ASSESSMENT OF THE GREEN AND ENERGY SAVING TECHNOLOGY IN THE CONSTRUCTION OF A BUILDING

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Abstract – Green *building, also known as sustainable building, involves the use of environmentally responsible and resource-efficient practices throughout a building's life cycle. This includes design, construction, operation, maintenance, and demolition. The integration of energy-saving technology throughout the entire building process is essential for maximizing the effectiveness of green energy-saving solutions. Green buildings offer benefits such as reduced energy usage and operational costs, improved air quality, and a healthier working environment. In India, green building rating methods include GRIHA, LEED, and IGBC. Green buildings save energy and water, lower CO2 emissions, and utilize rainwater harvesting and greywater reuse techniques. However, challenges such as high initial construction costs and a lack of incentives exist. Implementing green solutions in building projects is crucial for creating sustainable and healthy environments.*

Keywords: Green Building, Green Technology, Greenhouse Gases, Energy, Cost, Sustainable Materials, Energy Efficient Materials.

1.INTRODUCTION

Green building, also known as sustainable building, focuses on creating structures that are environmentally conscious and resource-efficient throughout their entire life cycle. This involves considering aspects such as site selection, design, construction, operation, maintenance, remodeling, and deconstruction. By adopting green building practices and using sustainable materials, the construction industry can reduce the environmental impact associated with the extraction, transportation, processing, fabrication, installation, reuse, recycling, and disposal of building materials.

The goal of green buildings is to optimize resource usage and minimize energy consumption. Buildings account for a significant portion of global energy consumption, and green buildings aim to minimize this energy usage by incorporating energy-efficient materials, technologies, and systems. By reducing energy consumption, green buildings contribute to lower greenhouse gas emissions and combat climate change.

2.LITERATURE REVIEW

1.) ANALYSIS OF GRREN TECHNOLOGY APPLICATION IN CONSTRUCTION

Swarnkar, Singh, 2015: The most thought behind the review is to shape the green idea assessable to the average person all together that they will see the value in its significance. The construction of buildings requires the use of fossil fuels, which produce a lot of toxic gases that are harmful to humans and the environment as a whole and contribute to global warming. In addition, the construction of buildings and projects contributes significantly to global warming because these structures require power, and the majority of them are powered by conventional power plants that also make use of highly polluting fossil fuels like oil and coal. One of the many human activities that contribute to the emission of greenhouse gases, particularly carbon dioxide (CO2), is this combination of the environmental impact of the particular building's construction and its operation after construction. The point of this exploration is to investigate the project's comprehension workers might interpret green development. The entire project is centered on the subject's original idea, which was to investigate the parameters and requirements of a green building and determine the concept's relevance. Additionally, the plan is to incorporate these ideas into the design solution, gain firsthand experience designing a green building, and take on the challenge.

2.) REVIEW OF THE APPLICATION OF GREEN BUILDING AND ENERGY SAVING TECHNOLOGY

Tong, 2017: The term "green building" refers to the application of the "green" idea of protecting the environment to the planning, construction, and use of a building. This is done by incorporating the particular circumstances of the construction into the appropriate use of "green" technologies and equipment in order to achieve "green building energy conservation," which ultimately leads to "people and Natural coordination" and "sustainable development." In order to achieve sustainable development, green buildings use as much energy-saving and environmental-protection technology in architectural design, construction, and demand use as possible to reduce energy consumption and natural

disturbances caused by residents, resulting in a construction that is optimal for their use. The primary emphasis here is on the necessity of reducing resource wastage. to safeguard the environment, with an emphasis on reducing carbon dioxide emissions and environmental pollution. Every step of green building—from planning to construction to use and maintenance to demolition—requires energy and environmental conservation. In green buildings, energy-saving technologies should be used throughout the design, construction, and use phases of the building. This will make it possible for green energy-saving technologies to be as effective in construction as possible. Suitable for people who live in green buildings, realize the sustainable development of green buildings, reduce energy consumption, and reduce people's interference with the natural environment.

3. AIM ABD OBJECIVES

3.1 AIM

Discover a quick and affordable way to develop a green building by analysing green and energy-saving building technology.

3.2 OBJECTIVES

- To comprehend the urbanisation situation in India, this study examines the rate of urbanisation, its effects on the environment and natural resources, and the severity of energy-related concerns associated to scarcity.
- Understanding green construction principles and current practises In this dissertation, green construction ideas and methods are discussed globally with a focus on India.
- This thesis provides information about major organisations involved in the green building movement as well as several green building rating systems and their coverage of various criteria and associated issues.
- To the perspective and status of green building implementation, awareness of, factors influencing adoption or non-adoption, and the most pressing issues during implementation in India.
- To analyse the data gathered from past surveys done in India and compile a list of several approaches and techniques that are typically used to execute green building principles.

4. METHODOLOGY

Green building construction methods will be investigated, studied, and developed as part of this project to reduce pollution and global temperature rise. In addition, it aims to raise public awareness of the advantages and long-term cost savings of green buildings among Indians as a whole. In addition, the structure of the structural methodology is as follows:

To meet the requirements of green technology, use the method listed below. From planning to demolition, the lifecycle of a green building involves a number of energy- and environment-saving measures. It is necessary to concentrate on the utilization of environmental factors during the design phase in order to reduce the degree of environmental harm brought on by demolition, as well as to ensure that the building provides people with low consumption, comfort, and space during its operational phase and minimize the negative effects of the construction process on the environment. A few concepts that apply to a green environment are listed below.

5. ASSESSMENT OF THE GREEN TECHNOLOGY

Building green offers a range of motives and benefits, encompassing environmental, economic, and social aspects. Sustainability initiatives emphasize the need for integrated design in both new construction and retrofitting existing structures. Green building practices aim to minimize or eliminate the negative impacts of buildings on the environment and human health.

Green building encompasses a holistic approach that integrates various practices and techniques to minimize the environmental impact of buildings. By utilizing renewable resources, employing sustainable materials, and adopting energy-efficient systems, green building promotes environmental responsibility, economic savings, and improved quality of life for occupants. It is a collaborative effort that requires the involvement of both the government and the community to create a sustainable and resilient built environment.

5.1 ASPECTS OF GREEN BUILDING

Following are the aspects of green building :

- Energy Efficiency: Green buildings prioritize energy efficiency by incorporating design features and technologies that minimize energy consumption. This includes efficient insulation, high-performance windows, energy-efficient lighting systems, and the use of renewable energy sources like solar panels.
- Water Conservation: Green buildings aim to reduce water consumption through various strategies. These include low-flow fixtures, water-efficient appliances, rainwater harvesting systems, and landscaping designs that minimize irrigation needs.

- Sustainable Materials: Green buildings promote the use of sustainable and environmentally friendly materials. This includes materials with low embodied energy, such as recycled or reclaimed materials, as well as materials that are locally sourced to reduce transportation-related emissions.

- Indoor Environmental Quality: Green buildings prioritize the health and well-being of occupants by ensuring high indoor air quality. This involves using low-emission materials, adequate ventilation systems, and controlling pollutants, such as volatile organic compounds (VOCs) and allergens.

- Waste Management: Green buildings implement waste reduction and recycling practices. This includes incorporating recycling stations, using construction techniques that minimize waste generation, and designing spaces that facilitate waste separation and recycling.

- Site and Landscape Design: Green buildings consider the site and its surroundings to minimize environmental impacts. This includes preserving natural habitats, using permeable surfaces to promote groundwater recharge, and incorporating green spaces for improved biodiversity and heat island reduction.

- Sustainable Transportation: Green buildings encourage sustainable transportation options to reduce reliance on single-occupancy vehicles. This may include providing bicycle storage and amenities, supporting public transit accessibility, and promoting carpooling or electric vehicle charging infrastructure.

- Life Cycle Assessment: Green buildings consider the entire life cycle of the building, including construction, operation, maintenance, and eventual deconstruction. Life cycle assessment helps identify opportunities to minimize environmental impacts and optimize the building's overall sustainability performance.

- Certification and Standards: Green buildings often seek certifications from recognized green building rating systems, such as LEED, BREEAM, or Green Star. These certifications provide a framework for evaluating and recognizing the sustainability achievements of a building.

- Education and Awareness: Green buildings promote education and awareness among occupants, users, and the community. This includes providing information on sustainable practices, energy-saving tips, and the benefits of green buildings.

6. ASSESSMENT METHOD AND DRIVERS TO GREEN BUILDING

6.1 ASSESSMENT METHOD

The assessment of green buildings is typically done through various rating systems and certification programs. These assessment methods evaluate the environmental performance and sustainability of a building based on predefined criteria. Here are some common assessment methods used in green building:

- LEED (Leadership in Energy and Environmental Design): Developed by the U.S. Green Building Council, LEED is an internationally recognized rating system that assesses building performance in areas such as energy efficiency, water conservation, materials selection, indoor environmental quality, and sustainable site development.

- BREEAM (Building Research Establishment Environmental Assessment Method): Widely used in the United Kingdom and Europe, BREEAM evaluates the environmental performance of buildings based on factors like energy, water, materials, waste, pollution, and ecology.

- GRIHA (Green Rating for Integrated Habitat Assessment): Developed by the Indian Green Building Council, GRIHA assesses the environmental impact of buildings in India, considering aspects such as energy efficiency, water conservation, waste management, and occupant health.

- WELL Building Standard: Focusing on occupant health and well-being, the WELL Building Standard evaluates features such as indoor air quality, lighting quality, water quality, fitness and comfort amenities, and biophilic design elements.

- Living Building Challenge: Considered one of the most rigorous certifications, the Living Building Challenge requires buildings to meet strict criteria related to energy, water, materials, equity, and beauty. It aims to create regenerative spaces that give back to the environment.

6.2 DRIVERS TO GREEN BUILDING

Several key drivers contribute to the growing adoption of green building practices:

- Environmental Concerns: Increasing awareness of climate change, resource depletion, and environmental degradation has led to a greater emphasis on sustainable building practices. Green buildings help reduce energy consumption, minimize carbon emissions, conserve water, and protect natural resources.
- Energy Efficiency and Cost Savings: Green buildings are designed to be energy-efficient, resulting in reduced energy consumption and lower utility costs over time. The potential for long-term financial savings is a significant driver for building owners and occupants.
- Government Regulations and Incentives: Many governments around the world have implemented regulations and incentives to encourage green building practices. This includes tax benefits, grants, rebates, and mandatory energy efficiency standards.
- Health and Well-being: Green buildings prioritize occupant health and well-being by improving indoor air quality, providing ample natural light, and incorporating biophilic design elements. This focus on human health and comfort is a strong driver for building occupants and organizations.
- Market Demand and Stakeholder Expectations: There is a growing demand for sustainable buildings from tenants, investors, and consumers who prioritize environmentally responsible practices. Green buildings often attract higher market value and have a competitive advantage in the real estate industry.
- Corporate Social Responsibility: Many organizations embrace green building practices as part of their corporate social responsibility initiatives. Building sustainably aligns with their values and demonstrates a commitment to environmental stewardship.

7. MISCONCEPTIONS AND BARRIERS TO GRREN BUILDING

Misconceptions and barriers to green building can hinder its widespread adoption and implementation. Here are some common misconceptions and barriers associated with green building:

7.1 Misconceptions:

- High Initial Cost: One of the primary misconceptions is that green building is more expensive compared to conventional construction. While there may be some upfront costs, studies have shown that the long-term operational savings and benefits outweigh the initial investment.
- Limited Design Options: Some people believe that green buildings have limited design options and aesthetics. However, green building practices and technologies have evolved, offering a wide range of design possibilities that can meet various architectural styles and preferences.
- Lack of Performance: There is a misconception that green buildings may not perform as well or provide the same level of comfort as traditional buildings. In reality, green buildings often prioritize occupant comfort, indoor air quality, and thermal performance, resulting in healthier and more comfortable spaces.
- Complexity: Green building is sometimes perceived as a complex and specialized field, requiring extensive knowledge and expertise. While there are technical aspects involved, there are resources, guidelines, and professionals available to guide and support green building projects.

7.2 BARRIERS

- Lack of Awareness and Education: Limited awareness and understanding of green building concepts and benefits can be a significant barrier. Educating stakeholders about the advantages and long-term value of green building is crucial for overcoming this barrier.
- Resistance to Change: Resistance to change within the construction industry can pose a barrier to green building adoption. Traditional practices and mindsets may need to be challenged and replaced with sustainable approaches.
- Regulatory and Policy Challenges: Inconsistent or inadequate regulations and policies can hinder the adoption of green building practices. Governments and regulatory bodies need to develop and enforce supportive policies that incentivize and mandate sustainable construction.

- Market Perception and Demand: The perception of green buildings among potential buyers, tenants, and investors can impact market demand. Demonstrating the benefits and value proposition of green buildings is essential for increasing market acceptance and demand.

- Limited Access to Financing: Securing financing for green building projects can be challenging, particularly for small-scale developments. Access to affordable green financing options and incentives can help overcome this barrier.

- Industry Fragmentation and Resistance: The construction industry is diverse, with various stakeholders involved. Fragmentation and resistance to change from industry players, including architects, contractors, and suppliers, can pose challenges to implementing green building practices uniformly.

8 RESULT AND DISCUSSION

8.1 RESULT

Buildings are designed and built to adhere to a set of functional and technical parameters that are outlined in building codes, regional laws and standards, and client requirements. A replacement or existing building is intended or redesigned during the building design process. Because even significant design changes are frequently performed at comparatively minimal expense during this period, the extent of influence is extremely high (see figure 8.1). Therefore, it's important to increase the building's environmental performance during this stage when the potential for change is greatest.

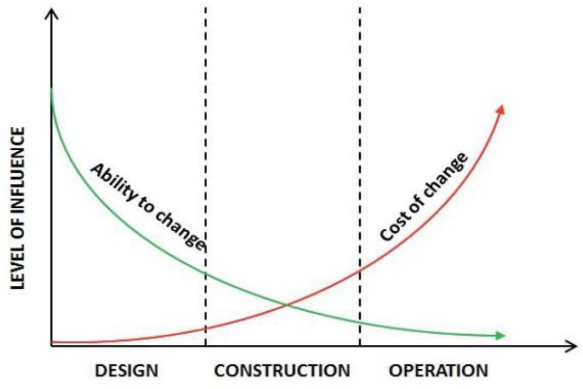

Figure 8.1: A Schematic Overview to Changes in The Level of Influence Over Time During Different Stages of the Building‘s Process.

8.2 DISCUSSION

Green technology is highly valued and essential for promoting sustainable principles in construction. Its application in both new and existing buildings brings significant and widespread benefits. The process of making a building "green" involves various stages, such as selecting an ideal location to maximize natural lighting and solar alignment, using eco-friendly materials, and incorporating sustainable design principles to address environmental concerns. Contrary to the misconception that any construction negatively impacts the environment, sustainable design minimizes or eliminates adverse effects. Green technology offers numerous advantages in the housing sector, despite potential higher upfront costs for materials and installation. These technologies are specifically designed to optimize resource efficiency, leading to long-term cost savings. A key benefit of implementing green solutions is the reduction of waste generated during construction. Traditional technologies like petrol generators have detrimental environmental impacts, making it crucial for businesses to choose green alternatives. Green technology reduces industrial carbon footprint by minimizing waste, conserving water, and consuming less energy compared to older technologies. As the housing industry increasingly embraces sustainable development, the use of green solutions becomes imperative and acceptable. The growing market for green energy offers diverse job opportunities in fields such as health engineering, solar utilities, and efficient lighting specialists.

9 CONCLUSION

Green building is becoming an emerging architectural concept due to the evolving strategies of the housing industry and advancements in technology. It involves the use of environmentally friendly materials and practices throughout the entire building process. By effectively managing infrastructure processes, construction industries can increase productivity, maintain high-performance systems, and reduce operating expenses. Research has shown that poor indoor air quality in workplaces negatively affects the productivity and well-being of office workers. Incorporating green solutions in building projects can contribute to a healthier working environment.

The perspective of this project suggests that energy efficiency can be significantly improved by eliminating wasteful energy usage, resulting in potential savings of up to 30% in energy expenditures. Further research is needed to understand stakeholders' perceptions regarding the progressive adoption of green technologies. Green buildings can be constructed easily

and cost-effectively, utilizing available resources and incorporating recycling practices for sustainable construction.

In India, the integration of green technology in building projects is recognized as crucial for achieving sustainable development goals. The twenty-first century has seen a significant focus on sustainable development, and a building company that prioritizes sustainable solutions can reduce energy consumption and operational costs by approximately 30%. For instance, the installation of a solar inverter for solar-generated electricity can lead to service cost reductions of about 30%.

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