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Development of Green Resources Utility Home a Mileu

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Abstract: Green resources utility refers to the sustainable and efficient use of natural resources, focusing on reducing environmental impact and promoting eco-friendly practices. It encompasses renewable energy, waste management, water conservation, and green technologies. In a broader context, it aligns with creating a supportive environment (milieu) for sustainable living, balancing ecological health and human development. Such efforts contribute to a greener planet by encouraging responsible consumption and preserving resources for future generations.
Keywords: Green growth is a strategy for economic growth that aims to reduce environmental impact while still creating jobs. It's a key part of India's.

I. INTRODUCTION

In recent decades, there has been a growing concern regarding environmental issues, and consumption of energy and resources in the building sector. Green buildings or sustainable developments are a response to growing environmental concerns. Yodels
defines green building as "A high-performance property that considers and reduces its impact on the environment and human health". Yet, green architecture developments seem to encounter several impediments and barriers. Gou et al.
mentioned some of the major topics in green building market readiness and some cost related barriers such as higher initial design and construction costs, extra costs of searching for green alternatives and certification processes, a long payback time of 20 years and a difficulty of defining quantifiable requirements during the procurement process. The extra costs and related risks of green design technology may discourage initial investors from commitment to green attributes [2]. Hwang and Tan
indicated that the ambiguity of the real costs and benefits is a major impediment to the development of green buildings. Cost-benefit analysis is a quantitative economic analysis method which evaluates profitability and return of investments for alternative design options.

Similarly to traditional financial strategy and performance measurements, green costbenefit studies examine the correlations between green strategies and green performances to discover relationships between costs and benefits for decision making. In green building studies, the relationships between green strategies and building performances are examined to verify the existence and strength of the link among certain variables, such as natural ventilation strategies and thermal comfort performances. Costbenefit studies, though, aim to identify relationships among green costs as a consequence of green strategies and benefits as a consequence of green performances. In other words, the extra costs of green buildings are evaluated against the extra financial benefits. Figure 1 illustrates both the relationships between strategies and performances found in green research studies, and the relationships between costs and benefits resulted from cost benefit research studies. An example of the mentioned relationship studies is the costbenefit analysis of indoor environmental qualities (IEQ) and employee productivity [5-7]. The quality of working environments and comfort has a great influence on occupant productivity and well-being . Higher employee productivity means higher financial benefits for companies [9]. Yet, monitoring and management of IEQ using sensor devices and other control strategies require purchases of equipment and higher building management fees. In a cost-benefit analysis, the extra costs are evaluated against the financial gains resulting from higher employee productivity.

In general, costs of green buildings can be divided into two categories: pre-construction costs and post construction costs. Preconstruction costs include soft costs and hard costs. Soft costs are the costs related to design, commissioning, and documentation fees . Hard costs are construction, materials, and building services costs Post-construction costs are building operating costs of energy consumption, water use, maintenance, and management. Benefits though, include differing savings and financial gains during building construction and post construction phases such as higher property market value, higher rents, fewer vacancies, marketing opportunities resulting from social benefits, lower carbon taxes, higher energy savings, less sick leave, and higher productivity. However, it is important for a researcher to identify the link between interests of stakeholders and cost-benefit evaluations.

Borders reported on the different interests of stakeholders with regard to cost variables during the whole life cycle (WLC) of green buildings. He indicated that for developers, who pay for land, design and construction costs, only the market value at the time of the project completion is important. In addition, green building labelling matters for developers, since it raises the marketing opportunities. Institutional investors, on the other hand, are interested in all cost variables except the running costs.

However, boards also showed that many institutional investors care about energy savings to have longer leases and keep good tenants happy. For owner-occupier's, all the related costs are important, including the market value at the time of the purchase and in the future. Tenants, though, are only interested in running costs and benefits such as energy savings, maintenance and management costs, productivity, health and social benefits such as public relations. The interesting point here is that energy savings, health and productivity gains are not directly important for the initial investors. Overall, it could be said that the accumulation of diverse cost-benefit variables is imperative for a full package of economic evaluations, and that it should be communicated to various stakeholders in the green building industry

II. LITERATURE REVIEW

In India buildings alone are said to contribute to 40% of energy related carbon emissions and considering the high density of population the housing sector is in urgent need of an overhaul. The pandemic situation this world is facing clarifies that "health is wealth". Health is directly proportional to the surrounding which we are exposed to.one should always respect the nature. Sustainability is the key to this trauma of changing environment. And it is rightly said that "these natural resources, nature is not given to us by our ancestors instead we have borrowed it from our future generation". Symposiuming the above mentioned we came across a solution to laid down the foundation for the G.R.U.H.A.M structure with proper planning and within the government's various norms. A clear vision to use G.R.U.H.A.M in the form of row houses scheme adds up a new step towards a revamping and the future of the residential buildings. These row-houses are sustainable,functional,eco-friendly homes. In the literature concerning green cost-benefit studies, conflicting values were indicated for a number of green cost variables, notably for green cost premiums. The green cost premium is the cost difference between the green and non-green version of a project. Kats and Capital [12] indicated green cost premiums from 0.66% to 6.50% for Level 1

LEED Certified and Level 4 Platinum buildings respectively. In contrast, another research reported average cost premiums of 46% for green school buildings [13]. Productivity is another difficult factor to measure and evaluate due to the lack of well-defined metrics [14]. Similarly to green cost premiums, the ambiguity exists for the real productivity and health benefits of green buildings as Isa et al. [15] reported. The stated discrepancies seem to be related to the lack of systematic and clear methodologies for finding the real links between costs and benefits. The literature review showed that much of the current costbenefit research lacked systematic and reliable methods for data collections and analytical approach. This research aims to review and analyses some of the existing study 170 M. Khoshbakht et al. / Procardia Engineering 180 (2017) 167 – 178 methods in order to raise some of the most common mistakes and obstacles in costbenefit studies. This paper tries to provide a framework for researchers to evaluate strengths, weaknesses, opportunities and threats of G.R.U.H.A.M building cost-benefit method before launching green building cost-benefit research projects. It has focused on providing an insight into the following aspects: x The identification of some of the most common limitations and issues in cost-benefit studies. x The understanding of the importance of cost-benefit study methodologies and their effects on research results and outcomes. x The construction of a systematic framework for researchers to use during the methodology and research development process for evidence-based decisions

III. METHOD

The present study was conducted in Haryana state from which two districts Gurgaon and Panchkula were selected purposively. Four green buildings three from Gurgaon and one building from Panchkula was selected purposively as they were rated by GRIHA (Green Rated Integrated Habitat assessment) the green rating system in India. Permissions were sought from the green building owners for collecting specific data. Four conventional corporate buildings including three Gurgaon and one from Panchkula, having proximity with the selected green buildings were also selected. In both green and conventional buildings all the IEQ parameters in bot seasons winter as well as summer were carried out on each floor of the building and further dividing floors into five zones viz. east, west, north, south and central part. Observation sheet was prepared for the recording the data about the different parameters of IEQ. The data were analyzed by using different statistical tools i.e. mean and paired 't'-test to compare the data related to IEQ of green and conventional buildings

IV. DESIRED AREA OF RESEARCH

A. *Energy Efficiency and Sustainability*

Objective: To design a residential building that significantly reduces energy consumption through the use of renewable energy sources such as solar and wind power. The goal is to achieve or surpass zero energy status, where the building produces as much energy as it consumes.

Focus: Implementing energy-efficient technologies, smart home systems, and materials that contribute to minimal environmental impact.

B. *Environmental Impact*

Objective: To create a home that not only minimizes its carbon footprint but also enhances the surrounding environment.

Focus: Incorporating green spaces, rainwater harvesting, waste reduction systems, and the use of sustainable, recyclable building materials.

C. *Cost-Effectiveness*

Objective: To ensure that the G.R.U.H.A.M model is financially viable and scalable for widespread adoption in residential construction.

Focus: Balancing the initial investment in green technologies with long-term savings on energy and maintenance costs.

D. *Community and Livability*

Objective: To create a living space that fosters a healthy and comfortable environment for residents while promoting community interaction.

Focus: Designing spaces that optimize natural light, air quality, and communal areas, enhancing the overall quality of life. 5. Innovation in Construction

Objective: To utilize cutting-edge construction methods and technologies that push the boundaries of sustainable architecture.

Focus: Exploring modular construction, 3D printing, and other advanced techniques that can reduce waste, construction time, and costs.

E. *Scalability and Reliability*

Objective: To develop a model that can be adapted and implemented in various climates and regions.

Focus: Designing the building with flexibility in mind, so it can be customized to meet local environmental conditions and regulatory requirements. This comprehensive approach ensures that G.R.U.H.A.M is not just a theoretical exercise but a practical, real-world solution that can be replicated and scaled to contribute to global sustainability efforts.

V. RESEARCH OBJECTIVES

A. *Hypothesis :*

1) Integrating green energy systems (such as solar panels, wind turbines, and rainwater harvesting) with energy-efficient building designs will result in a residential building that produces as much energy as it consumes, effectively achieving zero energy status. Hypothesis
2) Utilizing eco-friendly building materials and construction techniques will significantly reduce the carbon footprint of residential buildings, making them more sustainable and environmentally friendly. Hypothesis
3) The G.R.U.H.A.M model can be cost-effective and scalable, making it a viable option for widespread adoption in various climates and regions.
   Energy Efficiency: To analyze and implement renewable energy sources (solar, wind, etc.) in residential buildings.
4) Sustainability and Environmental Impact: To evaluate the effectiveness of eco-friendly building materials in reducing carbon emissions.
5) Cost-Effectiveness: To compare the initial costs of constructing a G.R.U.H.A.M building with traditional construction methods and evaluate long-term savings.
6) Livability and Community Impact: To investigate the impact of G.R.U.H.A.M designs on the quality of life for residents, including health benefits from improved air quality and natural light.

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7) Scalability and Reliability: To develop adaptable design strategies that allow the G.R.U.H.A.M model to be implemented in various geographical and climatic conditions. These objectives aim to validate the feasibility and benefits of the G.R.U.H.A.M model as a sustainable, zeroenergy residential building solution, contributing to the global push for greener, more sustainable living environments.

VI. SCOPE OF THE WORK

The thesis work on G.R.U.H.A.M (Green Resources Utilization Home-A Milieu) will focus on several key areas, encompassing the design, implementation, and evaluation of a sustainable residential building model. The scope includes theoretical research, practical application, and analysis, as outlined below:

1) *Review*
- Scope: Review existing literature on green energy buildings, zero energy buildings, sustainable construction practices, and renewable energy systems. This will include an analysis of current trends, challenges, and opportunities in sustainable residential architecture.
- Objective: To identify gaps in existing research and establish a foundation for the G.R.U.H.A.M project.

2) *Design and Development of "G.R.U.H.A.M" Model*
- Scope: Develop a comprehensive architectural and engineering design for the G.R.U.H.A.M building, integrating principles from green energy and zero energy building concepts.
- Objective: To create detailed plans, including energy systems, material selection, and construction techniques, that align with the project's sustainability goals.

3) *Energy Systems Integration*
- Scope: Explore and integrate renewable energy systems such as solar panels, wind turbines, and geothermal systems into the building design. This includes sizing, placement, and expected energy output.
- Objective: To ensure that the building meets or exceeds zero energy requirements, producing as much energy as it consumes.

4) *Environmental Impact Assessment*
- Scope: Conduct a thorough environmental impact assessment, including life cycle analysis (LCA) of materials, carbon footprint analysis, and evaluation of water and waste management systems.
- Objective: To quantify the environmental benefits of the G.R.U.H.A.M model and identify areas for further improvement.

5) *Cost-Benefit Analysis Page4*
- Scope: Perform a detailed cost analysis, comparing the G.R.U.H.A.M model with traditional construction methods. This will include initial construction costs, long-term energy savings, and maintenance costs.
- Objective: To demonstrate the economic viability of the G.R.U.H.A.M model and its potential for widespread adoption.

6) *Pilot Implementation*
- Scope: If feasible, the scope may include a pilot implementation of the G.R.U.H.A.M model in a small-scale residential building. This will serve as a proof of concept and provide real-world data for analysis.
- Objective: To validate the theoretical design through practical application and gather insights for scaling the model.

7) *Performance Evaluation*
- Scope: Monitor and evaluate the performance of the G.R.U.H.A.M building over a specific period, focusing on energy efficiency, sustainability metrics, and resident satisfaction.
- Objective: To assess whether the building meets its design goals and to identify any areas that require optimization.

8) *Scalability and Reliability Study*
- Scope: Investigate the potential for scaling the G.R.U.H.A.M model to different regions and climates. This includes adapting the design to local conditions and evaluating the impact of varying environmental and regulatory factors.

- Objective: To develop guidelines and strategies for replicating the G.R.U.H.A.M model in diverse settings.

9) Conclusion and Recommendations

Scope: Summarize the findings from the research, design, implementation, and evaluation phases. Provide recommendations for future research, policy implications, and potential improvements to the G.R.U.H.A.M model.

Objective: To conclude the thesis with actionable insights that contribute to the broader field of sustainable residential construction.

10. Limitations and Future Work

Scope: Identify the limitations of the current research and suggest areas for future exploration. This could include technological advancements, materials innovation, or more extensive pilot studies.

Objective: To acknowledge the boundaries of the current work and inspire continued research in sustainable building practices. This scope ensures that the thesis work is comprehensive, covering all critical aspects of the G.R.U.H.A.M project while providing a solid foundation for future research and development in sustainable residential architecture.

VII. DISCUSSION AND CONCLUSIONS

On the basis of critical evaluation of IEQ data reveal that the humidity of green building 1 was higher than the conventional building 1 (1.91%). The noise level in conventional building was less than that of green building 1 during winter afternoon (11.66 dB), evening (1.34 dB) and afternoon of summer as well (5.6 dB). This might be on account of the density of population which was higher in green building one. The more open space in green building might have resulted into the higher humidity level than the conventional building 1. The results regarding all the green buildings versus mean value of conventional buildings reveal that green buildings are better than that of conventional buildings except in case of humidity of green building 1(t= 2.77) during summer while during winter the humidity was found out be non-significant in case of green building 1(t= 1.72) followed by green building 2(t= 2.25) and 4(t= 2.88). As, we can see green buildings are far better than that of conventional buildings in every aspect of IEQ. Green and healthier environment anticipate less illness and therefore reduce absenteeism. So, more and more institutes should promote green buildings concept and green model villages as a result our earth planet will be healthy planet to live in as it reduces global warming.

=>In terms of costing of G.R.U.H.A.M,its cost comes out to be equivalent to any other conventional residential building which means a more durable, feasible residence is also present as an option to normal home as desired by the general public to buy.

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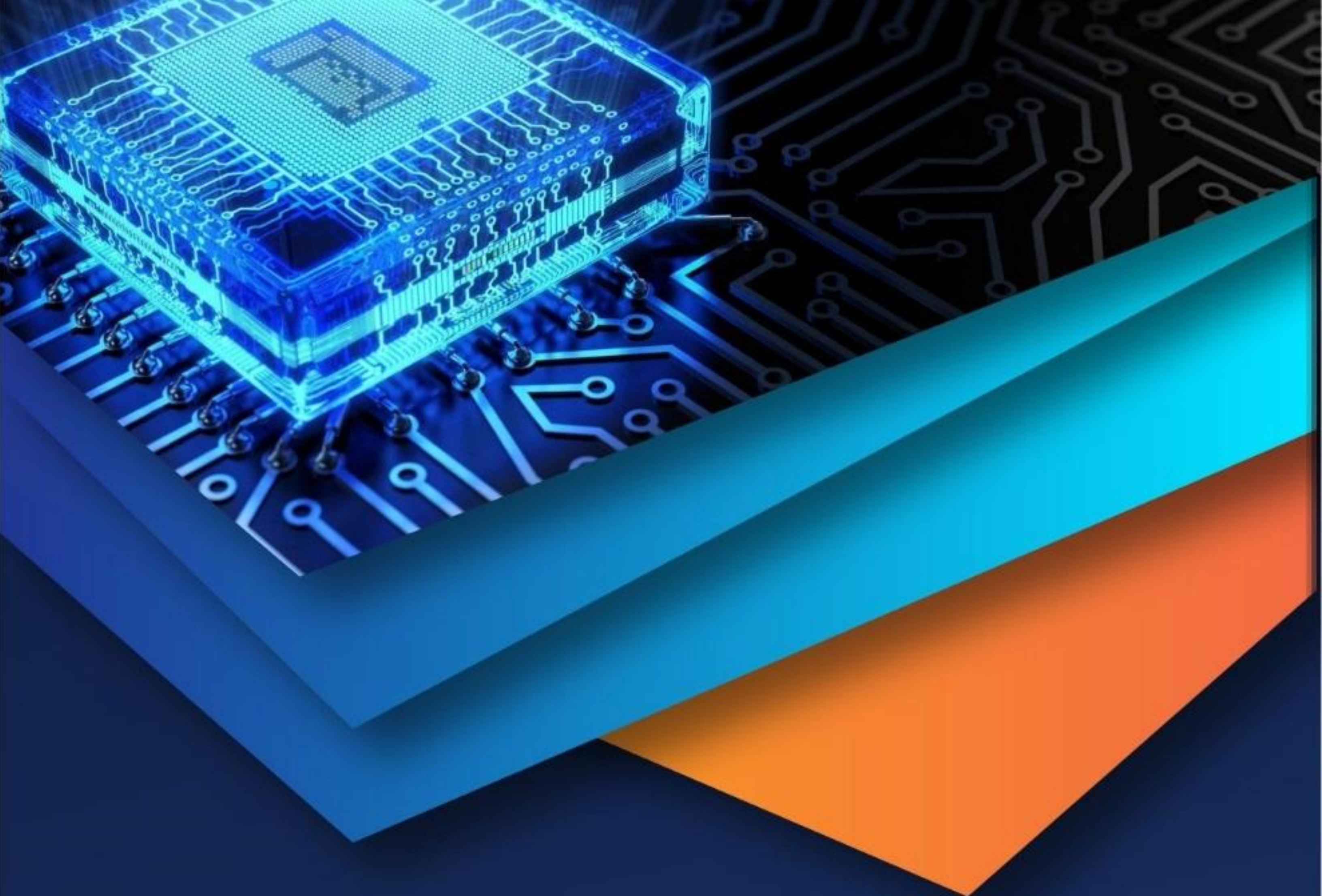

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