

Sustainable Low Cost Housing for Alternate Construction Materials and Techniques. : A Review

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Abstract - This paper addresses the approach to minimize the cost of house and it give affordability to the people now days .the basic principle behind this is to reduce cost of project by reducing duration of project and using different techniques which helps to reduce cost of project without losing quality.

The various aspects of prefabricated building methodologies and adoption of alternate building materials for low cost housing. In a building the foundation, walls, doors and windows, floors and roofs are the most important components, which can be analyzed individually based on the needs thus, improving the speed of construction and reducing the construction cost. The major methods of construction systems considered here are namely, prefabricated roofing components like precast RC planks, precast hollow concrete panels, precast concrete/Ferro cement panels and usage of new alternative building materials like Fly –Ash sand lime bricks, Solid concrete and stone blocks, Cellular Concrete, Laterite Blocks, Dry-Hydrated Lime, Rice-husk Ash Pozzolana and Hollow Concrete Blocks.

Keywords - Alternate Building Materials for low Cost Housing, Alternative; building materials; wall and roof, low cost housing technology.

I. INTRODUCTION AND LITERATURE REVIEW

- Being one of the largest countries in the world and possessing one of the largest populations in the world India still has lots of areas where it is lagging behind in comparison with the topmost economies in the world. As we know india has population about 1.4 billion and increasing at an unbelievable rates. Since the availability of the land is limited and demands for their accommodation and various other needs is

increasing. India is developing country having about 30% of people of high income group and other are middle class and low income group, low cost houses constructed without sacrificing performance and life of structure.

- Housing has a central importance to quality of life with considerable economic, social, cultural and personal significance. The focus of this research is housing for low income households or what is commonly known as affordable housing. Affordable housing is a term used to describe dwelling units whose total housing costs are deemed "affordable" to those that have a median income. A median income refers to the average pay scale level of the majority people in a population which is often low. Low income housing is aimed at individuals without enough income to provide adequate housing for themselves and/or their families. These families are usually unable to purchase a home because they fail to qualify for a mortgage. Most families choose to rent based on their income and family situation; unfortunately, there may not be enough rental housing or enough good-quality rental housing for low-income families.

Vidya Devi, Rinku Taur (Oct 2009)

This paper aims to point out the various aspects of prefabricated building methodologies for low cost housing by highlighting the different prefabrication techniques to reduce the cost of construction. Since there is repeated production of similar types of components in precast construction, therefore, it results in faster execution, more productivity and economy. In prefabricated construction, the work at site is reduced to minimum, thereby, enhancing the quality of work, reliability and cleanliness.

Rinku TAUR and VIDYA DEVI,"LOW COST HOUSING",ACSGE-Oct 25-27 ,2009,

2. Jones Lang LaSalle (2011)

The paper gives the idea about Urbanization and Housing shortage in India as per EWS, LIG, MIG and HIG as per the technical group report on Estimation of Urban Housing. In this paper under the Policy Framework and Regulations for Low Cost Housing the Central level Schemes as well as State sponsored initiatives are discussed. Central level schemes such as Jawaharlal Nehru National Urban Renewal Mission (JNNURM) and Maharashtra Housing and Area Development Authority (MHADA).

3. Javeed Munshi (2009)

present Conventional low-cost housing with adobe and river boulder rock is very vulnerable to severe damage in regions of moderate to high seismicity in areas such as Kashmir. The lack of resources, public awareness, technical know-how and enforcement of building codes plague the construction industry. This situation makes it nearly impossible to build quality low-cost housing that is resistant to earthquakes. Given this situation, it makes sense to develop pre-engineered standard modules of low-cost housing like the one presented in this paper. These modules can be designed appropriately for earthquake forces with specifications using local materials and methods of construction. The professional architects and engineers will have to contribute by creating the necessary awareness for using such modules. The government and the local municipalities will have to do their part to ensure that all specifications are strictly followed to ensure uniform quality of construction.

Javeed Munshi, "A Low-Cost Housing Option in Seismic Regions" ASCE, 2009.

4. Swaptik Chowdhury, Sangeeta Roy (Jan 21, 2013)

The paper presents work on low-cost having advantages on areas such as India where concrete or steel is expensive. This paper aims to point out the various aspects of prefabricated building methodologies for low cost housing by highlighting the different prefabrication techniques, and the economical advantages achieved by its adoption. Which can be analyzed individually based on the needs thus, improving the speed of construction and reducing the construction cost. The major current-methods of construction systems considered here are namely, structural, precast.

Swaptik Chowdhury, Sangeeta Roy, "Prospects of Low Cost Housing in India" scientific research. (2013)

5. R. MATHIYALAKAN, R. RAMKUMAR (MARCH, 2016)

The dream of owning a house particularly for low-income and middle-income families is becoming a difficult reality. It is necessary to adopt cost effective, innovative and environment-friendly housing technologies for the construction. Mass housing targets can be achieved by replacing the conventional

methods of planning and executing building operation based on special and individual needs and accepting common denominator based on surveys, population needs and rational use of materials and resources. Adoption of any alternative technology on large scale needs a guaranteed market to function and this cannot be established unless the product is effective and economical. The essence lies in the systematic approach in building methodology and not necessarily particular construction type or design.

R. MATHIYALAKAN and R. RAMKUMAR, "APPROACH TO LOW COST HOUSING" International Journal of Advanced Research Trends in Engineering and Technology (IJARTET) Vol. 3, Special Issue 2, March 2016.

6. Piyush Sahu, K. lokeshwar, Amber Sahu, Shubha Vaghmarey (May, 2014)

Mass housing targets can be achieved by replacing the conventional methods of planning and executing building operation based on special and individual needs and accepting common denominator based on surveys, population needs and rational use of materials and resources. The essence lies in the systematic approach in building methodology and not necessarily particular construction type or design. The methodology for low cost housing has to be of intermediate type less sophisticated involving less capital investment. Piyush Sahu, K. lokeshwar, Amber Sahu, Shubha Vaghmarey, "Low Cost Housing through Prefabrication" International Journal of Computer Science and Network, (May, 2014)

7. Yao Yan Professor President of CBMA Director of ICM Beijing, China (April, 2005)

The technologies from China presented here are selected by International Center for Materials Technology Promotion (ICM)/China Building Materials Academy (CBMA). These technologies are specially chosen for low-cost housing in the developing countries. Low-cost housing technology is now keenly needed in most of these countries, especially in African, Latin American, Asian regions and post-disaster areas. I am sure that technologies from China, the largest developing countries, are the most suitable for these countries.

ICM is one of the International Technology Centers established by UNIDO with the support of Chinese government, with its premises in CBMA. During the past half century, CBMA has made great contributions to the scientific and technological advancement of Chinese building materials industry. CBMA has also actively involved in most of the key engineering projects in China like the Green Olympic 2008 construction projects, Three Gorges Dam project, etc. I hope this technical catalogue can be of great help for post-disaster rehabilitation and house building in the developing countries. Yao Yan Professor President of CBMA Director of ICM Beijing, China, "Environment Friendly Building Material Technologies for Low Cost Housing" International Centre for Materials Technology Promotion United Nations Industrial Development Organization Beijing, P.R. China (April, 2005)

II. Scope of Paper

- 1) Today, Present study deals with various techniques which help to reduce the cost of project. Analyzing the factors which increases the cost .This study is totally based on precast, aluform and conventional technique. The motive of this study is to control the cost by maintaining quality which is the biggest threat now days. The main motive behind that is to increase availability of house at reasonable rates and use of new, modern techniques which reduce the cost of project.
- 2) Overall this study will be very useful for the previous, ongoing, and upcoming future construction projects of high scale area to minimize the cost, time and waste and also the enhancement of structure

III. Aim and Objectives

- 1) House is one of the biggest need and low cost housing gives the houses to people at reasonable rate. Therefore, the main aim of this study is:
- 2) To study different types of Construction materials and technique used to reduce the cost of construction.
- 3) To Compare cast and time reduction by adopting different materials and techniques for large scale project.
- 4) Alternate and Low Cost Construction Materials and Techniques used for Sustainable development.

IV. SUMMARY AND CONCLUSION

- Analysis is done on three site data :

 - 1) Site 1- MHADA PROJECT, Morwadi , Pimpri-Pune .(Pre-cast)
 - 2) Site 2- JNNURM Project, Vetalnagar. (Aluform)
 - 3) Site3- Row House Project, Sathewasti, Vishrantwadi (Conventional)

This data will help to determine the research basis and direction. Reviews of other works from literature survey will become the backbone of this research. Comparison of low cost building with conventional building.

(Table 1)Time Reduction:

Sr. No	Conventional Method	Pre-Cast Method	Aluform Method
	–	33.33%	58.33%

(Table 2)Cost Reduction

Sr.No.	Conventional	Pre-cast	Aluform
1	–	25.37%	32.28%

(Table 3) Cost Savings per Quarter (2016-17 Price)

V.Results and Discussion

- From above study we conclude that:

Sr No.	Item	With Conventional material (Rs)	With NBO Recommendations (Rs)	Savings (Rs)	Excess (Rs)	Percentage %	Remark
1							

1. Their is Cost reduction in construction due to adaptation of different (Pre-cast Rc Plank and joist system,) technique.
2. Pre-cast RC Plank and joist system is Best construction Technique in which Construction Cost reduction is 32.28% and Time reduction is 58.33% more and waste production also very less.
3. Pre-cast gives strength to the structure and cost is less than conventional but more than Pre-cast Rc Plank and joist system technique ,Time required also less than conventional technique but more than Pre-cast Rc Plank and joist system technique.
4. For Cost effective houses present study clearly states that technique is suitable technique for low cost housing mega projects.

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