

# Systematic Approach in Low Cost Housing

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**Abstract – Low cost housing refers to those housing units which are affordable by that section of society whose income is below than median household income. Quantifying and maximizing occupants' comfort in low cost housing units is dependent on design and construction decisions that affect the occupants' thermal comfort, indoor air quality, and day lighting quality. This depends on three key parameters— income level, size of dwelling unit and affordability. This paper aims to point out the various aspects of predestined building methodologies by highlighting the different available techniques, and the economic advantages achieved by its adoption. In a building the walls, floors and roofs are the most important sections, which can be analyzed distinctively based on the needs, thus, improving the speed of construction and reducing the construction cost. This paper also aims to give the characteristic of low cost housing and also cover local materials in the different components of building to make them as low cost available solutions for low income groups.**

**Keywords: Low cost construction materials, Low cost techniques.**

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## 1. INTRODUCTION

Developing countries such as India, only 20% of the population are high-income earners, who are able to afford normal housing units. Cost effective housing is a relative concept and has more to do with budgeting and seeks to reduce construction cost through better management, appropriate use of local materials, skills and technology but without sacrificing the performance and structure life. It should be noted has not low cost housings are not houses which constructed by cheap building materials of substandard quality. In this context, the Pradhan Mantri Awas Yojana (Prime Minister Housing for All Mission, 2015), envisages to provide housing to all by 15th August 2022. This would result in an enormous demand of building materials like steel, cement and wood etc. Low cost House is a new concept which deals with effective budgeting and use of techniques which help in reducing the cost of construction by the use of locally available materials along with improved skills and technology without compromising the strength, performance and life of the structure, Seeing the past constructions one can see the use of natural materials like straw, bamboo, fibers (jute, coir), earth etc. as an old practice in India. These materials apart from being locally available have easy workability and speedy construction hence reducing costs. After analyzing various industrial wastes it had been observed that fly ash and rice husk do possess pozzolonic properties which can act as an excellent

substitute material. Low cost housing technologies aim to cut down construction cost by using alternatives to the conventional methods and inputs. It is about the usage of local and indigenous building materials, local skills, energy saver and environment-friendly options.

## 2. LITERATURE REVIEW

1. **Manjesh Srivastava, Vikas Kumar (2017)** “The methods of using low cost housing techniques in India” - studied that the various materials and methods of construction that reduce the construction cost.
2. **Vivian W. Y. Tam<sup>1\*</sup> (2011)** “Cost effectiveness of using Low Cost Housing Technologies in construction” - This paper examined the cost effectiveness of low cost housing technologies in comparison with traditional methods. Two case studies are conducted and this proves the benefits and the trends for implementing low cost technologies in industry.

### 3. NEED OF STUDY

- India, only 20% of the population are high-income earners, who are able to afford normal housing units.
- To identify the perception of low-income groups regarding the management of low-cost housing.
- Its main purpose is reducing the cost of construction without affecting the safety and strength of construction.
- By use of locally available materials and by practicing low cost technologies, there is help to reduce cost of construction.
- It helps to create INDIA slum free and everyone get the shelters in their budget.

### 4. LIST OF CONSTRUCTION MATERIALS FOR LOW COST HOUSING

- Hollow blocks
- Load bearing walls
- Precast beams
- Precast slabs
- Precast stairs
- HOLLOW BLOCKS:

Hollow blocks are alternative of normal burnt bricks. These types of blocks can be manufactured in situ or can be precast in manufacturing factories.

Standard hollow block = more than 12 bricks with mortar. The Cost of 1 hollow brick Rs 17vs cost of 1 brick Rs 3.

- **LOAD BEARING WALLS:** Load bearing walls construction beneficial for low rise building construction. It consumes less concrete than RCC construction. As wall is thick, it provides thermal insulation. Easier and requires less time to construction Flexibility & strength is low though and it is advantage for frame structure.
  - **PRECAST BEAMS AND SLABS:**
1. Cast in situ is expensive as more iron rods and skilled manpower is required. Partial pre cast system uses combination of both pre cast and cast in situ. Use of pre cast element reduces cost, Small production factory is enough.

2. No heavy lifting equipment is required, No need of cement plaster.
3. Partial pre cast system is up to 40% cheaper than conventional cast in situ RCC floor by using precast building materials there will be saving of: Cement consumption- 45% Mild steel rod consumption-18% Formwork required -75%
- **PRECAST STAIRS:** Construction of stairs in Cast in situ is costly so, precast stairs are used,
  1. Riser used will be of 8 inch and tread will be of 9 inch.
  2. Cheaper and quicker to construct
  3. No form work required
  4. Can be cantilever or simply supported 5. Cantilever suitable for low cost construction but simply supported more durable

### 5. CHARACTERISTICS OF LOW COST HOUSING

#### Materials Energy Efficient

- Simple machines – saves energy in production
- Raw Materials – derived from agro industrial wastes and natural fibers, requires less energy in production
- Products -when used in house, buildings provide better thermal comfort that results in conservation of operational energy

#### Environment Friendly

- Converts agro-industrial waste into alternative material for low cost housing, thus improving waste management & environmental protection
- Utilizes local resource Substitutes wood - preserving forest cover
- Substitutes top soil – preserving soil for agriculture

#### Employment Generating

- Simple machines -with manual handling, increases employment for unskilled and semi-skilled workers

- Small enterprises –can be set up at decentralized locations
- Production of components – involves local people after short training

#### **Other Characteristics**

- Easy to manufacture
- Easy affordability
- Easy Erection/commissioning
- Faster & cheaper construction
- Effective Waste utilization
- Energy efficient and Environment friendly

### **6. LOW COST CONSTRUCTION TECHNOLOGIES**

It is found that the low cost housing techniques are cost effective and alternative construction technologies. It should be noted that cost effective construction technologies do not compromise with safety and security of the buildings and mostly follow the prevailing building codes. The detail procedures of each step used are as follow;

- **Foundation:** Arch foundation is used in which walls are supported on the brick or stone masonry. For that use materials like concrete blocks and stones.
- **Walling:** Rat trap bond technology is used in construction of walls. This technology is help to reduce the number of joints can reduce mortar consumption. No plastering of the outside face is required and the wall usually is quite aesthetically pleasing and air gaps created within the wall help making the house thermal comfortable.
- **Roofing:** A filler slab roofing system is used which based on the principle that for roofs which are simply supported, the upper part of the slab is subjected to compressive forces and the lower part of the slab experience tensile forces. Therefore in low tensile region of the slab does not need any concrete except for holding steel reinforcements together.
- **Flooring:** Flooring is generally made of terracotta tiles or colour oxides. Bedding is made out of broken brick bats.

- Plastering: Plastering can be avoided on the walls, frequent expenditure on finishes and its maintenance is avoided. Properly protected brick wall will never lose its colour or finish.

- **Doors and windows:** Doors and windows frames increase the cost of construction so use frameless door and windows. The simplest and cost effective door can be made of vertical planks held together with horizontal or diagonal battens. A simplest frameless window consists of a vertical plank of about 9” wide set into two holes, one at the top and one at the bottom. This forms a simple pivotal window. Wide span windows can be partially framed and fixed to walls or can have rows of pivotal planks

### **7. ADVANTAGE**

- Low cost housing is technique which helps to reduce construction cost and transportation cost.
- Low cost housing is useful to reduce the wastage of materials and in which proper use of locally available materials.
- Low cost housing creates the job by utilization of indigenous unskilled labour.
- Low cost housing technique is not depending on traditional skills.
- There is possible of create housing units in limited budget with less fund.

### **8. CONCLUSION**

The above list of suggestion for reducing construction cost is general nature and it varies depending upon the nature of building to be constructed, budget of the owner, geographical location where is to be constructed, availability of building material, good construction management practices etc. However, it is necessary that good planning and design methods shall be adopted by utilizing the services of an experienced engineer or an architect for supervising the work, thereby overall cost effectiveness to the extent of 25% in actual practice. The cooperative needs to set up which are dedicated to low cost housing so that cost of transportation and import of materials can be avoided which in turn will automatically reduce the overall cost of construction budget by 20-30%.

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