in this paper in order to guide green building design. In LCGCA, environmental load (EL) cost is proposed based on concept of environmental tax and counted into general building initial cost and operating cost, and then green payback time (GPT) could be worked out.

The operating energy consumption, life cycle EL, life cycle cost (LCC) and GPT of different envelope schemes have been compared. The results indicate GPT is obviously shorter than the general payback time when EL cost is considered.

F. Measuring awareness and preferences of real estate developers for green buildings over conventional buildings^[9]

1) *Study:* The demand of eco-friendly or green products and services has experienced considerable growth rates in recent years ranging from agricultural produce, clothing, and consumer electronics to real estate. Various studies for these products have identified that there is increasing willingness of customers to pay a price premium. This trend is supported by increased level of awareness regarding the environmental impact of production and consumption patterns. Green building construction primarily involves the design, construction, and operation of buildings and other facilities in ways that preserve natural resources and protect the environment for generations to come. The real estate development industry's rapidly growing interest in green buildings in many parts of the world confirms that market forces are leading more developers to adopt sustainable building techniques. Green buildings not only produce substantial operating savings, but also contribute in creating market value, improve health of building occupants and increase productivity. However, the greatest challenge faced by developers and buyers is lack of awareness about the benefits and opportunities of green buildings. This research paper uses primary research analyses and reveals the awareness and preferences of real estate developers to adopt green building designs. It also investigates the issues and challenges they face regarding factors like premium pricing, lack of awareness, consumer interest.

G. A Review on Green and Sustainable Manufacturing & Their Impact on Social, Economic, Environmental Prospects^[10]

1) *Study:* In this review we are going to discuss green and sustainable manufacturing. As we know in today's competitive world firms are getting growing pressure to keep environment green. It is also important to go for sustainable manufacturing with green manufacturing, because we have to also look over our future generation by fulfilling the requirement of present generation. There are various drivers (which we are going to discuss in this paper like recycling material, green design, Customers, competitors etc.), which responsible for green manufacturing. And its performance can be measured with the help of eco-innovation which have heavy impact on environment (pollutant release, material use, energy consumption etc.), social (i.e. employment, community etc.), and economy.

H. A Critical Review of Net Zero Energy Efficient Design Strategies in Construction Sector^[11]

1) *Study:* As pressure grows to curb greenhouse gas emanations, construction sectors can play a critical part in dominant energy use. Since they are collectively responsible for about 33-45% of the world's carbon emissions, climate change goals will be nearly impossible to reach without construction sectors full participation. Investments in energy efficiency can offer a profit way of dropping carbon emissions levels. And with sustainability expanding on the corporate outline, property owners that offer clean, green buildings differentiate. Net-zero energy, solar buildings are emerging as a promising explanation to minimizing the environmental impression of buildings. These buildings, which curtail energy consumption and optimally use incident solar energy, both passively and actively, are usually defined as those which spread as much energy as they import, over the course of a year. The paper here presents a detailed literature review on the net zero energy building.

The gap between energy demand and energy supply be likely to a bigger issue mainly in developing countries like India and an effective way is needed to tackle that problem, another challenging part is selecting the energy efficiency resources. Indeed, NZE has the potential for a self-energy efficient building. If it applies to construction sector energy production would be both profitable and economical which would also be according to the norms and standards of environment, health, and safety.

I. Green Building: Leader in Energy and Environment Design for Building Sector^[12]

1) *Study*

- a) Energy demand of whole world is including India is increasing day by day.
- b) For meeting that energy demands every country is expanding their power plant capacity and optimizing the various options to increase the energy generation capacities.
- c) The growth of energy sector is higher than population growth in countries like India & china which can be emphasize from the increasing trend of per capita energy consumption.
- d) We know that, energy generation from fossil fuels is directly affected to the environment and increasing trends of energy generation from fossil fuels also challenge the environmental impacts for the generation to come.
- e) The best option to meet the energy demand and supply requirements is to "GO GREEN".

III. CONCLUSION

Health and well-being of occupants are the most important aspect of IGBC Green New buildings rating system. The rating system ensures adequate ventilation, daylight and occupant well-being facilities which are essential in a building. The rating system also recognizes measures to minimize indoor air pollutants. Green building is contributing to the solution to the many global issues associated with climate change, human health and the quality of the environment.

REFERENCES

- [1] U.S. Environmental Protection Agency. "Why Build Green?" Green Building. Retrieved 1 December 2011.
- [2] Beyond Green™: Guidelines for High-Performance Homes, Meeting the Demand for Low-Energy, Resource-Efficient Homes by the Sustainable Buildings Industry Council. Washington, DC: SBIC.
- [3] IGBC (2014), Indian Green Building Council: Green Building new rating system version 3
- [4] Dr K N Sheth, " Sustainable Building Material Used In Green Buildings", ISBN: 978-3-942100-43-4, February 24-26, 2016"
- [5] Devarshi Tathagat, Dr.Ramesh D. Dod, "Role of Green Buildings in Sustainable Construction- Need, Challenges and Scope in the Indian Scenario", "IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE) e-ISSN: 2278-1684, p-ISSN: 2320-334X, Volume 12, Issue 2 Ver. II (Mar - Apr. 2015), PP 01-09"
- [6] Dr.Dina Ahmed Elmeligy, "Rating Systems Awareness for Green Buildings Applications", "International Refereed Journal of Engineering and Science (IRJES) ISSN (Online) 2319-183X, (Print) 2319-1821, Volume 3, Issue 5(May 2014), PP.53-64"
- [7] "Kushagra Varma, Mayank Chaurasia, Prasenjit Shukla, "Green Building Architecture: A Literature Review on designing Techniques " Tariq Ahmed, International Journal of Scientific and Research Publications, Volume 4, Issue 2, February 2014 ISSN 2250-3153"
- [8] "Lijing Gu, Daojin Gu, Borong Lin, Mingxing Huang, Jiazi Gai, Yingxin Zhu, "Life Cycle Green Cost Assessment Method For Green Building Design". International Building performance simulation Association 2007.
- [9] Chitral Patel and Pawan Kumar Chugan, Nirma University, "Measuring awareness and preferences of real estate developers for green buildings over conventional buildings", Himalaya Publishing House, Mumbai, 2013, pp.332-341 © Nirma University.
- [10] Rohit Kumar Gupta, Rajesh Purohit, R.S. Rana, Shelar Dipak, Ashutosh Mishra, "A Review on Green and Sustainable Manufacturing & Their Impact on Social, Economic, Environmental Prospects", International Journal on Applications in Science, Engineering & Technology Volume.1, Issue.1, 2015
- [11] Sunny Kumar Vora, Prof Mamta Rajgor, Dr. Jayeshkumar Pitroda, "A Critical Review of Net Zero Energy Efficient Design Strategies in Construction Sector", International Journal of Innovative Research in Advanced Engineering (IJIRAE) ISSN: 2349-2163 Issue 5, Volume 2.
Jignesh sailor, Himanshu naik, viral Kumar Makwana, "Green Building: Leader in Energy and Environment Design for Building Sector", ID REEES/10/EN/114
- [12] IGBC (2014), Indian Green Building Council: Green Building new rating system version 3. Retrieved from <http://www.igbc.in/site/igbc/index>.
- [13] IGBC (2012), Indian Green Building Council: from <http://www.igbc.in/site/igbc/index.jsp> on 22nd November, 2012



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