



## LOW COST HOUSING

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### Abstract

*The planning of low cost housing is continuously becoming difficult for the individuals as well as well as for government. Nowadays, houses are not affordable for the poor people due to the high construction cost and non-affordable land. This picture can be improved by reducing the cost of land or cost of construction, without making any adjustment in the quality of structures. The research paper aims to study the housing problems in India and identifying the solution to overcome this problems. This is a big misunderstanding that low cost housing is suitable for only poor quality works, and they are constructed by using low quality of building materials. But the true fact is that, the low cost housing is done by right organisation of resources. The economy is also gained by delaying the finishing works or making them in phases. The main objective of this paper is to highlight the various aspects of prefabricated building methodologies and adoption of alternate building materials for low cost housing. Low cost housing is a concept which deals with effective budgeting which help in reducing cost of construction having advantages on areas like India where concrete or steel housing is pricey. Low cost housing materials are of two types, that is natural and artificial. Natural material are bamboo and earth, and artificial materials are waste product of industries like bagasse ash, fly ash, rice husk, etc. are used. The use of locally available material along with improving technology without sacrificing strength, performance and life of the structures.*

**Keywords:** Low-Cost Housing; Building Materials; Strength; Effective Budgeting; Performance.

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## 1. INTRODUCTION

In developing countries like India, housing is a very difficult problem. The gradual change from huts and mud brick houses to cement plastered and multi-storied building houses has proved a great change in lifestyle and need of houses for individuals. In India, this picture is changed from past few decades. As compared to rural areas, housing availability and problems of housing is more difficult in urban areas. As we know, India has the population of about 1.4 billion and it is also goes on rising unbelievably. So there is more shortage of land, and the demand for the housing and the other needs is increasing day by day. Low cost housing can be defined as, a concept of using effective organization of resources and the techniques that reduces the cost of construction by using the locally available materials without making adjustments in strength performance and life of a structure. The natural materials like bamboo, straw, jute, fibres, earth, etc. apart from the locally available materials have easy workability and fast construction speed with the reduced cost. The main aim of this research is for the people having low income or it is also known as affordable housing. Through this study, we can find

out the suitable solutions for the growing problem of low cost housing in India.

## 2. LOW COST HOUSING MATERIALS

On the basis of source of the building materials, Low Cost Housing materials can be classified into two types that is, natural materials and manmade materials.

### 2.1. Natural Materials

#### 2.1.1. Bamboo

As India is the second largest country in bamboo production. About 50% of world bamboo produced in India. Total of the 136 species of bamboo occurring in India, 58 species spread out over 10 genera are endemic to the north eastern part of India alone (Sharma, 1987) [2]. From 9.57 million hectares constitutes about 12.8% of the total area under forests (Bahadur and Verma, 1980) [3]. Therefore as production occurs in large quantities it is easily and cheaply available. Bamboo in construction is used in various purposes like

formwork, roofing, wall and also houses which are fully made up of bamboo. Bamboo has high tensile strength than steel and has fire resistance about 4000 deg C. It has high elasticity hence used in earthquake prone areas. As it is available in abundant quantity and it is a natural material this can be used in low cost building.

**Corrugated Bamboo Roofing Sheet:** Bamboo as a building material has high strength and low weight. A successful roofing material with a development of traditional material comes from Bamboo Board. Bamboo is eco friendly and light in weight also strong and durable and has minimal fire hazard when compared to other roofing materials. For roofing, walling, door and window shutters and other components in building construction these sheets can be used. As it does not support combustion therefore it is fire resistant and it is thermally insulated, has sound and moisture insulation and is not toxic.



### 2.1.2. Earth

Earth is very old building material. But due to its limitations it becomes difficult to use. It has limitations like water seepage, erosion of water. It is also attacked by termites and pests, and requires high maintenance. These problems can be solved by using compressed earth block and non-erodible mud plaster.

#### 1) Compressed earth block-

Compressed earth blocks are uniform building blocks, developed form of the moulded earth block. Compressed earth block is used for load-bearing walls, non-load bearing walls, and heat-accumulating walls. Compressed earth blocks are not-fired to preserve its moisture regulating property and heat-accumulating property.

#### 2) Non-erodible mud plaster-

The mud walls are eroded due to the rain. To save the mud walls from this erosion, mud plaster is replaced by non-erodible mud plaster. It is prepared by mixing bitumen cutback with the mud paste. It is applied over the walls in thin layer to fill up the small holes and undulations on the walls.

## 2.2. Man Made Materials

### 2.2.1. Rice Husk

India is one of the world's largest rice producer. In overall India, Punjab has the largest productivity of rice. Rice husk is the by-product of rice paddy milling industries. It has disposal problems leading to environmental pollution. So this by-product is used to make a new product. Among all the industries, cement and concrete manufacturing industries can use the rice husk in a proper way. The husk contains about 75% of organic volatile matter and the remaining 25% of its weight is converted into ash during the firing process, this is known as rice husk ash (RHA). It has dumping problem, as it affects land and surrounding area, where it is dumped. For using it as building material some products are developed:

#### 1) Low cost sandcrete block

From burning firewood, by using charcoal, rice husk ash (RHA) is prepared. For confirming the block making suitability of the rice husk, primary analysis on the constituents of rice husk ash were conducted, by making hollow sandcrete blocks. The compressive strength of the blocks increases as curing is done, and decreases as RHA content increases.

#### 2) In Concrete

Rice husk ash gives good reactivity when partially replaced with cement. As rice husk ash is more reactive in cement paste, its use in concrete manufacturing is very important. Rice husk ash consists of cellulose, lignin, hemicellulose, holocellulose, etc. Rice husk ash has the property of corrosion resistance and compatibility to the concrete.

### 2.2.2. Fly Ash

Fly ash is a mineral residue obtained after burning of fine glass and coal. It constitutes of silica, alumina and iron. Fly ash is classified under two classes that are class C and class F fly ash. The primary difference between class C and class F fly ash is the chemical composition of the ash itself. Class C fly ash is highly pozzolanic that means it reacts with excessive lime generated in the hydration of Portland cement. Class C fly ash is pozzolonic and also be self cementing.

#### 2.2.2.1 Fly ash Bricks

Class C fly ash is used for making fly ash bricks. As it contains high calcium oxide it acts as a cement. It is energy efficient. Its advantages are low water penetration, light in weight and thermal insulation. Fly ash is also used as partial replacement of cement. As it is waste product and can be used in construction, it reduces cost of construction.

## 3. Selection criteria of low cost building material

### 1. Manufacturing of low cost building materials

It should be environmental friendly, improve technologies for production and reduction in waste generation.

### 2. Use of recycled waste as building materials

Waste produced can be used for the production of a material cheaper in cost.

**3. Use of Natural low cost building materials**

Natural materials are sustainable and environmental friendly. Materials like stone, wood, lime, bamboo, sand have low embodied energy.

**4. Use of local building materials**

It reduces transportation dependency and also suitable for local environment.

**5. Use of non-toxic building materials**

Materials to be free from any kind of toxics.

**6. Life, Durability and Maintenance**

Use of durable construction materials decreases the maintenance cost. Low maintenance cost saves a lot of building operating costs.

**7. Recyclability and Reusability**

It should be such that which can be recycled and reused for example- plastic.

**8. Biodegradability**

It should not produce toxic gases while decomposition and decomposes naturally when discarded.

**3. CONCLUSION**

For reducing the cost, it is necessary to use locally available materials for the construction. Also the engineer must have good knowledge about the properties of low cost building materials to achieve the economy. Many researchers have advised to replace the conventional materials with low cost building materials. In addition to low cost materials, there are many ways like proper management of resources and less advanced methodology that requires less capital investment. It also depends on the trust of the consumer on the low cost housing materials, and for this, in this paper, the trust gaining materials are chosen.

**ACKNOWLEDGEMENT**

I express my profound gratitude to my guide Prof. H.H.Mehta, Department of Civil engineering, J.D.I.E.T. Yavatmal, for their valuable advice and inspiring guidance which has played a vital role in carrying out this work. I express my thanks to all my department faculties for their valuable advice.

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