Environmental Friendly Construction Techniques and Materials

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ABSTRACT

The adoption of environmentally friendly building methods and materials has brought about not only a significant improvement in the state of the natural world, but also an increase in the efficiency with which natural resources are utilised. The research emphasised on sustainable recycled building material that can be utilised in current construction techniques while having a minimum impact on the environment. Additionally, the research focussed on the evaluation of operating buildings and the process of renovating them. In the process of getting improved new construction sites or buildings, we somehow get a little distracted from the fact that running buildings are in large numbers and also have an effect on the global atmosphere in which we are living. Because of this, this aspect of engineering should get the desired concentration as we are giving to the new projects. In this study, we focused on utilising the newly innovated environmentally friendly techniques and materials in the repairs and renovation works going to retrieve the existing infrastructure so that it can also contribute in the noble cause of sustainable development to safe guard the living conditions of our future generation. This was done so that the existing infrastructure can help retrieve the existing infrastructure. The risk that climate conditions throughout the world will continue to shift is what inspired the development of eco-friendly construction and green building designs. It is essential for there to be an environment that is hospitable for life to flourish, but in the name of progress, natural resources are being extracted from the earth, and large tracts of land covered in forests have been cleared. This makes it difficult to make a living. As the need for shelter is a very essential component of the lifecycle of human beings, the topic that receives the greatest attention in the present climate is the construction of environmentally friendly buildings.

Keywords: Environmental, Techniques.

INTRODUCTION

Overview

The structures in which we live and the buildings we use for a variety of reasons, including commercial, educational, and so on, have had a significant influence on our climate. They have been responsible for the use of approximately forty percent of the raw materials produced in nations with strong industrial bases. The structures have used about seventy percent of the entire electrical energy and roughly around twelve percent of the water that is suitable for human consumption. In addition to this, they are also liable for creating 45–65 percent of the waste items that are disposed of in our landfills. In addition to this, buildings are responsible for a significant amount of the harmful discharge that occurs in our environment. About 30 percent of glasshouse gases such as carbon dioxide are created as a result of their operations, and another 18 percent are produced as a result of activities associated to those processes, such as the extraction of raw materials and the transportation of those materials. The observed quality of indoor air is also accountable for the health-related problems detected in the employees working in buildings, which become a significant contributor to low output and efficiency. Building Construction projects each year use around forty percent of raw materials such as coarse sand, fine sand, stones, and aggregates, as well as twenty-five percent of wood. This percentage represents the amount of raw material that has been used. Taking into account its effects on the environment, the AEC sector has a significant bearing on the state of the planet's atmosphere. Residential construction is covering an enormous amount of land, which calls for careful consideration in the selection of eco-friendly and environmentally responsible building materials.

Main Objective

The principal goals of the current examination are as said beneath:

1. To identify strengths and weaknesses of LEED (India) and GRIHA as compared to rating schemes of US and UK considering Indian regional implications.
2. Development of the fuzzy logic-based system of green building rating, a Greenness Index and the decision-making process of maintenance needs for future for existing buildings.

METHODOLOGY

The fundamental objective of this study is to devise a methodology that can assess the feasibility of low-rise residential buildings, with the primary emphasis being given solely on structures that have been recently erected. The research will help in lowering the negative impacts that extant structures have on their surroundings, such as the creation of carbon dioxide emissions and waste during the process of restoration, for example. This will be accomplished as a direct result of the research. The purpose of this project is to educate individuals about the detrimental influence that their living arrangements or the activities they engage in while exploiting natural resources have on the local surroundings in which they live.

The study comprises of the following techniques/procedure

1. Selection of existing building
2. Assessment in respect to Green rating guidelines
3. Recommendations to improve the Green rating with using of waste and conservation of natural resources consumed in the building.
4. Reassessment
5. Result

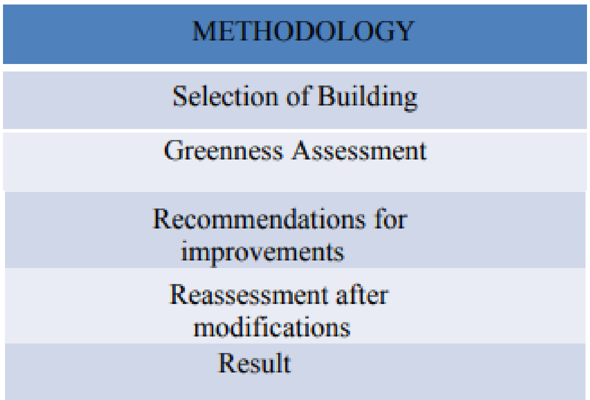

Fig . 1 Methodology

We have chosen the Government Primary School in Sugar Mills, Rohtak, India for the purpose of conducting research on the implementation of greenness criteria in the pursuit of getting maximum grade by making specific modifications in a structure that is already in use. In the current research, it is recommended to make an evaluation of the chosen structure according to the norms and gradings categorised in the GARIHA-EB (GARIHA for Existing Structures) rating system, and to indicate the change that is required in the building to boost both its performance and its ratings. This will be done in order to improve the overall quality of the structure.

Existing Grade

Points Accreditation: The following grade for this structure was determined using the GARIHA-EB version1

Table-1: Assignment of Credits

S. No	PARTICULAR	MAXIMUM POINTS	POINTS OBTAINED
1	Site Parameter	6	2
2	Maintenance and House Keeping	17	5
3	Energy	35	10
4	Water	25	8
5	Health	12	5
6	Social Sense	5	2
7	Bonus points	4	0
Total =		**104**	**32**

The building under consideration has obtained in all 32credits.

Table-2: GARIHA-EB Rating

PARTICULAR	GARIHA -EB Rating
25-40	□

41-55	□ □
56-70	□ □ □
71-85	□ □ □ □
86 and above	□ □ □ □ □

Hence it is eligible to obtain only one star as per the GARIHA-EB Version-1

LEED (Leadership in Energy and Environmental Design)
The US Green Building Council (2007) served as a model for the development of the LEED-India programme, which was launched in 2010.It is a separate organisation that was brought together by the Indian Green Building Council (IGBC). In 2011, the Governing body passed the instructions in the form of a rating system to evaluate the buildings based on whether or not they had achieved the desired purpose taking into account the LEED grading structure.

1. Locations that are intended to be permanent
2. Reduction of Water Waste
3. The Environment and Energy
4. Available Sources and Components
5. The Process of Innovation and Design
6. The Quality of the Indoor Environment in the Home
7. The Priority of the Region

Its goal is to improve occupant living conditions, ecological balance, and commercial outcomes of buildings by the implementation of existing and innovative processes, rules, and procedures, as well as through the imposition of a well-established protocol and evaluation system. The Leadership in Energy and Environmental Design (LEED) certification system consists of a list of graded points organised into seven primary categories. The amount of sustainability and greenness index that a building can achieve may be determined with the use of LEED, and the building can then be classified into one of four primary slabs, which are outlined in the table below.

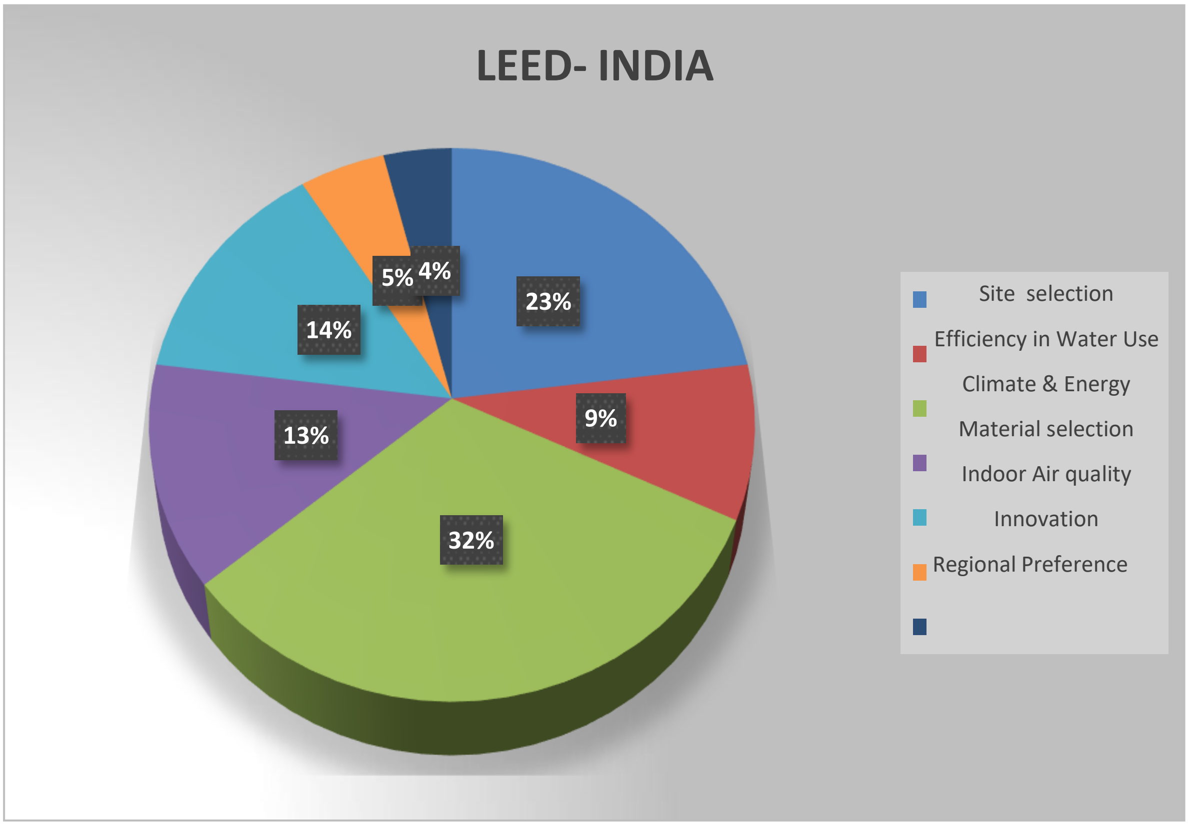

Fig 2

RESULTS

Site Specifications
Effect of Heat Island

1. The school has around forty percent of its territory open to the sky, such as in parking and paths; these areas

will be outfitted with temporary roofing and shade structures.

2. A minimum of fifty percent of the open area may be covered with pavers, etc., which are set in place and have space between them to allow for the growth of grass and other types of plant.
3. Reflective roof paints can be put to the roof surface to reduce the amount of heat that is absorbed from the sun. This will assist in lowering the amount of energy that is required to keep the building at a comfortable temperature.
4. It is recommended that flowers, hedge plants, and other trees be planted in the lawn area and along the boundary wall of the building.

Table-3: **Estimation Heat Island**

	Estimation				
	Provision for Pavers, Plantation and Roof paint				
S. No	**Item**	**Unit**	**Qty**	**Rate**	**Amount**
1	Earth work in excavation using mechanical means (Hydraulic excavator) or manual means across areas (exceeding 30 cm in depth, 1.5 m in breadth, as well as 10 sqm on plan), including taking out and disposing of excavated earth lead up to 50 m and lift up to 1.5 m, as instructed by the Engineer-incharge. Rock of a typical kind	cum	10	352.45	3525
2	Providing and placing in situ cement concrete of the prescribed quality, minus the expense of centring and shuttering - All work up to plinth level: 1:2:4 (1 cement: 2 coarse sand (zone-III): 4 graded stone aggregate 20 mm nominal size)	cum	2	6788.6	13577
3	Providing and placing in situ cement concrete of the required quality, minus the expense of centring and shuttering - All work up to the plinth level: 1:4:8 (1 Cement: 4 coarse sand (zone-III): 8 graded stone aggregate 40 mm nominal size	cum	1.5	5,789.60	8684.4
4	Providing and laying 60 mm thick factory made cement concrete interlocking paver block of M -30 grade made by block making machine with strong vibratory compaction, of approved size, design & shape, laid in required colour and pattern over and including 50 mm thick compacted bed of coarse sand, filling the joints with fine sand etc. all complete as per the direction of Engineer-in-charge. Providing and laying 50 mm thick compacted bed of coarse sand .	sqm	80	602.2	48176
5	Masonry constructed of standard burned clay F.P.S. (non-modular) bricks of class designate 7 and a half inches for the foundation and plinth in: 6.1.1 Cement mortar 1:4 (1 cement: 4 coarse sand)"	cum	4	6376.25	25505.00
6	15 mm cement plaster on rough sideof single or half brick wall of mix : 1:4 (1 cement: 4 coarse sand)	sqm	40	200.05	8002

7	The demolition of cement concrete by hand or by using mechanical methods, including the disposal of waste within fifty metres of the lead, in accordance with the order of the Engineer in charge. Nominal concrete 1:3:6 or richer mix (i/c equivalent design mix)	cum	1	1737.45	1737
8	Steel work that has been welded in built-up sections or framed construction, including cutting, lifting, fastening in position, and applying a priming coat of an authorised steel primer utilising structural steel, etc. as necessary. When used in gratings, frames, guard bars, ladders, railings, brackets, gates, and other works of a similar kind	kg	1000	131	131000
9	Painting with paint made of synthetic enamel of a brand and manufacturer that has been certified to produce an even shade New work should have at least two coatings .	sqm	50	121.55	6078
10	supplying and installing a poly carbonate sheet that is 12 millimetres thick, of an authorised quality, and in the shade that is required, together with the requisite aluminium section, EPDM gasket, whether sealent at joints to make the joints leak resistant, i/c nails, screws, and so on, complete in all respects as per the guidance of the Engineer-in-charge .	sqm	80	1566	125280
11	Putting in various kinds of flowers, haze plants, and so on.	each	100	150	15000
12	coating the roof's surface with a white paint that reflects light.	sqm	300	130	39000
13	Disposal of building garbage, malba, and other similar unserviceable, dismantled, or waste items by mechanical means, including loading, transporting, and unloading to an approved municipal dumping ground or as allowed by the Engineer-in-charge, beyond a 50-meter initial lead, for all leads including all lifts involved .	cum	12	138.85	1666
				Total	**427230**

CONCLUSION

This enquiry provided light on the relevance of green grading systems for previously finished residential, commercial, and institutional projects. Considering that the bulk of studies concentrated on either presently ongoing or soon-to-be-started construction efforts, this investigation shed light on the value of green grading systems for already completed building projects. After reading a wide range of research papers and articles, it has been observed that the majority of them focused on new revolutionary green materials or applying them in new projects. This observation was made after reading a variety of research papers and publications. On the other hand, the number of research projects that concentrate on achieving sustainability in pre-existing buildings, which also have a significant influence on the environment in which we live, is quite limited. This is something that has been noticed by a number of people. The authors of this study arrived at a number of findings and suggestions after reviewing previously published research and carrying out local surveys that covered a broad spectrum of topics. There is an urgent need to shift the focus of green building practises away from individual materials and towards combinations of components that provide the greatest potential for minimising adverse effects on the surrounding environment. This is necessary because the majority of the research that is being conducted right now is centred on the individual components of buildings as well as traditional building practises.

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