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Technological and Green Solutions for Rural House Construction – a Review

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Abstract – *This article mainly aims at providing sustainable and technological alternatives for building low cost rural houses. A construction mainly progresses on the applicability of the building material, local circumstances of raw materials, the construction methods, the power of households and the local conditions of the site .In such a situation the use of sustainable methods can improve the construction and also ensure safety to the environment. Low cost housing should also ensure the good quality materials used and should be affordable. In this paper we are discussing some characteristics and materials of buildings situated in rural areas and rehabilitation proposals for rural houses using technological and sustainable alternatives, which aims at the development of rural areas for a sustainable future.*

Key Words: sustainable housing, technological solution, rural housing, green buildings

1. INTRODUCTION

Housing is undisputedly a core basic need of human beings. Majority of the Indian people live in rural areas, most of which are economically underdeveloped. Nearly 72 % of Indian population lives in rural areas. After understanding the necessity of providing housing facilities to rural people the central government came up with a new policy Pradhan Mantri Awas Yojana, and this Mission will be implemented during 2015-2022 and will provide central assistance to Urban Local Bodies and other implementing agencies through States/UTs. High-quality building materials must always be used in housing, also in low-cost housing. A number of environment-friendly, energy-efficient, cost-effective building materials and components have been developed in India. This paper collectively gives few sustainable and technological alternatives to improve the rural housing in India**.**

2. WHY TECHNOLOGICAL SOLUTION FOR RURAL HOUSEHOLDS?

Considering a country like India rural areas are to be given a good attention. The most of the rural parts of india are lacking basic needs such as a house for all. In order to develop the rural areas we should initiate new ideas and technologies towards the rural areas. The green technologies and sustainable methods of construction are to efficiently utilize for the complete rural development. The most needy demand of rural people is to own a house for all. So in such a situation by in cooperating new technologies and green materials rather than conventional methods the reconstruction of rural houses can be made fast and cost effective.

3. CASE STUDY: SURVEY CONDUCTED IN AVOLY GRAMA PANCHAYTH

Fig -1: Twin Houses of Avoly Grama Panchayath

A survey was carried out in Avoly Grama Panchayath to study the present situation of the rural housing. This gave us the idea of existing rural houses in that region. The houses were mainly in the form of twin houses as shown the figure 1, consisting of a bed room, toilet, common room and one toilet. The household demanded for a reconstruction of houses with two bedroom, toilet, common living and dining room with minimum facilities. The situation of all the existing houses was poor and they were at the stage of dismantling and reconstruction. A very few houses were renovated and were partially completed .14 houses were to be reconstructed under the Pradhan Mantri Awas Yogana program of Avoly Grama Panchayath.

4. PLAN AND ESTIMATION FOR THE RECONSTRUCTION OF RURAL HOUSES

The suggested plan for the reconstruction included a bedroom, toilet, kitchen and a common dining and living room along with a small sitout.The estimate of the above plan was found to be Rs.2, 30,180.

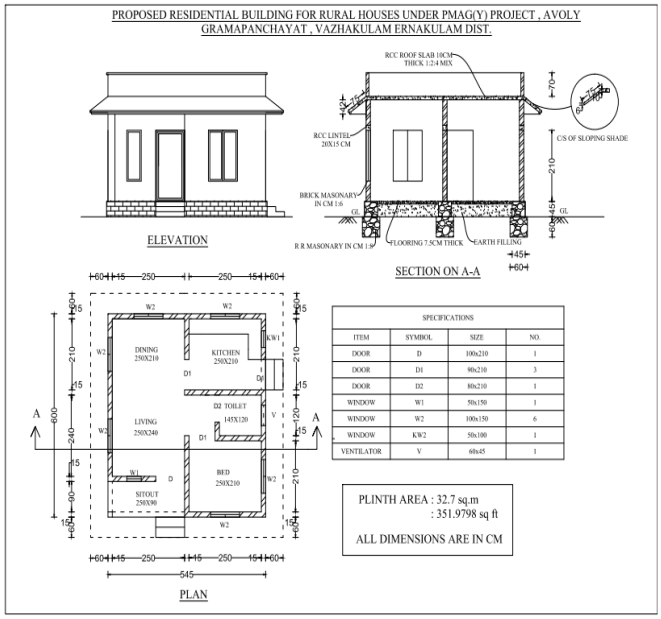

Fig -2: Plan Prepared

5. TECHNOLOGICAL AND GREEN SOLUTIONS

Green building involves establishing construction to 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 as well as to maximize the use of recycled content materials, modern resource efficient engineered materials, and resource efficient composite type structural systems wherever possible. Also many technological and innovative ideas can be installed so as to reduce the cost of building construction. Some of those technologies include interlocking bricks, gypsum wall etc:-

5.1 Interlocking Bricks

Interlocking bricks are very widely in the field of building construction because it reduces the cement consumption and also it makes the construction much faster than the conventional method of construction. There are mainly two types of interlocking bricks they are soil interlocking bricks and concrete interlocking bricks. The soil interlocking bricks are much costly as compared with the concrete blocks but they provide a cooling atmosphere in turn reduces the electricity consumption. Concrete interlocking bricks are durable, reliable, and cost effective and are available in customized shape and size. The method used in interlocking bricks is known as dry stack where there is minimum use of cement and sand.

Fig -2: Concrete Interlocking Bricks

5.2 Gypsum Walls

The threat of global warming necessitates serious exploration of energy efficient building materials. The utilization of an industrial waste – Phospho-gypsum,with a new concept of green building methodology which is rapid and affordable of mass housing .It also outline the chemistry of binding in Phosphor Gypsum and strength of the load bearing wall panel from the practical exposure and various models developed from experiments .GFRG wall panel has many advantages like light weight ,crack free ,fire resistant ,time saving and flexible in all aspects of home plan designs .GFRG building technology is completely green , save natural resources and reduces carbon footprint. This technology cleans up the environment by utilizing the byproduct Phospho –gypsum.

5.3 Simple steps to reduce cost of construction

- Reduce plinth area by using thinner wall concept for example use 15 cm thick solid concrete block wall.
- Use locally available material in an innovative form like soil cement blocks in place of burnt brick.
- Use energy efficiency materials which consume less energy like concrete block in place of burnt brick.
- Use environmentally friendly materials which are substitute for conventional building components like use R.C.C. Door and window frames in place of wooden frames.
- Preplan every component of a house and rationalize the design procedure for reducing the size of the component in the building.
- By planning each and every component of a house the wastage of materials due to demolition of the unplanned component of the house can be avoided.

- Each component of the house shall be checked whether if it's necessary, if it is not necessary, then that component should not be used.

6. REVIEW

Nirmal Kumar (2012) outlines on Technological Solution for Sustainable Rural Housing by 2022. Rural housing in India is a problem of a multi dimensional complexity, both in terms of economic development and adequate provision of housing and support services, and remains as a serious concern even after 60 years of independence. Houses in a typical Indian village are self-built, self-managed with locally available materials and skilled as also unskilled labour. India is well endowed with both technology and human resources. A number of environment-friendly, energy-efficient, costeffective building materials and components have been developed in India. Several organizations, Non-Governmental Organizations (NGOs), innovators and creative practicing professionals have come up with many innovative options which can contribute to cost reduction in the construction of houses[1].

Kalpana Gopalan, Madalasa Venkataraman(2015) researched on Affordable housing Policy and practice in India. Affordable housing is a problem that many countries are taking stock of, world over. In India, the problem is much starker with an estimated shortage of around 18 million houses, with 99% of this in the economically weaker sections of society. Also discussed about the issues with the various definitions of affordable housing; the institutions and agencies responsible for formulating and implementing affordable housing policies in the state; the opportunities and challenges in affordable housing as well as a discussion on learning from international experience in this sector. Analyse the policy responses by various governments, international experience, and lacunae that still exist[2].

CONCLUSION

The rural houses can be effectively reconstructed cost effectively by utilizing several new green technologies .This will enable the rural people to fulfill their dream of owning a house for them. The far advancement and initiatives taken by the youth in the field of green technologies can effectively remove the problems faced by poor rural of a developing country like India. By utilizing innovative methods and cost effective materials, cost of the proposed building can be reduced by 50-60%. Further innovative ideas and new technologies can be incorporated for low cost housing.

REFERENCES

[1] Nirmal Kumar(2014),"Technological Solution for Sustainable Rural Housing by 2022", International Journal of Combined Research & Development (IJCRD) eISSN:2321-225X;pISSN:2321-2241 Volume: 3; Issue: 3; September -2014 www.ijcrd.com Page

[2] Kalpana Gopalan, Madalasa Venkataraman (2015), "Affordable housing: Policy and practice in India",IIMB Management Review ,Volume 27, Issue 2,June 2015, Pages 129-140

[3] Vivian W.Y.Tam(2011), "Cost Effectiveness of using Low Cost Housing Technologies in Construction", Procedia egineering Volume14, 2011, Pages 156-160

[4] P. P. Bhangale1 , Ajay K. Mahajan," Cost Reduction through Cost Effective Construction Techniques", International Journal of Science and Research (IJSR), ISSN (Online): 2319-7064.

[5] S. S. Shinde1, A. B. Karankal2." Affordable Housing Materials & Techniques for Urban Poor's", International Journal of Science and Research (IJSR), India Online ISSN: 2319-7064

[6] Vivek Kumar1, Vidit Gupta2, Shivam Sagar3, Sushant Singh4, Mohd. Haroon5," A Review Study on Alternate Low Cost Construction Materials & Techniques for Building Design", International Research Journal of Engineering and Technology (IRJET), Volume: 04 Issue: 04 | Apr -2017.

[7] Bredenoord J*,"Sustainable Housing and Building Materials for Low-income Households",Journal of architectural Engineering Technology ,