

Construction Techniques For Sustainable Environment In Residential Building: A Research

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Abstract- *Consequently, Sustainable materials vary from building structures. They need specialized materials and construction methods, in addition to a managerial commitment to sustainability. The cement manufacturing sector has made considerable strides in lowering its Emissions of carbon dioxide from cement production. Concrete has good sustainability attributes. Utilizing a carbon-negative manufacturing technique and renewable power, they are made. . Sustainable development is a way of discussing the future in which biological, social, and economic indicators are combined in the goal of a higher quality of life. For instance, a flourishing civilization depends on a healthy ecosystem to supply its residents with food and clean water, basic sanitation, and clean air. To apply the concepts of Responsible Bricks (Fly ash bricks), Self-sustaining Cement/ Sustainability Mortar (Made with Fly ash), and Responsible Paints (recycled paints), as well as practices that benefit the public, such as Rain water collecting and solar electric architecture. To investigate the constraints of polymeric plastics in relation to development and Sustainable innovations above traditional techniques. To investigate the economic viability (Cost analysis) of environmental sustainability components.*

Keywords- Sustainable construction, Globalization, Tools and techniques,

I. INTRODUCTION

1.1 General

Sustainable development is the overarching paradigm of the United Nations. The 1987 Bruntland Commission Report as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” described the concept of Sustainable development.

There are four dimensions to Sustainable development – society, environment, culture and economy – which are intertwined, not separate. Sustainability is a paradigm for thinking about the future in which

environmental, societal and economic considerations are balanced in the pursuit of an improved quality of life. For example, a prosperous society relies on a healthy environment to provide food and resources, safe drinking water and clean air for its citizens.

“Sustainable development thus, is development that meets the needs of present and future generations. Given the global and local effects of environmental decay, it is no surprise that Sustainable development has become a catchword in development planning and resource management. However, interpretations of this concept are still ambiguous. According to the Brundtland Report, the idea of Sustainable development reaches far beyond environmental protection, as it means a process of change in which exploitation of resources, direction of investments, orientation of technological development, and institutional changes are made consistent with future, as well as present needs. It is not a fixed state of harmony, but rather a balanced and adaptive process of change.

1.2 Definition of Sustainable Development

"Sustainable development is development that meets the needs of the present, without compromising the ability of future generations to meet their own needs."

The concept of Sustainable development can be interpreted in many different ways, but at its core is an approach to development that looks to balance different, and often competing, needs against an awareness of the environmental, social and economic limitations we face as a society.

All too often, development is driven by one particular need, without fully considering the wider or future impacts. We are already seeing the damage this kind of approach can cause, from large-scale financial crises caused by irresponsible banking, to changes in global climate resulting from our dependence on fossil fuel-based energy sources. The longer we pursue unsustainable development, the more frequent and severe its consequences are likely to become, which is why we

need to take action now. The concept of Sustainable Development has in the past most often been broken into three constituent parts: Environmental sustainability, Economic Sustainability and sociopolitical Sustainability.



Figure 1.2. Benefits of Sustainable Building (Source: <https://atalian.us/ifc-creates-tool-to-promote-Sustainable-buildings-in-emerging-markets/>)

1.3 Benefits of sustainable building

1. The Rising Popularity of Sustainable Architecture

With our society's increasing concern for the environment, it's no surprise that Sustainable Building continues to grow in popularity and you may be wondering what is Sustainable design? From residential structures to corporate facilities, architects are discovering new Sustainable design processes to preserve our ecosystem while reducing our carbon footprint. Here are ten benefits of Sustainable Building and Sustainable construction practices and how this architectural trend can protect the generations of tomorrow:

2. Improved Indoor Environment: Quality of Life

When it comes to our quality of life, it's no secret that our surroundings have a major impact on our health. Over the past several decades, designers around the globe have made massive progress, developing Sustainable architecture that can dramatically affect the inhabitants of such buildings and drastically reduce the negative environmental impact that buildings may have. From interior design elements like improved lighting sources, thermal conditions, ergonomic features and even upgraded air quality, occupants residing or working in Sustainable structures have experienced a marked improvement in their health, stress levels and overall quality of life.

3. Saving Water: Reduce, Reuse, Replenish

Another tangible benefit of Sustainable building: water efficiency. Research shows that Sustainable architecture

can not only reduce water waste through water-efficient plumbing fixtures but also reduce the strain on shared water resources. By installing specially-engineered systems to purify water, it enables water recycling and also allows for alternative sources of water (such as rainwater). These developments not only save this vital natural resource but protect clean water sources for the future.

4. Enhanced Health: Eco-Friendly for Life

Living in a Sustainable building can save your life – literally. According to studies, people who reside in sustainable structures experience a myriad of health benefits due to the eco-friendly materials utilized in construction. For example, Sustainable Buildings avoid using building materials that may contain harmful volatile organic compounds (VOCs) or plastic by-products which have been known to release toxic fumes and carcinogens into the atmosphere. These dangerous materials are linked to respiratory disease, allergies, and other health disorders, and in extreme cases, an increased risk of cancer.

5. Reducing The Strain: Shared Resources, Increased Efficiency

With our planet's ever-increasing population (particularly in large cities across the globe), our local shared resources are being threatened as demands continue to grow. Based on the advancements and Sustainable practices and technologies developed by ingenious architects worldwide, vital resources such as water and energy are being protected. By increasing efficiency, Sustainable structures are capable of reducing the environmental impact on such resources, which can potentially be protected and preserved for future generations.

6. Reduced Operational Cost and Maintenance: Traditional vs. Sustainable

One of the greatest benefits of Sustainable Buildings are their lower maintenance costs – featuring specially-engineered design elements to lower energy consumption and help reduce energy cost and water bills for each occupant. These efficient structures can save corporate and residential owners a bundle. Although the expense required for building owners to build such structures may be initially higher than traditional non-sustainable forms of architecture, the cost over the long term is recovered exponentially.

7. Energy-Efficient: Non-Renewable vs. Natural Resources

As a sustainable architect, energy efficiency is a primary goal in Sustainable Building design. Developing structures that derive their energy from natural sources – such as the sun, wind, and water – is extremely beneficial to the environment, protecting the ecosystem from pollution associated with non-renewable sources (such as oil and coal). An added benefit: non-renewable energy sources are not only toxic but costly, while their energy-efficient counterparts (such as solar energy vs. traditional electricity) can save thousands over the lifetime costs of the infrastructure.

8. Carbon Footprint Reduction: Saving The Planet One Step at A Time

There has been an increase in large corporations opting for sustainable initiatives. According to the Environmental Protection Agency (EPA), buildings account for 30% of all sustainable house gas emissions in the United States. Landlords and large businesses have taken heed, as increasing sustainability is an opportunity to do something positive for both business and society as a whole.

9. Keep It Clean: Protecting Our Ecosystem

Global warming has been a growing concern for a number of years, and it's no wonder – our planet has seen a drastic depletion of our natural resources, while pollution and the consequent climate-change is at an all-time high. Sustainable architecture is not only energy-efficient and healthier for its inhabitants, but it also benefits the planet. By reducing our reliance on non-renewable resources (fossil fuels such as coal and oil), sustainable architecture can actually promote and maintain a cleaner environment.

10. Efficient & Sustainable Material: Minimal Use for Maximum Impact

Upcycling has taken the architectural world by storm – by using recycled material and reusing resources (and even repurposing old structures), Sustainable architects, engineers, and sustainable designers are tapping into existing resources to reduce carbon footprints and save natural resources. By implementing Sustainable strategies into the design process, like reducing waste, preserving natural resources (such as water and wood), protecting our air supply, and limiting energy use, Sustainable Building companies can create extremely efficient structures that can withstand the test of time.

1.3 Advantages of sustainable building

1. Cost-effective

Studies have confirmed that the initial investment in Sustainable Buildings will lead to savings of more than ten times the initial investment after ten years. The turnover of the investment happens between ten to eighty years. An important primary feature of Sustainable Building is to ensure efficient use of resources, which allows users to save much more by reducing operational and maintenance costs on energy, water, etc. Although Sustainable Buildings can initially cost more than normal buildings, you can usually cover the difference in cost in 3-4 years.

2. Improved Health

One of the goals of Sustainable Buildings is to improve the environment, including the air for residents of the building. A resident of Sustainable Buildings enjoys better health due to less risk of being exposed to pollution from air and water. For instance, most indoor pollutants are due to materials used in furnishing and constructing buildings, i.e., carpet, paint. Inhaling such pollutants can be toxic to the health, and accumulation of it over time can cause serious health issues such as difficulty breathing..

3. Increased Efficiency

The efficiency of water and energy is one of the best advantages of Sustainable Building—energy efficiency results in reduced use of coal, a significant source of power for the world. In a bid to preserve this natural resource, solar panels are installed to utilize energy from the sun instead. The buildings are also designed so that enough lightening from the sun enters through the window panels to avoid the use of artificial lighting at all times, thus saving more energy.

4. Better Environment

Statistics show that air pollution accounts for around 4.2 million deaths per year and over 3 million deaths of children under five due to environmental problems. These statistics only show how toxic our environment is from the emission of carbon dioxide, trillion gallons of untreated sewage dumped into the water, and several other pollutions.

5. Higher Market Value

Sustainable Buildings have a great return on investment and higher market value due to lower maintenance costs. While the rent is set to have a high value in the real estate market, the sale value is even significantly higher. Experts say that an average Sustainable Building can be sold at a premium price worth 7% more than a traditional one.

1.4 Disadvantages of sustainable building

1. High Initial Investment

Even though the returns are great over time, the initial investment is still a major problem in Sustainable Buildings. Several people want to live healthily but cannot afford the initial cost of construction. Depending on how many eco-friendly technologies you want to implement in your building, the cost may even be higher. Yet, the initial investment is still very high due to the unavailability of the resources needed to build a Sustainable Building. However, if you shy away from Sustainable Buildings because of their high price, you should start considering them.

2. Getting the Right Material

It can be far-fetched to get the materials needed to construct Sustainable Buildings. They are not often available in every part of the world and might take a while and cost a lot to ship. Also, aside from materials needed to construct the building, other materials such as technologies needed might be difficult to find.

3. Longer Time to Build

Constructing a Sustainable Building takes a while. A lot goes into the planning and design before being built. Building a Sustainable Building can take up to 3 years and above because you must consider the surroundings.

4. Uncontrollable Air Temperature

Often, it is not easy to control the air temperature in Sustainable Buildings. These eco-friendly buildings utilize the sun to generate power; thus, they run on heat, and the air is controlled from one central point.

5. Location

Figuring out the right location is another disadvantage of Sustainable Buildings. It is primarily because of climatic changes. Sustainable Buildings utilize the sunlight as much as possible, so using energy alternatives such as solar, building in a region with very few sunny days would be a wrong location because you would likely run out of energy at some point.

1.5 Aim

The aim of the research is to find out the contribution of construction materials in Sustainable development in construction industry.

1.6 Objectives

- To study various Sustainable building materials.
- To study the contributing parameters of construction materials for Sustainable development with the help of questionnaire and data analysis using SPSS.
- To implement the concept of Sustainable Bricks (Fly ash bricks), Sustainable cement/ Sustainable cement (Made with Fly ash) and Sustainable paints (recycled paints) as well as the techniques of profit of people such as Rain water harvesting and passive solar architecture.
- To study the limitations of conventional materials with reference to sustainability and Sustainable materials over it.
- To study the economic feasibility (Cost analysis) of materials in Sustainable development.

II. REVIEW OF LITERATURE

“Design of A Sustainable Building: A Conceptual Framework for Implementing Sustainability in the Building Sector”

The Peter O. Akadir et.al. proposed framework based on the Sustainable triple bottom line principle, includes resource conservation, cost efficiency and design for human adaptation. The framework will allow design teams to have an appropriate balance between economic, social and environmental issues. It aims to change the way construction practitioners think about the information they use when assessing building projects.

“Sustainable performance criteria for construction method selection in concrete buildings”

Decisions to use prefabrication are still largely based on anecdotal evidence or simply cost-based evaluation when comparing various construction methods. Holistic criteria are needed to assist with the selection of an appropriate construction method in concrete buildings during early project stages. A total of 33 Sustainable performance criteria (SPC) based on the triple bottom line and the requirements of different project stakeholders were identified. The resultant list of SPCs provides team members a new way to select a construction method, thereby facilitating the Sustainable development of built environment.

“The Investigation of the Barriers in Developing Green Building in Malaysia”

In this study MiladSamari et.al. (2012) said that Green building is the foundation of the Sustainable construction development in Malaysia. The respondents were randomly selected from the professionals of Malaysian construction industry across the country and the method applied for collecting data is questionnaire survey. The main barriers can be listed as: lack of credit resources to cover up front cost, risk of investment, lack of demand as well as higher final price.

“Drivers and barriers of Sustainable design and construction: The perception of green building experience”

Sustainability in the built environment is becoming a strong force in the construction industry to achieve social and environmental benefits and to lower negative environment impacts. This study identified the main drivers and barriers of Sustainable design and construction factors with a two-step process, including an in-depth literature review and an experts' review. The most important driving factors were energy conservation, improving indoor environmental quality, environmental/resource conservation, and waste reduction. Based on these findings, the study suggests the direction of sustainability policies and programmes as well as the direction for future research and development.

“Barriers and drivers for Sustainable building”

Sustainable building is not hindered by a lack of technologies and assessment methods, but by organizational and procedural difficulties entailed by the adoption of new methods. New technologies are resisted because they require process changes entailing risks and costs. These hindrances can be reduced by learning what kind of decision-making phases, new tasks, actors, roles and ways of networking are needed. The most important actions to promote Sustainable building are the development of awareness of clients about the benefits and the development and adoption of methods for Sustainable building requirement management.

III. METHODOLOGY



Figure :Flow Chart of methodology

Sustainable Building Materials

Careful selection of environmentally Sustainable building materials is the easiest way for architects to begin incorporating Sustainable design principles in buildings. Traditionally price has been the foremost consideration when comparing similar materials or materials designated for the same function.

However, the “off-the-shelf” price of a building component represents only the manufacturing and transportation costs, not social or environmental costs. The three principles of sustainability in architecture

Sustainable building materials can be defined as materials with overall superior performance in terms of specified criteria. For Selection of Sustainable building materials, the following criteria are commonly used:

1. Bricks

- i. Flyash Bricks are considered as the Sustainable material of construction So in this case it is used in the Sustainable Construction. Sustainable building is one of the most important trends in the construction industry today.

Cement

- If PPC (Portland Pozzolana Cement) is used in construction, it will be Sustainable Material Because PPC contains the flyash as the main ingredients.
- Geopolymer concrete, or SUSTAINABLE concrete, is part of a movement to create construction materials

that have a reduced impact on the environment. It is made from a combination of an inorganic polymer and between 25% and 100% industrial waste.

Sustainable Paints (Recycle Paints)

- i. Paints with reduced levels of VOCs are eco-friendlier than conventional paints, some house paints have an even lower environmental impact.
- ii. Homeowners can select premium-grade zero-VOC paints that also use VOC-free colorants, are free of vinyl and other plasticizers and include no toxic biocides.

Technologies Used in Sustainable Construction

1. Solar Power

Solar power has been increasingly exploited as Sustainable construction technology. In Sustainable construction, it can be utilized in two ways, one pertains to active solar energy and another is passive solar power.

2. Biodegradable Materials

The use of biodegradable materials is an eco-friendly means of making construction Sustainable. Most traditional construction materials lead to the accumulation of waste products and toxic chemicals, the majority of which take hundreds of years to break down. And even after they degrade, they contaminate and harm the environment.

3. Sustainable Insulation

Insulation is one of the greatest concerns when it comes to the construction of buildings and homes. However, most people hardly know that insulators are simply wall filters that don't need to be made from expensive and highly finished materials.

The Sustainable insulation has proven to be a Sustainable construction technology as it eliminates the need for high-end finishes made from non-renewable materials.

4. Cool Roofs

Cool roofs are one of the Sustainable Sustainable design technologies that aim at reflecting heat and sunlight away. It helps in keeping homes and buildings at the standard room temperatures by lowering heat absorption and thermal emittance.

5. Rain Water Harvesting

- The principle of collecting and using precipitation from a catchments surface.
- There are two main techniques of rain water harvestings.
- Storage of rainwater on surface for future use.
- Recharge to ground water.

6. Passive Solar Architecture and Active Solar Panels.

Passive solar design refers to the use of the sun's energy for the heating and cooling of living spaces by exposure to the sun. When sunlight strikes a building, the building materials can reflect, transmit, or absorb the solar radiation. In addition, the heat produced by the sun causes air movement that can be predictable in designed spaces. Passive solar cooling systems work by reducing unwanted heat gain during the day, producing non-mechanical ventilation, exchanging warm interior air for cooler exterior air when possible, and storing the coolness of the night to moderate warm daytime temperatures. At their simplest, passive solar cooling systems include overhangs or shades on south facing windows, shade trees, thermal mass and cross ventilation

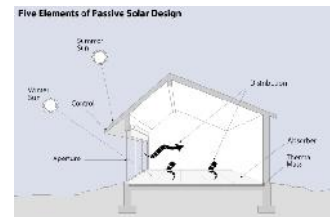


Figure - Passive Solar architecture
(Source:https://en.wikipedia.org/wiki/Passive_solar_building_design)

IV. CASE STUDY



Figure - Exotica 2 3D view

Site Details

- Name of site : Cool homes
- Location of site : cool homes, ring road, behind gajananmaharajmandir, bhusawal, jalgaon.
- A G+4 proposed building of 24 flats and of 4 shops is taken for case study location is in Bhusawal.
- Design Team : Apex consultant
- Owner and Developer : Shivaji Patil
- Architect : Sneha Nichat
- Cost of project : 2.4 cr.
- Structural Engineer : Navneet Patil
- Builder : Praj Infra Solutions pvt.ltd.
- Area : 6400 sq.feet

- Recharge to ground water.

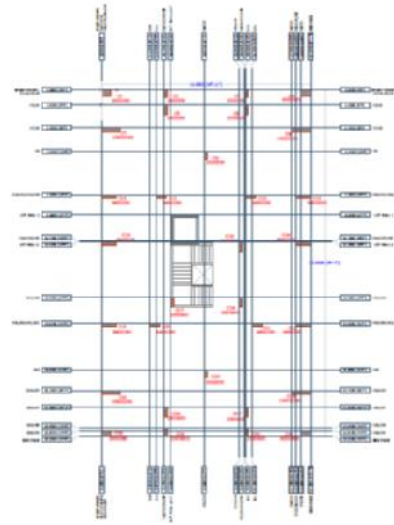


Figure:- Centre Line Plan

1. Autoclaved aerated concrete (AAC) bricks

AAC is a highly thermally insulating concrete-based material used for both internal and external construction. Besides AAC's insulating capability, one of its advantages in construction is its quick and easy installation, because the material can be routed, sanded, or cut to size on site using standard carbon steel power tools.

2. Flyash Cement

- If PPC (Portland Pozzolona Cement) is used in construction, it will be as an ecological and Sustainable Material Because PPC contains the flyash as the main ingredients.
- Geopolymer concrete, or Sustainable concrete, is part of a movement to create construction materials that have a reduced impact on the environment. It is made from a combination of an inorganic polymer and between 25% and 100% industrial waste

3. Recycled Paints

Paints with reduced levels of VOCs are more eco-friendly than conventional paints, some house paints have an even lower environmental impact.

Homeowners can select premium-grade zero-VOC paints that also use VOC-free colorants, are free of vinyl and other plasticizers and include no toxic biocides.

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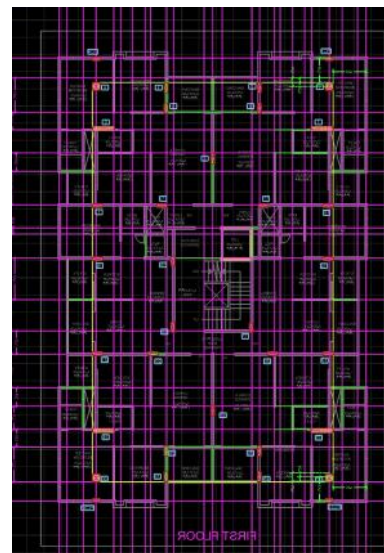


Figure:- First floor center line plan

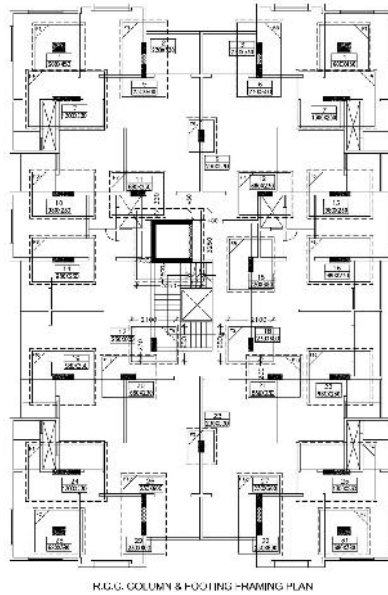


Figure:- R.C.C Column & Footing Framing Plan

VI. DATA ANALYSIS

The questionnaire was conducted to investigate the difficulties that are faced during implementation of sustainable construction. The number of participants in this research was 40, and the data was collected using a quantitative manner. The participants' identities are not divulged in this research.

link:-

https://docs.google.com/forms/d/e/1FAIpQLSfgRUxrG9_SX1w86TNL-hSJJ_U6t_z2pfXxrGItyZdfStCTFw/viewform?usp=pp_url

Responsestothequestionnaire

The researcher distributed a questionnaire as part of the data gathering methodology. The survey was designed to investigate the challenges with writing abilities that instructors encountered while teaching writing skills. The following replies were supplied by the study's participants:

Ques 1:- According to you financial and environmental feasibility of Sustainable construction feature individually by use of methods such as natural present value, benefit cost ratio, payback period and return on investment.

	Frequency	Percent
Valid yes	27	69.2
No	7	17.9
May be	5	12.8
Total	39	100.0

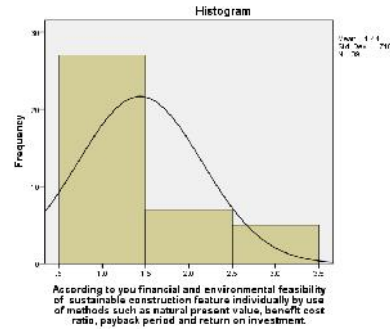


Figure :- According to you financial and environmental feasibility of Sustainable construction feature individually by use of methods such as natural present value, benefit cost ratio, payback period and return on investment Interpretation

We have taken the survey of according to you financial and environmental feasibility of Sustainable construction feature individually by use of methods such as natural present value, benefit cost ratio, payback period and return on investment. The total respondents is 39 .It has minimum respondents is May be (5,12.8) as well as maximum is Yes (27,69.2).

Ques 2:- Do you agree that the Sustainable construction be giving us cost benefits in the future?

	Frequency	Percent
Valid Strongly disagree	7	17.9
Disagree	14	35.9
Neutral	4	10.3
Agree	7	17.9
Strongly agree	7	17.9
Total	39	100.0

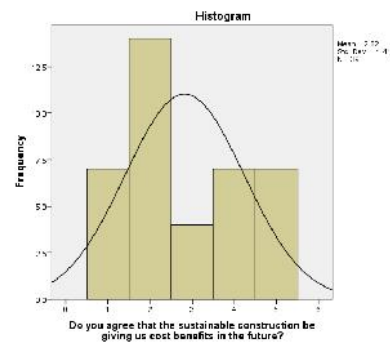


Figure :- Do you agree that the Sustainable construction be giving us cost benefits in the future?

Interpretation

We have taken the survey of Do you agree that the Sustainable construction be giving us cost benefits in the future. The total respondents is 39. It has the minimum respondents is Neutral (4,10.3) as well as maximum is Disagree (14,35.9)

Ques 3:- What according to you are the limitations of convectional materials with reference to sustainability?

	Frequency	Percent
Valid Sustainable materials are technologically more advanced	19	48.7
Convectional materials has less life as compared to Sustainable building materials	13	33.3
Any of the above	3	7.7
None of the above	4	10.3
Total	39	100.0

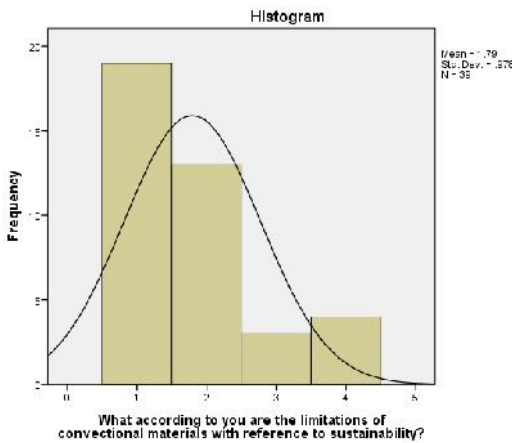


Figure 1 What according to you are the limitations of convectional materials with reference to sustainability?

Interpretation

We have taken the survey of what according to you are the limitations of convectional materials with reference to sustainability. The total respondents are 39. It has minimum respondents is Any of the above (3,7.7) as well as maximum respondent is Sustainable materials are technologically more advanced (19,48.7).

- **Detail Quantity Estimation of Sustainable Building**

CEMENT

I. Sustainable building material

Concrete has excellent sustainability qualities, and the industry has made significant progress in reducing its CO2 emissions from cement manufacture.

They are produced by implementing a carbon-negative manufacturing process and using renewable electricity It shows the Sustainable building material cement quantity of 4507, and one cement bag rate is 250 for that total cost of cement is 11,26,750

Table :- Cement

RATE	250
QUANTITY	4507
TOTAL COST	11,26,750

II. Conventional building material

RATE	350
QUANTITY	4507
TOTAL COST	15,77,450

- **AAC BRICKS**

I. SUSTAINABLE BUILDING MATERIAL

AAC blocks designed by the UAL Industries under the brand name KONARK are considered highly Sustainable as a building material. It shows the Sustainable building material aac brick quantity of 125 M^3, and one aac brick bag rate is 3200 PER M^3 for that total cost of aac brick is 1600204

Table :- AAC Bricks

RATE	3200 PER M^3
QUANTITY	125 M^3
TOTAL COST	4,00,000

II. CONVENTIONAL BUILDING MATERIAL

RATE	8 RS PER BRICK
QUANTITY	125 M^3
TOTAL COST	500000

AAC bricks are costing us 1,00,000 cheaper as our sustainable development material

I. SUSTAINABLE BUILDING MATERIAL

Table 4.6 Solar Panel

- **TOTAL COST ESTIMATION OF MATERIALS FOR SUSTAINABLE BUILDING**

RATE	4,78,600
QUANTITY	-
TOTAL COST	₹ 4,78,600 Rs

II. CONVENTIONAL BUILDING MATERIAL

Table :- Total Cost Estimation Of Materials For Sustainable Building

RATE	NA
QUANTITY	NA
TOTAL COST	NA

S R N O	SUSTAINABLE BUILDING				CONVENTIONAL BUILDING			
	QU AN TIT Y	SUST AINA BLE BUIL DING MAT ERIA L	R A T E	COS T	QU AN TIT Y	CONV ENTI ONAL BUIL DING MATE RIAL	R A T E	CO ST
1	450 7 bags	FLY ASH CEM ENT criteri a 15 (4)	2 5 0	11,26 ,750	450 7 bags	CEME NT	3 5 0	15,7 7,45 0
2	126 Bras s	SAN D	3 5 0 0	4,41, 000.0 0	91 bras s	SAND	3 5 0 0	4,41 ,000 .00
3	237 Bras s	AGG REG ATE	4 5 0 0	10,66 ,500	237 Bras s	AGGR EGAT E	4 5 0 0	10,6 6,50 0
4	NA	WAT ER	NA	NA	NA	WATE R	NA	NA

5	100 0 ltr	ADM IXTU RE criteri a 4,14,1 7 (5)	1 5 0 / LI T	1500 00	NA	NA	NA	NA
6	125 m^3	AAC BRIC KS criteri a 15(6)	3 2 0 0/ M ^ 3	4,00, 000	125 M^3	RED BRIC KS	8	500 000
7	SOL AR PA NE L	SOL AR PAN EL criteri a 18,19, 14(10)	L u m - su m	4,78, 600	NA	NA	NA	NA
8	Rain Wat er Har vesti ng	R.W. H criteri a 11,21 (7)		70,00 0	NA	NA	NA	NA
T O T A L				37,32 ,850				35,8 4,95 0

VII. RESULTS AND DISCUSSIONS

GRAPH ANALYSIS

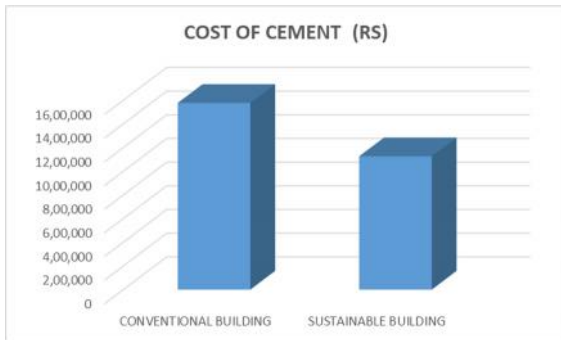
Table :- Overall Cost of Material

OVERALL COST OF MATERIAL	
CONVENTIONAL BUILDING	SUSTAINABLE BUILDING
₹ 35,34,950	₹ 37,32,850



Table :- Cost of Cement Rs

COST OF CEMENT Rs.	
CONVENTIONAL BUILDING	SUSTAINABLE BUILDING
₹ 15,77,450	₹ 11,26,750



Graph no 4.12 Represents bar charts for cement cost

VIII. CONCLUSION

Sustainable buildings are naturally different from conventional buildings. They require special materials and building practices as well as management commitment to sustainability.

1. Concrete has excellent sustainability qualities, and the industry has made significant progress in reducing its CO2 emissions from cement manufacture. They are produced by implementing a carbon-negative manufacturing process and using renewable electricity It shows the Sustainable building material cement quantity of 4507, and one cement bag rate is 250 for that total cost of cement is 11,26,750.
2. Sand isn't sustainably sourced, it isn't considered a Sustainable material. Sand is technically renewable, however, because it takes millions of years to naturally produce sand it's not considered renewable. It shows the Sustainable building materials and quantity of 126 BRASS, and one sand BRASS rate is 3500 for that total cost of sand is 4,41,000.00.
3. Sustainable aggregates means choosing the smarter option, extracting value from existing resources that would otherwise be wasted, while reducing the need to dig up more virgin rock. The more demand there is for products with recycled content, the more demand there is for recycling. It shows the Sustainable building material aggregate quantity of 194 BRASS, and one aggregate bag rate is 4500for that total cost of aggregate is 8,73,000.00.
4. AAC blocks designed by the UAL Industries under the brand name KONARK are considered highly Sustainable as a building material. It shows the

Sustainable building material aac brick quantity of 125 M^3, and one aac brick bag rate is 3200 PER M^3 for that total cost of aac brick is 1600204

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