Study of Low Cost Housing: A Review

Akhildeep Kurup  
MGM’S College of Engineering and Technology, Kamothe

Devendra Gawade  
MGM’S College of Engineering and Technology, Kamothe

Tejas Kolambkar  
MGM’S College of Engineering and Technology, Kamothe

Dhananjay Waghachaure  
MGM’S College of Engineering and Technology, Kamothe

Abstract

Housing is the major sector of urban infrastructure. Government of India has launched the scheme “Housing for All by 2022” for urban areas. To achieve this goal Government is providing subsidy to the urban poor upto Rs. 1 lakh per house which causes huge burden over the country’s economy. Despite urban houses are not affordable to the poor due to escalating land & construction cost. This scenario can be improved if the land or construction cost can be reduced to some extent without compromising with the quality of structure. Low cost housing offers the use of various low cost material & technique which reduces the overall cost of construction. In this paper an attempt is made to review the various researches on low cost housing material & techniques which can be used for both rural and urban areas according to their suitability in different conditions.

Keywords: Low Cost Housing, Affordable Housing, Low Cost Building Material, Urban Housing For the Poor

I. INTRODUCTION

House or shelter is one of the basic necessities for a human being. Evolution of houses from huts and mud brick houses to G+1, cement plastered, multi-storey housing colonies has witnessed a great change in lifestyle and housing needs of individual. The housing scenario in India has changed a lot during past few decades since independence. Nearly 31% of India's current population lives in urban areas and with increasing urbanization, urban areas expected to house 40% of India's population by 2030.(CE & CR, MAY 2017). Housing availability and various difficulties arising due to it is more critical in urban areas as compared to rural areas. This can be understood from the data given by NSSO (National sample survey organization from the 69 round conducted on July 12 to December 12 which revealed that 61.1% of the urban population resided in their own houses and the other 35.4% in rented homes whereas in rural areas 93.3% of the population had own houses and near 5.1% where residing on a rental basis.

At a rough estimate India's overall housing shortage as of today stands at about 22 million homes and in this the shortage of affordable housing has a sizable share. Provision of low cost houses can be the solution for this problem. Low cost housing can be defined as a concept which deals with effective budgeting and following of techniques which help in reducing the cost of construction through the use of locally available materials along with improved skills and technology without sacrificing the strength performance and life of the structure. It is deemed affordable to those with low income as rated by governing authorities.

II. LITERATURE REVIEW

The study of literature includes deep investigation of the research done in past decades aiming to provide low cost housing and studies the results of the study done by various authors and ultimately provides the future scope of their study.

A.K Kasthurba et. al (2014) discusses the use of Laterite as a sustainable building material and highlights its benefits as of a locally available and cheap material as compared to the conventional modern materials. The attempt is to develop standards for use of Laterite in building applications. The use of Laterite is marginalized because of the lack of standardization and the difficulty in conducting various testing procedures. Standard size laterites of 390x190x190 mm were taken for experimenting and testing procedures for determining its various engineering properties which implied the need for development of a suitable classification since the test sample had shown large variation in strength but, for residential uses it is sufficient and the minimum strength requirement should be reconsidered.

B.V.V. Reddy (2011) had studied the suitability of manufactured sand as fine aggregate material. In this study the characteristics of concrete and mortar using M-sand as fine aggregate were determined and compared with that of concrete with river sand. The mortar made with M-sand showed better engineering properties (compressive strength, better workability, bulk density etc.) as compared to that with river sand. The concrete sample was of M20 & M30 grade which gave very satisfactory results when M-sand was used in place of river sand. Hence the test program gave a positive aspect on the suitability of M-sand as an alternative to river sand and also helps in the cost reduction for constructional activities.

M.M. Eldhose et. al (October 2014) investigated the physical properties of GFRG Panel and the suitability of various suitable filler materials with the help of various experiments. The Physical properties of GFRG panels such as water absorption, compressive strength and flexural strength were investigated and results were obtained. The compressive strength was also tested by using 3 types of filler materials (Nominal mix-M25, Flyash concrete and Recycled aggregate concrete) which provided with 3 different values. The results from various tests implied that filler materials increases the compressive strength of GFRG panels and...
Recycled aggregate concrete as a filler material gave satisfactory results. Hence, it can be concluded that GFRG panels with suitable filler material can be used efficiently as a low cost construction technique.

BMTPC (Building materials and technology promotion council) while working under Ministry of Urban development and poverty alleviation had managed to find innovative building materials which can be used as a substitute of wood and several other traditional materials for housing and building construction sector. The use of bamboo through industrial processing has proven that it can withstand up to 3656 kg/cm² of pressure. The BMCS sheets have shown good resistance to water, fire, decay, termites, insects etc. In India, Bamboo mat boards (BMB), Bamboo mat veneer composites (BMVC) and Bamboo mat corrugated sheets BMCS developed at IPIRTI has gained user acceptance as alternate to wood plywood and corrugated ACC and GI sheets.

R.K. Wattie et. al (May 2014) had obtained result of the various properties of interlocking blocks through an experimental effort. The effect of GFRP with maximum percentage of fly ash in interlocking bricks is studied. Materials used for the casting of brick were cement, fly ash, stone-dust, GFRP, fine aggregate and water which were mixed in varying proportions and blocks of size 230 x 100 x 75mm are obtained and were tested for different values of compressive strength and it was noted that the compressive strength of any individual block shouldn’t fall under the minimum average compressive strength by more than 20%. The study showed that the water absorption of the bricks is directly proportional to the fly ash content used and the strength of interlocking bricks increases with increasing fly ash time to time. Interlocking bricks have sufficient strength and are extremely suitable for low cost housing and non-load bearing structures.

Alone and Sawant (2014) used scorecard approach to assess the factors causing concrete waste in building construction and found that in India concrete waste makes around 4.7% part of total material (year-2012). Based on site observations, interviews & questionnaire survey a complete set of 50 factors, grouped in 5 categories was done. The value of waste index was calculated for each category and they found that project management, planning and methodology was the highest rated factor with waste index 227 followed by materials, machinery and equipment. This concluded that project management, planning and methodology is the factor causing highest influence to the generation of concrete waste and hence increasing construction costs.

Ar. J. Jebaraj Samuel (2015) studied various cost effective methods at different parts of a building. He achieved cost reduction by replacing conventional materials with alternative materials, proper designing approach, planning, and management of construction and with good construction skills. For foundation, he suggested the use of arch foundation which saves foundation expenses up to 40%. Replacement of plinth slab by brick on edge can save 35-50% plinth cost. The use of rat-trap bond wall achieves the same strength as conventional 250mm wall but requires 20% less bricks. Replacement of wooden frames by concrete or steel frames can be done for achieving cost reduction up to 40%. Conventional RCC lintels cost 30-40% higher than brick arch lintels which can be used for smaller spans and for roofing, he suggested the use of filler slabs which is about 23% less costlier than conventional slab.

Rinku Taur and Vidya Devi T. (2009) studied different aspects of low cost housing including prefabricated elements, use of locally available materials and use of new techniques for improving durability of conventional low cost materials which makes them useful to be used for today’s housing requirements. Their research included use, advantages and limitations of prefabricated materials for various works. Implementation of any alternative technology for mass housing on large scale may subject to economy and effectiveness of the material and ultimately its acceptance by market. So, the methodology for low cost housing can be suggested as of intermediate type instead of adopting an alternative technology for entire construction.

A.D. Chougule et. al (Nov. 2014) discusses the use of filler slab as an alternative construction technique to the modern conventional methods. The materials to be used as filler materials should be light weight, inert and inexpensive with a particular size which so as to be can be accommodated within the spacing reinforcement. According to a study conducted by Central building research institute a filler slab with non-autoclaved cellular concrete blocks can be used for sustainable construction. A comparison was made between the filler slab and conventional RC slab which proves that the strength of conventional slab and filler slab is almost equal and hence do not have any strength deformities and can be adopted in place of conventional slab. The filler slab technique is a cost effective method and saves up to 30% of concrete hence justifying its role as a efficient low cost construction technique.

III. CONCLUSION

Many researchers have suggested to replace the major part of conventional material with new low cost housing material. Each material has its own advantages & disadvantages. Use of Laterite stone for wall masonry is suggested to be done wherever it is available locally at cheap price as compared to BBM if used for same work. There are many ways apart from using low cost housing materials like reduction of material waste, proper planning using methodology which is less sophisticated & involving less capital investment. Adoption of any alternative methods & materials needs a guaranteed market and this depends on effectiveness of the some. It also depends on the trust of consumers on the new materials. So, in this paper materials which can gain trust are chosen.

REFERENCES


[9] Dr. R. Kuberan, Urban development to give decent quality of life to residents, CE & CR, Volume 30, No. 5, May 2017, pp. 10